

PowerBASIC Compiler for Windows Version 10

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<http://www.powerbasic.com>

Introducing PowerBASIC For Windows 10

Introducing PowerBASIC 10 for Windows

PowerBASIC for Windows is a native code compiler for Win95/98/ME, WinNT, Windows 2000, Windows XP, Windows Vista, and Windows 7. It creates applications with a Graphical User Interface (GUI), to provide the typical "Look and Feel" of Windows. It creates highly efficient executables and industry-standard DLLs for optimum flexibility. The machine code generated by PowerBASIC is among the most efficient in the industry, both in terms of size and speed. It compares most favorably with leading compilers of any dialect, Pascal, C++, Fortran, and others.

Our favorite slogan is "We put the Power in BASIC", and we sincerely believe you will find this to be true. With compilation speeds of 1 million lines per minute, unrivaled performance, and the smallest executables in the industry, PowerBASIC has become the new standard of comparison in Windows programming.

Thank you for joining us in the War on Bloatware!

Features

- Create client [COM](#) applications and [COM components](#) using [Dispatch](#), [Direct](#), [Automation](#), or [Dual interfaces](#).
- Fast and Small 32-bit EXEs and [DLLs](#) for Microsoft Windows 95/98/ME/NT/2000/XP/Vista/Windows 7.
- Multi-threaded application support: [Thread Object](#), [Thread Functions](#), [ThreadSafe Functions](#), [ThreadSafe Subroutines](#), [ThreadSafe Methods](#), [ThreadSafe Properties](#), [Thread Create](#), [Thread Suspend](#), [Thread Resume](#), [Thread Status](#), and [Thread Close](#).
- 32-bit [protected mode](#) code generation for maximum performance.
- Automatic unreferenced [code removal](#).
- Total support for both [ANSI](#) and [Unicode](#) strings with automatic conversion.
- [Dynamic Dialog Tools](#) for easy creation of Graphic User Interface applications.
- A complete [graphics package](#) for easy development of graphic presentations, splash screens and more.
- Support for [Windows only printers](#) with the [XPRINT](#) statement and functions.
- Supports existing [Line Printers](#), with PowerBASIC [LPRINT](#) statements and functions.
- A complete set of advanced string manipulation functions: [VERIFY](#), [REMOVE](#), [REPLACE](#), [EXTRACT](#), [TALLY](#), [REPEAT](#), and [many more](#).
- [REGEXPR](#) and [REGREPL](#) functions for regular expression search and replace.
- Array [Sort](#) and [Scan](#), element [Insert](#) and [Delete](#).
- [MIN](#) and [MAX](#) value Functions that work with both and data types.
- [PEEK](#), [POKE](#), [PEEK\\$](#), [POKE\\$](#) for direct memory access. and Indexed Pointers for direct memory access.
- [Matrix](#) operations: Init, Identity, Transposition, Inversion, scalar, and matrix math.
- 80-bit Extended-precision math.

- [Register Variables](#) for increased performance: up to six unique register variables: (2) or (4).
- Unsigned integral types: [BYTE](#) (8-bit), [WORD](#) (16-bit) and [DWORD](#) (32-bit).
- Signed integral types: [INTEGER](#) (16-bit), [LONG](#) (32-bit) and [QUAD](#) (64-bit).
- Two [Currency](#) variable types.
- User-Defined [TYPES](#) and [UNIONS](#).
- [FIELD](#) variables for file I/O.
- [Variant](#), [GUID](#), and [Object](#) variables.
- Optional parameters in BASIC [Subs](#), [Functions](#), [Methods](#), and [Properties](#).
- Optional parameter passing to and procedures.
- Optional requirement that variables must be declared before use.
- Built-in 32-bit [Inline Assembler](#) with 80486, Pentium, and SIMD opcodes.
- Inline Assembler includes Floating-Point and MMX instructions.
- Direct export of Subs and Functions.
- Import Subs and Functions from the entire Win32 API or any 32-bit DLL.
- Client/Server [Network Communications](#) - TCP/UDP for E-mail, FTP, etc.
- High-speed [Serial Communications](#) support.
- True 32-bit code pointers, great for callbacks.
- Easy to use syntax highlighting [Integrated Development Environment](#) (IDE) and [debugger](#).

See Also

[The Integrated Development Environment](#)

[Running PB/Win](#)

[Debugging PB/Win Programs](#)

What's New

New Statements and Functions

New Statements and Functions

- [#COM CLASS](#) metastatement allows you to add the COM attribute to a [class](#) defined elsewhere.
- [#EXPORT](#) metastatement declare a [Sub/Function](#) to have the EXPORT attribute.
- [#LINK](#) metastatement links a pre-compiled [Static Link Library](#) (SLL) into your host program.
- [#OPTIMIZE CODE ON](#) metastatement removes unreferenced code from the compiled program.
- [#OPTIMIZE CODE OFF](#) metastatement keeps unreferenced code in the compiled program.
- [#OPTION LARGEMEM32](#) metastatement allows your application to use more than the original limit of 2 Gigabytes of memory.
- [#OPTION WIN95](#) metastatement includes a complete Unicode emulation package in your EXE or [DLL](#) to allow them to run properly on Windows 95, 98, and ME.

- [#OPTION ANSI API](#) metastatement directs the internal runtime library to only use ANSI Windows API calls.
- [#PAGE](#) metastatement sets a page boundary for the PowerBASIC [IDE](#).
- [#RESOURCE BITMAP](#) metastatement embeds a bitmap as Resource data into your program or DLL.
- [#RESOURCE ICON](#) metastatement embeds an icon as Resource data into your program or DLL.
- [#RESOURCE MANIFEST](#) metastatement embeds a manifest file into your program or DLL.
- [#RESOURCE RCDATA](#) metastatement embeds raw resource data into your program or DLL.
- [#RESOURCE STRING](#) metastatement embeds a
as Resource data into your program or DLL.
- [#RESOURCE TYPELIB](#) metastatement embeds a [type library](#) as Resource data into your program or DLL.
- [#RESOURCE PBR](#) metastatement embeds a PowerBASIC compiled resource (.PBR) into your program or DLL.
- [#RESOURCE RES](#) metastatement embeds a compiled resource (.RES) file into your program or DLL.
- [#RESOURCE WAVE](#) metastatement embeds a wave file into your program.
- [#RESOURCE VERSIONINFO](#) metastatement embeds version information into your program or DLL.
- [#UNIQUE](#) metastatement specifies whether unique [variable](#) names are required.
- [ASM ALIGN](#) statement rounds up the instruction location to a power of two address.
- [ASMDATA/END ASMDATA](#) statements define a block where primitive read-only data is stored.
- [BITS\\$](#) function copies string contents without modification.
- [CHRBYTES](#) function determines the size of a single character in a string variable.
- [CHR\\$\\$](#) function converts one or more numeric Unicode character codes, code ranges, and/or strings into a single string.
- [ChrToOem\\$](#) function translates a string of ANSI/WIDE characters to OEM byte characters.
- [ChrToUtf8\\$](#) function translates a string of ANSI/WIDE characters to UTF-8 byte characters.
- [CLIP\\$](#) function deletes characters from a string.
- [COLLECTION](#) Object Group provides a convenient way to refer to a related group of items as a single object.
- [COMM_TIMEOUT](#) statement places a limit on the time to complete a
operation.
- [CONTROL ADD HEADER](#) statement adds a header control to a dialog.
- [CONTROL HIDE](#) statement makes a
invisible.
- [CONTROL NORMALIZE](#) statement makes a control visible.
- [DAYNAMES\\$](#) function converts a Day-of-Week number to the associated name.
- [DEC\\$](#) function converts an integral value to a decimal string.
- [DIALOG DEFAULT FONT](#) statement specifies the default font to be used for DDT [Dialogs](#) and Controls.
- [DIALOG HIDE](#) statement makes a Dialog invisible.
- [DIALOG NONSTABLE](#) statement makes a Dialog non-stable (closeable).
- [DIALOG NORMALIZE](#) statement makes a Dialog visible.
- [DIALOG STABILIZE](#) statement makes a Dialog stabilized (non-closeable).

- [END](#) statement terminates the program immediately.
- [ENUM/END ENUM](#) statements creates a group of logically related [numeric equates](#).
- [EXE.INST](#) read-only user defined type returns the instance handle of the program which is currently executing.
- [FASTPROC/END FASTPROC](#) statements defines a FastProc code section.
- [FOR EACH/NEXT](#) statements defines a loop of program statements which can sequentially examine and act upon each member of a [PowerCollection](#) or [LinkListCollection](#).
- [GET\\$\\$](#) statement reads WIDE string data from a file [opened](#) in [binary](#) mode.
- [GRAPHIC\(CANVAS.X\)](#) function retrieves the writable width of the attached graphic [target](#).
- [GRAPHIC\(CANVAS.Y\)](#) function retrieves the writable height of the attached graphic target.
- [GRAPHIC\(Cell.Size.X\)](#) function retrieves the character [cell](#) width including external leading.
- [GRAPHIC\(Cell.Size.Y\)](#) function retrieves the character cell height including external leading.
- [GRAPHIC\(Chr.Size.X\)](#) function retrieves the character width on the graphic target.
- [GRAPHIC\(Chr.Size.Y\)](#) function retrieves the character height on the graphic target.
- [GRAPHIC\(Client.X\)](#) function retrieves the client width of the attached graphic target.
- [GRAPHIC\(Client.Y\)](#) function retrieves the client height of the attached graphic target.
- [GRAPHIC\(Clip.X\)](#) function retrieves the width of the [clip area](#).
- [GRAPHIC\(Clip.Y\)](#) function retrieves the height of the clip area.
- [GRAPHIC\(COL\)](#) function retrieves the next column print position, based upon the row and column position of a [text cell](#).
- [GRAPHIC\(DC\)](#) function retrieves the handle of the DC (device context) for the selected graphic target.
- [GRAPHIC\(INSTAT\)](#) function determines whether a keyboard character is ready.
- [GRAPHIC\(LINES\)](#) function retrieves the number of text lines which will fit on the graphic target.
- [GRAPHIC\(LOC.X\)](#) function retrieves the horizontal location of the graphic target on the desktop.
- [GRAPHIC\(LOC.Y\)](#) function retrieves the vertical location of the graphic target on the desktop.
- [GRAPHIC\(MIX\)](#) function retrieves the color mix mode for the selected graphic target.
- [GRAPHIC\(OVERLAP\)](#) function retrieves the status of Graphic [Overlap Mode](#).
- [GRAPHIC\(PIXEL...\)](#) function retrieves the color of the pixel at the specified point.
- [GRAPHIC\(POS.X\)](#) function retrieves the horizontal POS (last point referenced) by a GRAPHIC statement.
- [GRAPHIC\(POS.Y\)](#) function retrieves the vertical POS (last point referenced) by a GRAPHIC statement.
- [GRAPHIC\(PPI.X\)](#) function retrieves the horizontal resolution of the display device, in points per inch.
- [GRAPHIC\(PPI.Y\)](#) function retrieves the vertical resolution of the display device, in points per inch.
- [GRAPHIC\(ROW\)](#) function retrieves the next row print position, based upon the row and column position of a text cell.
- [GRAPHIC\(SCROLLTEXT\)](#) function retrieves the status of Graphic [ScrollText Mode](#).
- [GRAPHIC\(SIZE.X\)](#) function retrieves the overall width of the selected graphic target.
- [GRAPHIC\(SIZE.Y\)](#) function retrieves the overall height of the selected graphic target.
- [GRAPHIC\(STRETCHMODE\)](#) function retrieves the default bitmap stretching mode for the attached DC.
- [GRAPHIC\(TEXT.SIZE.X...\)](#) function calculates the width of text to be printed.

- [GRAPHIC\(TEXT.SIZE.Y...\)](#) function calculates the height of text to be printed.
- [GRAPHIC\(View.X\)](#) function retrieves the horizontal position of the [virtual](#) graphic [viewport](#).
- [GRAPHIC\(View.Y\)](#) function retrieves the vertical position of the virtual graphic viewport.
- [GRAPHIC\(WORDWRAP\)](#) function retrieves the status of Graphic [WordWrap](#) Mode.
- [GRAPHIC\(WRAP\)](#) function retrieves the status of Graphic [Wrap Mode](#).
- [GRAPHIC\\$\(CAPTION\)](#) function retrieves the caption from a [Graphic Window](#).
- [GRAPHIC\\$\(INKEY\\$\)](#) function reads a keyboard character if one is ready.
- [GRAPHIC\\$\(WAITKEY\\$\)](#) function reads a keyboard character or extended key, waiting until one is ready.
- [GRAPHIC\\$\(WAITKEY\\$...\)](#) function reads a limited set of keyboard characters or extended keys, with an optional timeout value.
- [GRAPHIC CELL SIZE](#) statement retrieves the character cell size including external leading.
- [GRAPHIC CELL](#) statement sets or retrieves the next [print](#) position, based upon the row and column position of a text cell.
- [GRAPHIC COL](#) statement retrieves the next column print position, based upon the row and column position of a text cell.
- [GRAPHIC GET CANVAS](#) statement retrieves the buffer size of the attached graphic target.
- [GRAPHIC GET CAPTION](#) statement retrieves the caption from a Graphic Window.
- [GRAPHIC GET CLIP](#) statement retrieves the size of the clip area.
- [GRAPHIC GET OVERLAP](#) statement retrieves the status of Graphic Overlap Mode.
- [GRAPHIC GET SCROLLTEXT](#) statement retrieves the status of Graphic ScrollText Mode.
- [GRAPHIC GET SIZE](#) statement retrieves the overall size of the selected graphic target.
- [GRAPHIC GET STRETCHMODE](#) statement retrieves the default bitmap stretching mode for the attached DC.
- [GRAPHIC GET VIEW](#) statement retrieves the position of the virtual graphic viewport.
- [GRAPHIC GET WORDWRAP](#) statement retrieves the status of Graphic [WordWrap](#) Mode.
- [GRAPHIC GET WRAP](#) statement retrieves the status of Graphic Wrap Mode.
- [GRAPHIC ROW](#) statement retrieves the next row print position, based upon the row and column position of a text cell.
- [GRAPHIC SET AUTOSIZE](#) statement expands a graphic target into autosize mode.
- [GRAPHIC SET CAPTION](#) statement changes the caption on a Graphic Window.
- [GRAPHIC SET CLIENT](#) statement changes the size of a [graphic control](#) or graphic window to a specific [client area](#) size.
- [GRAPHIC SET CLIP](#) statement establishes margins around the outer edges of the graphic target.
- [GRAPHIC SET FIXED](#) statement restores a graphic target to standard fixed mode.
- [GRAPHIC SET OVERLAP](#) statement enables or disables Graphic Overlap Mode.
- [GRAPHIC SET SCROLLTEXT](#) statement enables or disables Graphic ScrollText Mode.
- [GRAPHIC SET SIZE](#) statement changes the overall size of a graphic control or graphic window.
- [GRAPHIC SET STRETCHMODE](#) statement sets the default bitmap stretching mode for the current DC.
- [GRAPHIC SET VIEW](#) statement changes the position of the viewport on a virtual graphic target.
- [GRAPHIC SET VIRTUAL](#) statement expands a graphic target into virtual mode.

- [GRAPHIC SET WORDWRAP](#) statement enables or disables Graphic WordWrap Mode.
- [GRAPHIC SET WRAP](#) statement enables or disables Graphic Wrap Mode.
- [GRAPHIC SPLIT](#) statement splits a string into two parts for display on a graphic target.
- [GRAPHIC STRETCH PAGE](#) statement copies and resizes a bitmap to the clip or client area of the selected graphic target.
- [GRAPHIC WINDOW HIDE](#) statement makes a graphic window invisible.
- [GRAPHIC WINDOW MINIMIZE](#) statement minimizes a graphic window.
- [GRAPHIC WINDOW NONSTABLE](#) statement makes a graphic window non-stable (closeable).
- [GRAPHIC WINDOW NORMALIZE](#) statement makes a graphic window visible.
- [GRAPHIC WINDOW STABILIZE](#) statement makes a graphic window stabilized (non-closeable).
- [GRAPHIC WINDOW TEXT](#) statement creates a new standalone window oriented more towards the display of text.
- [HEADER](#) statement manipulates a HEADER control in order to set/retrieve data.
- [IMPORT ADDR](#) statement loads a library ([DLL](#)) to access an imported procedure.
- [IMPORT CLOSE](#) statement frees a library.
- [LinkListCollection.ADD](#) method adds an item to the end of the LinkListCollection.
- [LinkListCollection.CLEAR](#) method removes all items from the LinkListCollection.
- [LinkListCollection.COUNT](#) method returns the number of items currently in the LinkListCollection.
- [LinkListCollection.FIRST](#) method sets the current index for the LinkListCollection to one (1) and returns the previous value.
- [LinkListCollection.INDEX](#) method sets the current index for the LinkListCollection to the specified value and returns the previous value.
- [LinkListCollection.INSERT](#) method adds the specified item to the specified index position.
- [LinkListCollection.ITEM](#) method returns the item from the specified index position.
- [LinkListCollection.LAST](#) method sets the index value to the last item and returns the previous value.
- [LinkListCollection.NEXT](#) method returns the next item in the LinkListCollection.
- [LinkListCollection.PREVIOUS](#) method returns the previous item in the LinkListCollection.
- [LinkListCollection.REMOVE](#) method removes the item at the specified position from the LinkListCollection.
- [LinkListCollection.REPLACE](#) method replaces the item at the specified position with a new item in the LinkListCollection.
- [IPowerArray.ARRAYBASE](#) method returns the address of the first element of the array.
- [IPowerArray.ARRAYDESC](#) method returns the address of the SAFEARRAY descriptor.
- [IPowerArray.ARRAYINFO](#) <Get> property retrieves the info string, if one is present.
- [IPowerArray.ARRAYINFO](#) <Set> property assigns the info string to the array.
- [IPowerArray.CLONE](#) method copies an exact duplicate of the SafeArray, and stores it in the specified PowerArray object.
- [IPowerArray.COPYFROMVARIANT](#) method copies an exact duplicate of the specified SafeArray and stores it in this PowerArray object.
- [IPowerArray.COPYTOVARIANT](#) method copies an exact duplicate of the SafeArray in this object and stores it in the specified Variant.
- [IPowerArray.DIM](#) method dimensions (creates) a new array.
- [IPowerArray.ELEMENTPTR](#) method retrieves the address of the specified data element.

- [IPowerArray.ELEMENTSIZE](#) method retrieves the storage size (in bytes) of each data element of the array.
- [IPowerArray.ERASE](#) method destroys the contained array and empties the object.
- [IPowerArray.LBOUND](#) method retrieves the lower bound number for the dimension specified.
- [IPowerArray.LOCK](#) method increments the lock count of the SAFEARRAY.
- [IPowerArray.MOVEFROMVARIANT](#) method transfers ownership of the specified SafeArray contained in the variant to the PowerArray object.
- [IPowerArray.MOVETO VARIANT](#) method transfers ownership of the SafeArray contained in this PowerArray object to a variant parameter.
- [IPowerArray.REDIM](#) method allows the SafeArray to be erased and re-dimensioned to a new size.
- [IPowerArray.REDIMPRESERVE](#) method allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved.
- [IPowerArray.RESET](#) method sets all elements in the SafeArray back to their initial, default value.
- [IPowerArray.SUBSCRIPTS](#) method retrieves the number of dimensions (subscripts) for this array.
- [IPowerArray.UBOUND](#) method retrieves the upper bound number for the dimension specified.
- [IPowerArray.UNLOCK](#) method decrements the lock count of the SAFEARRAY.
- [IPowerArray.VALUEGET](#) method retrieves the value of the specified array element.
- [IPowerArray.VALUESET](#) method assigns the value to the specified array element.
- [IPowerArray.VALUETYPE](#) method retrieves the %VT code which describes the data contained in this array.
- [IPowerCollection.ADD](#) method adds an item and key to the end of the PowerCollection.
- [IPowerCollection.CLEAR](#) method removes all items and keys from the PowerCollection.
- [IPowerCollection.CONTAINS](#) method scans the PowerCollection for the specified key.
- [IPowerCollection.COUNT](#) method returns the number of data items currently contained in the PowerCollection.
- [IPowerCollection.ENTRY](#) method returns the PowerCollection item specified by the Index number.
- [IPowerCollection.FIRST](#) method sets the index to the first item and returns the previous value.
- [IPowerCollection.INDEX](#) method sets the index value and returns the previous value.
- [IPowerCollection.ITEM](#) method returns the item associated with the specified key in the PowerCollection.
- [IPowerCollection.LAST](#) method sets the index to the last item and returns the previous value.
- [IPowerCollection.NEXT](#) method returns the next item in the PowerCollection.
- [IPowerCollection.PREVIOUS](#) method returns the previous item in the PowerCollection.
- [IPowerCollection.REMOVE](#) method removes the item associated with the specified key from the PowerCollection.
- [IPowerCollection.REPLACE](#) method replaces the item associated with the specified key with a new item.
- [IPowerCollection.SORT](#) method sorts the data items in the PowerCollection based upon the text in the associated keys.
- [IPowerThread.Close](#) method releases the handle of this thread.
- [IPowerThread.Equals](#) method compares the specified object to determine if it references the same object as this object.
- [IPowerThread.Handle](#) method retrieves the handle of the thread for use with Windows API functions.

- [IPowerThread.Id](#) method retrieves the ID of the thread for use with Windows API functions.
- [IPowerThread.IsAlive](#) method checks the thread to see if it is currently "alive".
- [IPowerThread.Join](#) method waits for the specified thread object to complete before execution of this thread continues.
- [IPowerThread.Launch](#) method begins execution of the thread object.
- [IPowerThread.Priority](#) property get retrieves the priority value for this thread.
- [IPowerThread.Priority](#) property set sets the priority value for this thread.
- [IPowerThread.Result](#) method retrieves the results value if the thread has ended.
- [IPowerThread.Resume](#) method resumes execution of a suspended thread.
- [IPowerThread.StackSize](#) property get retrieves the size of the stack for this thread.
- [IPowerThread.StackSize](#) property set sets the size of the stack for this thread to the value specified.
- [IPowerThread.Suspend](#) method suspends execution of the thread.
- [IPowerThread.TimeCreate](#) method retrieves the date and time-of-day of the thread creation.
- [IPowerThread.TimeExit](#) method retrieves the date and time-of-day of the thread exit
- [IPowerThread.TimeKernel](#) method retrieves the amount of time this thread has spent in kernel mode.
- [IPowerThread.TimeUser](#) method retrieves the amount of time this thread has spent in user mode.
- [IPowerTime.AddDays](#) method adds or subtracts a specified number of days to value of this object.
- [IPowerTime.AddHours](#) method adds or subtracts a specified number of hours to value of this object.
- [IPowerTime.AddMinutes](#) method adds or subtracts a specified number of minutes to value of this object.
- [IPowerTime.AddMonths](#) method adds or subtracts a specified number of months to value of this object.
- [IPowerTime.AddMSeconds](#) method adds or subtracts a specified number of milliseconds to value of this object.
- [IPowerTime.AddSeconds](#) method adds or subtracts a specified number of seconds to value of this object.
- [IPowerTime.AddTicks](#) method adds or subtracts a specified number of ticks to value of this object.
- [IPowerTime.AddYears](#) method adds or subtracts a specified number of years to value of this object.
- [IPowerTime.DateDiff](#) method compares the date component of an external PowerTime object to this objects date component.
- [IPowerTime.DateString](#) method returns the Date component of the object expressed as a string.
- [IPowerTime.DateStringLong](#) method returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name.
- [IPowerTime.Day](#) method returns the Day component of the object.
- [IPowerTime.DayOfWeek](#) method returns the Day-of-Week component of the object.
- [IPowerTime.DayOfWeekString](#) method returns the Day-of-Week of the object, expressed as a string (Sunday, Monday...).
- [IPowerTime.DaysInMonth](#) method returns the number of days which comprise the month of the date of the PowerTime object.
- [IPowerTime.FileTime](#) property get returns a Quad-Integer value of the PowerTime object as a FileTime.
- [IPowerTime.FileTime](#) property set the FileTime Quad-Integer value specified is assigned as the PowerTime object value

- [IPowerTime.Hour](#) method returns the Hour component of the object.
- [IPowerTime.IsLeapYear](#) method returns [true/false](#) (-1/0) to tell if the object year is a leap year.
- [IPowerTime.Minute](#) method returns the Minute component of the object.
- [IPowerTime.Month](#) method returns the Month component of the object.
- [IPowerTime.MonthString](#) method returns the Month component of the object, expressed as a string (January, February...).
- [IPowerTime.MSecond](#) method returns the millisecond component of the PowerTime object.
- [IPowerTime.NewDate](#) method assigns a new value to the date component of the PowerTime object.
- [IPowerTime.NewTime](#) method assigns a new value to the time component of the PowerTime object.
- [IPowerTime.Now](#) method assigns the current local date and time on this computer to this object.
- [IPowerTime.NowUTC](#) method assigns the current Coordinated Universal date and time (UTC) to this object.
- [IPowerTime.Second](#) method returns the Second component of the object.
- [IPowerTime.Tick](#) method returns the Tick component of the object.
- [IPowerTime.TimeDiff](#) method compares the time component of an external PowerTime object with this objects time component.
- [IPowerTime.TimeString](#) method returns the Time component of the PowerTime object expressed as a string.
- [IPowerTime.TimeString24](#) method returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.
- [IPowerTime.TimeStringFull](#) method returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.tt in 24-hour notation.
- [IPowerTime.Today](#) method the current local date on this computer is assigned to this PowerTime object.
- [IPowerTime.ToLocalTime](#) method converts the object to local time.
- [IPowerTime.ToUTC](#) method converts the object to Coordinated Universal Time (UTC).
- [IPowerTime.Year](#) method returns the Year component of the PowerTime object as a numeric value.
- [IQueueCollection.CLEAR](#) method removes all items from the QueueCollection.
- [IQueueCollection.COUNT](#) method returns the number of data items currently contained in the QueueCollection.
- [IQueueCollection.DEQUEUE](#) method returns the item at the "oldest" position in the QueueCollection.
- [IQueueCollection.ENQUEUE](#) method adds the specified item to the "newest" position in the QueueCollection.
- [IStackCollection.CLEAR](#) method removes all items from the StackCollection.
- [IStackCollection.COUNT](#) method returns the number of data items currently contained in the StackCollection.
- [IStackCollection.POP](#) method returns the item at the "Stack-Top" (the item most recently added).
- [IStackCollection.PUSH](#) method adds the specified item to the StackCollection at the "Stack-Top" position.
- [IStringBuilderA.Add](#) method appends an ANSI string to the object.
- [IStringBuilderA.Capacity](#) property get retrieves the size of the internal buffer.
- [IStringBuilderA.Capacity](#) property set sets the size of the internal buffer.
- [IStringBuilderA.Char](#) property get returns the numeric character code of the character at the specified position.

- [IStringBuilderA.Char](#) property set changes the numeric character code of the character at the specified position.
- [IStringBuilderA.Clear](#) method erases all data in the object.
- [IStringBuilderA.Delete](#) method deletes all data in the object.
- [IStringBuilderA.Insert](#) method inserts a string at a specified position.
- [IStringBuilderA.Len](#) method returns the number of characters stored in the object.
- [IStringBuilderA.String](#) method returns the ANSI string stored in the object.
- [IStringBuilderW.Add](#) method appends an WIDE string to the object.
- [IStringBuilderW.Capacity](#) property get retrieves the size of the internal buffer.
- [IStringBuilderW.Capacity](#) property set sets the size of the internal buffer.
- [IStringBuilderW.Char](#) property get returns the numeric character code of the character at the specified position.
- [IStringBuilderW.Char](#) property set changes the numeric character code of the character at the specified position.
- [IStringBuilderW.Clear](#) method erases all data in the object.
- [IStringBuilderW.Delete](#) method deletes all data in the object.
- [IStringBuilderW.Insert](#) method inserts a string at a specified position.
- [IStringBuilderW.Len](#) method returns the number of characters stored in the object.
- [IStringBuilderW.String](#) method returns the WIDE string stored in the object.
- [ISNOTNULL](#) function determines if a string is not nul (contains 1 or more characters).
- [ISNULL](#) function determines if a string is nul (zero-length).
- [LISTVIEW GET HEADERID](#) statement returns the handle of the [LISTVIEW](#) control and the ID of [HEADER](#) control.
- [MEMORY COPY](#) statement copies a specified number of [bytes](#) from one address to another.
- [MEMORY FILL](#) statement fills a specified address with a specified number of bytes with one or more copies of a specified [string expression](#).
- [MEMORY SWAP](#) statement exchanges a specified number of bytes from at one address with the data at another address.
- [MENU CONTEXT](#) statement creates a floating context [menu](#).
- [METRICS](#) function retrieves information or dimensions of system elements.
- [MONTHNAME\\$](#) function converts a Month number to the associated name.
- [OBJEQUAL](#) function checks if [object](#) variables refer to the same object.
- [OemToChr\\$](#) function translates a byte string of OEM characters into ANSI/WIDE characters.
- [PLAY](#) statement plays a wave file under program control.
- [POKE\\$\\$](#) statement stores the characters of a string expression as consecutive 2-byte words of memory at a specific address.
- [PEEK\\$\\$](#) function retrieves a specified count of consecutive 2-byte wide characters, and returns them as a wide character string.
- [PowerArray](#) object encapsulates the Windows SAFEARRAY structure.
- [PowerTime](#) object contains a date and time value, allowing easy calculations.
- [PREFIX/END PREFIX](#) statements execute a series of statements, each of which utilizes pre-defined source code.
- [PUT\\$\\$](#) statement writes a WIDE Unicode string to a file opened in binary mode.

- [RESOURCE\\$](#) function returns predefined resource data.
- [RESUME FLUSH](#) statement flushes the RESUME stack and program execution simply continues on the line immediately following the RESUME FLUSH.
- [RETURN FLUSH](#) statement removes the most recent return address from the system stack and program flow continues normally after the RETURN FLUSH.
- [SHRINK\\$](#) function shrinks a string to use a consistent single character delimiter.
- [SPLIT](#) statement splits a string into two parts.
- [STRINGBUILDER](#) Object offers the ability to concatenate many string sections at a very high level of performance.
- [STRING\\$\\$](#) function returns a Unicode string consisting of multiple copies of a specified character.
- [TAB GET IMAGE](#) statement retrieves the index of the image displayed on the specified TAB page.
- [TAB GET PAGE](#) statement retrieves the page number of the specified TAB page dialog.
- [TAB GET SELECT](#) statement returns the index of the currently selected TAB page.
- [TAB GET TEXT](#) statement retrieves the text displayed on the specified page tab.
- [TAB SET IMAGE](#) statement displays the specified image on the specified page tab.
- [TAB SET TEXT](#) statement displays the specified text on the specified page tab.
- [THREAD](#) Object offers a collection of methods which allow you to easily create and maintain additional threads of execution in your programs.
- [TXT.CELL](#) method sets or retrieves the cursor position.
- [TXT.CLS](#) method clears the Text Window and moves to caret to the upper left corner.
- [TXT.COLOR](#) method sets the foreground color.
- [TXT.END](#) method destroys and detaches the Text Window currently attached to your program from the process.
- [TXT.INKEY\\$](#) method reads a keyboard character if one is ready.
- [TXT.INSTAT](#) method determines whether a keyboard character is ready.
- [TXT.LINE.INPUT](#) method reads an entire line from the keyboard.
- [TXT.PRINT](#) method writes text data to the TEXT WINDOW at the current caret location.
- [TXT.WAITKEY\\$](#) method reads a keyboard character, waiting until one is ready.
- [TXT.WINDOW](#) method creates a new Text Window and attaches it to your program.
- [UNWRAP\\$](#) removes paired characters from the beginning and end of a string.
- [Utf8ToChr\\$](#) function translates a byte string of OEM characters into ANSI/WIDE characters.
- [VAL](#) statement converts a text string to a numeric value with additional information.
- [VARIANT\\$\(BYTE, VmtVar\)](#) function returns the contents of a Variant as a ANSI byte string. This result can be assigned to an ANSI string variable or a User-Defined Type.
- [VARIANT\\$\\$](#) function returns the Unicode string value contained in a Variant variable.
- [WINDOW GET HANDLE](#) statement retrieves the handle of a Window.
- [WINDOW GET STYLE](#) statement retrieves the style of the Window.
- [WINDOW GET STYLEX](#) statement retrieves the extended-style of the Window.
- [WINDOW GET USER](#) statement retrieves the 32-bit user data value associated with the window.
- [WINDOW SET ID](#) statement changes the integral ID of the window.
- [WINDOW SET STYLE](#) statement changes the style of the Window.
- [WINDOW SET STYLEX](#) statement changes the extended-style of the Window.

- [WINDOW SET USER](#) statement changes the 32-bit user data value associated with the window.
- [WRAP\\$](#) function adds paired characters to the beginning and end of a string.
- [XPRINT\(CANVAS.X\)](#) function retrieves the writable width of the [host printer](#) page.
- [XPRINT\(CANVAS.Y\)](#) function retrieves the writable height of the host printer page.
- [XPRINT\(Cell.Size.X\)](#) function retrieves the character [cell](#) width including external leading.
- [XPRINT\(Cell.Size.Y\)](#) function retrieves the character cell height including external leading.
- [XPRINT\(Chr.Size.X\)](#) function retrieves the character width on the host printer page.
- [XPRINT\(Chr.Size.Y\)](#) function retrieves the character height on the host printer page.
- [XPRINT\(Client.X\)](#) function retrieves the width of the client area (printable area) on the host printer page.
- [XPRINT\(Client.Y\)](#) function retrieves the height of the client area (printable area) on the host printer page.
- [XPRINT\(Clip.X\)](#) function retrieves the width of the [clip area](#) on the selected printer.
- [XPRINT\(Clip.Y\)](#) function retrieves the height of the clip area on the selected printer.
- [XPRINT\(COL\)](#) function retrieves the next column print position, based upon the row and column position of a [text cell](#).
- [XPRINT\(COLLATE\)](#) function retrieves the XPRINT [collate status](#).
- [XPRINT\(COLORMODE\)](#) function retrieves the XPRINT [colormode status](#).
- [XPRINT\(COPIES\)](#) function retrieves the XPRINT [copy count](#).
- [XPRINT\(DC\)](#) function retrieves the handle of the device context (DC) for the host printer page.
- [XPRINT\(DUPLEX\)](#) function retrieves the XPRINT [duplex status](#).
- [XPRINT\(LINES\)](#) function retrieves the number of lines that can be printed.
- [XPRINT\(MIX\)](#) function retrieves the [color mix mode](#) for a host printer page.
- [XPRINT\(ORIENTATION\)](#) function retrieves the [paper orientation](#) for a host printer page.
- [XPRINT\(OVERLAP\)](#) function retrieves the status of XPrint [Overlap Mode](#).
- [XPRINT\(PAPER\)](#) function retrieves the current paper size/type.
- [XPRINT\(PIXEL...\)](#) function retrieves the color of a pixel on a host printer page.
- [XPRINT\(POS.X\)](#) function retrieves the last horizontal point referenced (POS) by an XPRINT statement.
- [XPRINT\(POS.Y\)](#) function retrieves the last vertical point referenced (POS) by an XPRINT statement.
- [XPRINT\(PPI.X\)](#) function retrieves the horizontal resolution of the host printer page.
- [XPRINT\(PPI.Y\)](#) function retrieves the vertical resolution of the host printer page.
- [XPRINT\(ROW\)](#) function retrieves the next row print position, based upon the row and column position of a text cell.
- [XPRINT\(QUALITY\)](#) function retrieves the print [quality setting](#) for the host printer.
- [XPRINT\(SELECTION\)](#) function retrieves the status of the SELECTION flag.
- [XPRINT\(SIZE.X\)](#) function retrieves the width of the host printer page.
- [XPRINT\(SIZE.Y\)](#) function retrieves the height of the host printer page.
- [XPRINT\(STRETCHMODE\)](#) function retrieves the default bitmap [stretching mode](#) for the attached [DC](#).
- [XPRINT\(TEXT.SIZE.X...\)](#) function calculates the width of text to be printed on a host printer.
- [XPRINT\(TEXT.SIZE.Y...\)](#) function calculates the height of text to be printed on a host printer.

- [XPRINT\(TRAY\)](#) function retrieves the [active printer tray](#).
- [XPRINT\(WORDWRAP\)](#) function retrieves the status of XPRINT [WordWrap Mode](#).
- [XPRINT\(WRAP\)](#) function retrieves the status of XPRINT [Wrap Mode](#).
- [XPRINT\\$\(ATTACH\)](#) function returns the name of the [attached host printer](#).
- [XPRINT\\$\(PAPERS\)](#) function retrieves a list of supported paper types.
- [XPRINT\\$\(TRAYS\)](#) function retrieves a list of supported paper trays.
- [XPRINT CELL SIZE](#) statement retrieves the character cell size including external leading.
- [XPRINT CELL](#) statement sets or retrieves the next print position, based upon the row and column position of a text cell.
- [XPRINT GET ATTACH](#) statement retrieves the name of the attached host printer.
- [XPRINT GET CANVAS](#) statement retrieves the buffer size of the attached host printer.
- [XPRINT GET CLIP](#) statement retrieves the size of the clip area on the selected printer.
- [XPRINT GET OVERLAP](#) statement retrieves the status of XPrint Overlap Mode.
- [XPRINT GET PAGES](#) statement retrieves the XPRINT [page number limits](#) for this [print job](#).
- [XPRINT GET SELECTION](#) statement retrieves the status of the SELECTION flag.
- [XPRINT GET STRETCHMODE](#) statement retrieves the default bitmap stretching mode for the attached DC.
- [XPRINT GET WORDWRAP](#) statement retrieves the status of XPRINT WordWrap Mode.
- [XPRINT GET WRAP](#) statement retrieves the status of XPRINT Wrap Mode.
- [XPRINT PREVIEW](#) statement display a replica of a printed document on the screen.
- [XPRINT PREVIEW CLOSE](#) statement reverts XPRINT output back to the host printer.
- [XPRINT SET CLIP](#) statement establishes margins around the outer edges of the print page.
- [XPRINT SET OVERLAP](#) statement enables or disables XPRINT Overlap Mode.
- [XPRINT SET PAGES](#) statement sets the XPRINT page number limits for this print job.
- [XPRINT SET STRETCHMODE](#) statement sets the default bitmap stretching mode for the current DC.
- [XPRINT SET WORDWRAP](#) statement enables or disables XPRINT WordWrap Mode.
- [XPRINT SET WRAP](#) statement enables or disables XPrint Wrap Mode.
- [XPRINT SPLIT](#) statement splits a string into two parts for printing with XPRINT.
- [XPRINT STRETCH PAGE](#) statement copies and resizes a bitmap to the clip or client area of the print page.

See Also

[Changes to existing Statements and Functions](#)

[New in the IDE](#)

[Additional Changes](#)

Changes to existing Statements and Functions

Changes to existing Statements and Functions

- [#COMPILE](#) metastatement has been enhanced to support compiling of [Static Link Libraries](#).

- [%DEF](#) operator has been expanded so that `%PB_EXE` returns false when compiling a Static Link Library.
- [ARRAY DELETE](#) and [ARRAY INSERT](#) statements now supports [Variants](#), [Objects](#), [Guids](#), and [UDT](#) arrays.
- [ARRAY SORT](#) now uses CALL instead of USING when specifying a custom array sort function.
- [ASC](#) function has been improved to support [Unicode](#) as well as [ANSI](#).
- [ASC](#) statement has been improved to support Unicode as well as ANSI strings.
- [ASMDATA](#) DD now supports sign-extended values.
- [BIN\\$](#) function has been expanded to 64-bits with formatting and now supports adding leading and trailing spaces to the string result.
- [CALL](#) statement offers automatic conversion of numeric, string, and UDT parameters to variant parameters.
- [CHOOSE](#), [CHOOSE&](#), and [CHOOSE\\$](#) functions have been enhanced with optional ELSE clause. The ELSE option allows an optional choice value to be returned when no match is made. For example:

```
ChoiceVar$ = CHOOSE$(7,"ONE", "TWO" ELSE "NUL")
```

In this case, the ELSE expression "NUL" is returned.

CHOOSE and CHOOSE& also support an optional BIT clause where the selection is based upon the first bit set (lowest to highest) in the specified index. This is particularly valuable when used with an ENUMERATION which also uses the BIT option, to describe a set of attributes for an item in your program.

The CHOOSE\$ function now has an optional BITS clause that works in the same general fashion as the BIT clause, except the function may return multiple choices, as a concatenated string, if more than one bit is set. For example:

```
x$ = CHOOSE$(BITS 5, "Computer ", "Laptop ", "Desktop ")
```

Since the value 5 consists of 2 bits (the lowest and third-lowest) set, the first and third strings are concatenated and returned to the caller. In this case, "Computer Desktop " is the result.

- [CLIPBOARD GET TEXT](#) statement automatically converts the retrieved string to ANSI or Unicode to match the format of the target variable.
- [CODEPTR](#) function has been improved to return the address of a [FASTPROC](#).
- [COMBOBOXADD](#) and [COMBOBOXINSERT](#) statements now offer an optional TO clause that returns the index position of the added string.
- [COMM](#) function, [COMM LINE](#), [COMM OPEN](#), [COMM PRINT](#), [COMM RECV](#), [COMM SEND](#), and [COMM SET](#) have been expanded to support ANSI and Unicode strings. [COMM LINE](#), [COMM OPEN](#), [COMM PRINT](#), [COMM RECV](#), and [COMM SEND](#) have been improved with an optional timeout (see [COMM TIMEOUT](#)) to complete the given COMM operation.
- [CONTROL ADD GRAPHIC](#) statement. Graphic controls may now be resized with [CONTROL SET CLIENT](#), [GRAPHIC SET CLIENT](#), [CONTROL SET SIZE](#), or [GRAPHIC SET SIZE](#).
- [CONTROL SET CLIENT](#) statement now resizes graphic controls.
- [CONTROL SET FONT](#) statement resets back to the default original font chosen by PowerBASIC when a font handle of zero is specified.
- [CONTROL SET SIZE](#) statement has been enhanced to support graphic controls.
- [DECLARE](#) statement has been updated to support the COMMON and THREADSAFE descriptors. A COMMON [Sub](#) or [Function](#) is one which may be referenced by and between linked unit modules (Main or [SLL](#)). With the THREADSAFE option, PowerBASIC automatically establishes a semaphore which allows only one thread to execute the Sub/Function at a time. Other callers must wait until the first thread exits the THREADSAFE procedure before they are allowed to begin.

- [DIR\\$](#) function now supports Unicode file names and directories. The [DIRDATA](#) built-in [UDT](#) has been updated to return Unicode short and long filenames.
- [EXIT](#) statement has been improved to support exiting a FASTPROC immediately.
- [FONT NEW](#) statement now optionally supports creating fonts with external leading.
- [FUNCTION/END FUNCTION](#) statements have been expanded to support an optional THREADSAFE descriptor. With the THREADSAFE option, PowerBASIC automatically establishes a semaphore which allows only one thread to execute the procedure at a time.
- [GET\\$](#) statement reads ANSI string data from a [file](#) opened in [binary mode](#), but if the data is read into a Unicode string it will be converted to Unicode before it is assigned.
- [GRAPHIC COLOR](#) statement now supports parameters of -3 to indicate that the existing color should not be changed.
- [GRAPHIC GET CLIENT](#) statement now returns the client area size in [dialog units](#) or [pixels](#) only. The size represents the physical size of the display area on the screen. This change was necessary because of the improved graphic functionality involving [virtual](#) windows, [resizing](#) of graphic windows, etc. Prior versions returned scaled sizes if a [GRAPHIC SCALE](#) was executed. Substitute [GRAPHIC GET CANVAS](#) for functionality which is fully compatible with the old format.
- [GRAPHIC GET LOC](#) and [GRAPHIC SET LOC](#) now only support [Graphic Windows](#). For [Graphic Controls](#) use [CONTROL GET LOC](#) and [CONTROL SET LOC](#).
- [GRAPHIC SET FONT](#) statement resets back to the default original font chosen by PowerBASIC when a font handle of zero is specified.
- [GRAPHIC PRINT](#) statement has been expanded to support POS(), SPC(), TAB(), commas, and semicolons. The POS(n) clause is an optional function used to set the POS to the horizontal [page unit](#). Multiple uses of the POS function is permitted in a single statement. The SPC(n) clause is an optional function used to insert *n* spaces into the printed output. Multiple use of SPC is permitted in a single statement. The TAB(n) clause is an optional function used to tab to the *n*th column before printing the next expression. Multiple use of TAB is permitted in a single statement.
- [GRAPHIC RENDER](#) statement now supports icons as well as bitmaps.
- [GRAPHIC WAITKEY\\$](#) statement has been improved with a optional KeyMask\$ and TimeOut& expressions. If the optional KeyMask\$ expression is included, only a limited set of keys are recognized. KeyMask\$ may include any number of Sub-Masks, one for each key to observe. For example, GRAPHIC WAITKEY\$("YyNn") will recognize upper-case or lower-case Y or N (for yes/no answers), while any other key will be ignored. If KeyMask\$ is omitted, or evaluates to a zero-length string, any key event will be recognized. If the optional TimeOut& expression is included, it tells the maximum number of milliseconds to wait for a key. GRAPHIC WAITKEY\$(5000) will wait a maximum of 5 seconds. The specified TimeOut period will only be approximate, so you should not rely upon precision accuracy. If the TimeOut period is exceeded, a zero-length string is returned. If the TimeOut& parameter is omitted, or evaluates to zero (0), it will wait an infinite length of time.
- [GRAPHIC WINDOW](#) statement has been expanded to support an optional font handle of the initial font to be used in the GRAPHIC WINDOW.
- [GRAPHIC WINDOW END](#) statement has been enhanced with an optional handle of the graphic window to close.
- [HEX\\$](#) function now supports adding leading and trailing spaces to the string result.
- [IPowerTime.DateDiff](#) now reports invalid parameters through [OBJRESULT](#).
- [IPowerTime.TimeDiff](#) now reports invalid parameters through OBJRESULT.
- [IPowerTime.NewDate](#) now reports invalid parameters through OBJRESULT.
- [IPowerTime.NewTime](#) now reports invalid parameters through OBJRESULT.
- [LET statement \(with Types\)](#) has been expanded to support assigning a Variant byte string to a UDT using the [Variant\\$](#) function.
- [LISTBOXADD](#) and [LISTBOX INSERT](#) statements now offer an optional TO clause that returns the

index position of the added string.

- [MENU ADD POPUP](#) statement has been expanded with an optional AS id& clause. id& is a unique numeric identifier for this popup menu. id& may be used later with a BYCMD option to reference this popup.
- [MENU GET STATE](#) statement has been enhanced to support the %MFS menu states equates.
- [MENU SET STATE](#) statement has been enhanced to support the %MFS menu states equates.
- [METHOD/END METHOD](#) statements have been expanded to support an optional THREADSAFE descriptor. With the THREADSAFE option, PowerBASIC automatically establishes a semaphore which allows only one thread to execute the procedure at a time.
- [MID\\$ function](#) and [MID\\$ statement](#) now support both a starting and ending position.
- [OCT\\$](#) function has been expanded to 64-bits with formatting and now supports adding leading and trailing spaces to the string result.
- [OPEN](#) statement has been improved with the CHR clause. The CHR clause specifies the character mode for this file: ANSI or [WIDE](#) (Unicode). Since sequential files consist of text alone, the selected mode is enforced by PowerBASIC. All data read or written to the file is automatically forced to the selected mode, regardless of the type of variables or expressions used. With binary or random files, this specification has no effect, but it may be included in your code for self-documentation purposes.
- [PATHNAME\\$](#) function has been enhanced to accept relative path names.
- [POKE](#) statement now supports multiple data items to be stored successively.
- [PROPERTY/END PROPERTY](#) statements have been expanded to support an optional THREADSAFE descriptor. With the THREADSAFE option, PowerBASIC automatically establishes a semaphore which allows only one thread to execute the procedure at a time.
- [PUT\\$](#) statement has been expanded to support Unicode string expressions. If string expressions result is a Unicode string, it is converted to ANSI byte characters.
- [SELECT CASE/END SELECT](#) block has been improved with the CONST\$\$ modifier to enhance performance when the controlling expression is Unicode.
- [SUB/END SUB](#) statements have been expanded to support an optional THREADSAFE descriptor. With the THREADSAFE option, PowerBASIC automatically establishes a semaphore which allows only one thread to execute the procedure at a time.
- [TOOLBAR ADD SEPARATOR](#) statement has been improved with an optional unique numeric identifier. This identifier may be used later with a BYCMD option in [TOOLBAR DELETE](#), [TOOLBAR SET STATE](#), etc.
- [TRIM\\$](#) function has been expanded to take a numeric expression and convert it to a string without any leading or trailing spaces along with an option specify the maximum number of significant digits.
- [UCODEPAGE](#) statement now supports the OEM code page. By default, the system ANSI code page, is used to map the character translation. If you are compiling a [CONSOLE](#) application or one which makes use of the high-order ANSI codes, [CHR\\$\(128\)](#) through [CHR\\$\(255\)](#) for line drawing and a few international characters, you should declare an OEM code page by placing UCODEPAGE OEM at the start of your
function.
- [VAL](#) function has been enhanced with an optional parameter to specify the position in the string where the conversion should begin.
- [VARIANT\\$](#) and [VARIANT\\$\\$](#) used to return strings based on the contents of the variant. [VARIANT\\$](#) now assumes the contents of the variant is a wide Unicode string and converts it to a ANSI string. [VARIANT\\$\\$](#) assumes the contents of the variant is a wide Unicode string and returns the contents directly as a wide Unicode string. [VARIANT\\$\(BYTE, VmtVar\)](#) always returns the contents as an ANSI byte string. This result can be assigned to an ANSI string variable or a User-Defined Type.
- [XPRINT ATTACH CHOOSE](#) statement has been expanded to support optional numeric expression to control the execution of the Printer Dialog.

- [XPRINT COLOR](#) statement now supports parameters of -3 to indicate that the existing color should not be changed.
- [XPRINT PRINT](#) statement has been expanded to support POS(), SPC(), TAB(), commas, and semicolons. The POS(*n*) clause is an optional function used to set the POS to the horizontal [page unit](#). Multiple uses of the POS function is permitted in a single statement. The SPC(*n*) clause is an optional function used to insert *n* spaces into the printed output. Multiple use of SPC is permitted in a single statement. The TAB(*n*) clause is an optional function used to tab to the *n*th column before printing the next expression. Multiple use of TAB is permitted in a single statement.
- [XPRINT SET FONT](#) statement resets back to the default original font chosen by PowerBASIC when a font handle of zero is specified,

See Also

[New Statements and Functions](#)

[New in the IDE](#)

[Additional Changes](#)

Additional Changes

Additional changes

- [Pre-Compiled modules](#) and libraries are now supported.
- Unreferenced code is automatically removed from the compiled program to minimize the executable file size. This can be overridden using the [#OPTIMIZE OFF](#) metastatement.
- There is a dramatic improvement of execution speed in many/most [DWORD](#) expressions.
- Dramatic improvement in execution speed.
- Mask variable assignment expressions may contain any combination of [LONG](#) and DWORD values without error. Operators may include +, -, AND, OR, XOR.
- [WSTRING](#), [WSTRINGZ](#) and [WFIELD](#) wide [Unicode](#) strings data types are now supported.
- [Variant](#) variables now recognize the %VT_DECIMAL data type and now may contain [UDT](#) data as a string of bytes (%VT_BSTR).
- Many new predefined numeric equates and string equates have been built-in to the compiler. One new equate is [%PB_COMPILETIME](#) which contains the date and time of compilation. See the [Built-in string equates](#) and [Built-in numeric equates](#) topics for a complete list.
- Run Time [error code 98](#) added: [XPRINT PREVIEW](#) error
- Compiler [error code 444](#) added: [PREFIX](#) clause expected. A PREFIX clause is expected in this statement.
- Compiler [error code 461](#) changed: INSTANCE arrays must be declared. INSTANCE arrays must be declared before any CLASS code.
- Compiler [error code 465](#) changed: May be defined only once. A program element which should only appear once was duplicated in your program. For example, two [#STACK](#) metastatements could cause this error to be generated. A common source of this problem is multiple [#INCLUDE](#) files which define the same term.
- Compiler [error code 466](#) changed: This name is already in use. This name (identifier) is used for more than one purpose, causing a fatal conflict. For example, you might have used the name ABC as both a [variable](#) and a [label](#). You must rename one or both uses of this particular name. PowerBASIC generates this error when it sees the second use of the name.

- Compiler [error code 468](#) changed: This equate may not be redefined. A [numeric](#) or [string equate](#) is defined a second time with a different value. Equate definitions may appear more than once, but the value must remain constant.
- Compiler [error code 500](#) update: Variable name must be unique. All [Global](#), [Threaded](#), and [Instance](#) variable names must be unique to guarantee access to a specific variable. If [#UNIQUE_VAR_ON](#) is specified, then all variable names must be unique.
- Compiler [error code 503](#) changed: Invalid MAIN Function(s).
/Function(s) do not match the target file type.
- Compiler [error code 512](#) changed: Brackets not supported (use OPTIONAL). Brackets are no longer supported for optional parameters.
- Compiler error code 518 removed.
- Compiler [error code 540](#) changed: Invalid operation with a [register](#) variable. This assembler opcode or operands are invalid using a register variable.
- Compiler [error code 560](#) added: [FASTPROC](#) expected. A FASTPROC statement must precede other related statements like [EXIT FASTPROC](#) and END FASTPROC.
- Compiler [error code 561](#) added: END FASTPROC expected. A FASTPROC statement must be matched with an associated END FASTPROC.
- Compiler [error code 599](#) changed: Requires [CLASS](#) but outside of Interfaces. This item must be enclosed within a CLASS, but outside of Interfaces.
- Compiler [error code 606](#) changed: [PowerCollection](#) / [LinkListCollection](#) required. [FOR EACH](#) loops require an object of a specific class.
- Compiler [error code 607](#) added: New syntax requires GETCOM/NEWCOM/ANYCOM. The [LET](#) statement syntax for COM OBJECT creation has been changed. Previous syntax is no longer recognized.
- Compiler [error code 609](#) added: Too many [macro](#) expansions. You have used more than 65,535 macros in this program.
- Compiler [error code 610](#) added: Invalid within a [FastProc](#). You have used a feature which is not supported within a FastProc.
- Compiler [error code 611](#) added: FASTPROC params must be ByVal Long Integer. FASTPROC parameters must be ByVal Long Integer.
- Compiler [error code 612](#) added: FASTPROC return may only be Long Integer. FASTPROC return value must be Long Integer or nothing.
- Compiler [error code 613](#) added: Cannot compile - the program is now running. The program you are trying to compile is currently executing. You may have to use Task Manager to force the program to end.
- Compiler [error code 614](#) added: Mismatched [CHR Mode](#) (ANSI/Wide). The string operand does not match the required ANSI or Wide mode.
- Compiler [error code 615](#) added: [PREFIX](#) expected. A PREFIX statement must precede each END PREFIX statement.
- Compiler [error code 616](#) added: END PREFIX expected. A PREFIX statement must be matched with an associated END PREFIX.
- Compiler [error code 617](#) added: [ASMDATA](#) expected. An ASMDATA statement must precede each END ASMDATA statement.
- Compiler [error code 618](#) added: END ASMDATA expected. An ASMDATA statement must be matched with an associated END ASMDATA.
- Compiler [error code 619](#) added: [ENUM](#) expected. An ENUM statement must precede each END ENUM statement.
- Compiler [error code 620](#) added: END ENUM expected. An ENUM statement must be matched with

an associated END ENUM.

- Compiler [error code 621](#) added: cannot inherit from itself. An interface cannot inherit from itself.
- Compiler [error code 622](#) added: [AS STRING](#) required for variant conversion. Conversion from a UDT as a string requires AS STRING notation.
- Compiler [error code 623](#) added: [THREADPARM](#) Instance variable required. THREAD Class must declare a THREADPARM Instance variable.
- Compiler [error code 624](#) added: Invalid THREADPARM variable type. THREADPARM must be a LONG, DWORD, or UDT PTR INSTANCE variable.
- Compiler [error code 625](#) added: [THREAD Method](#) required. THREAD Class must include a THREAD Method.
- Compiler [error code 626](#) added: Duplicate THREAD Method. THREAD Class must have exactly one THREAD Method.
- Compiler [error code 627](#) added: INHERIT [IPowerThread](#) expected. THREAD METHOD is only allowed with a threaded interface.
- Compiler [error code 628](#) added: Not valid in a [Static-Link-Library](#) (SLL). This language element is invalid in a Static-Link-Library.
- Compiler [error code 629](#) added: ALIAS disallows Private/Thread/Callback.
- Compiler [error code 630](#) added: [Link](#) File Error. The SLL Link File is not valid for this compiler.
- Compiler [error code 631](#) added: Nested Link Files. You cannot link an SLL file into an SLL file.
- Compiler [error code 632](#) added: [COMMON](#) name is a duplicate. COMMON procedure name was previously defined.
- Compiler [error code 633](#) added: COMMON signature is mismatched. COMMON procedure signature (params, return type...) is mismatched.
- Compiler [error code 634](#) added: Undefined COMMON reference. COMMON item was referenced but not defined.
- Compiler [error code 635](#) added: [USING](#) clause is required. USING <ProcName> is required to describe the function signature.
- Compiler [error code 636](#) added: Invalid [VersionInfo Resource](#).
- Compiler [error code 637](#) added: This SLL requires [CONSOLE \(PB/CC only\)](#) or [DDT](#) support which is not available.
- Compiler [error code 638](#) added: Please change AS STRING to AS WSTRING.
- Compiler [error code 639](#) added: TYPE variable expected.
- Compiler [error code 640](#) added: Invalid use of BYCOPY. The BYCOPY override may not be used with certain parameters (for example, entire arrays).

See Also

[New Statements and Functions](#)

[Changes to existing Statements and Functions](#)

[New in the IDE](#)

New in the IDE

New in the IDE

- Added support for the new [#PAGE](#) metastatement.
- Added Print Preview. This allows you to select a range of pages to print.
- The edit window is now based on tabs rather than MDI children. The tabs support hover, to see the complete filespec, and a context menu for tab actions. You can set the preferred maximum width of the displayed filespec.
- New [toolbar](#) icons support new sizes. You may turn off the toolbar or select icon sizes of 16x16, 24x24, and now 32x32 and 48x48.
- [Projects](#) now use the extension .PBprj. The old .PBP format supported only a list of files and a primary file. The new .PBprj format supports a list of files, their scrolling position and caret position, a primary file, the active tab, breakpoints, bookmarks, and the debug Watch list. When the IDE is closed, any open tabs are saved as a default project.
- [Templates](#) now may be defined as being for [PBCC](#), for PBWIN, or for CCWIN. With CCWIN templates, lines that start with [PBCC] are used only for PB/CC, and lines that start with [PBWIN] are used only for PB/Win. Lines without a [target] will be used for either compiler.
- Quick context-sensitive syntax help is shown on the status bar. Hovering over the status bar shows additional information, if any. Clicking the status bar brings up context-sensitive help for the displayed syntax.
- [Custom help files](#) can have help keys that overlap with other custom help files. The user will get a pick list, in that case, allowing them to choose the most relevant help file.
- [Find/Replace](#) can now be set to wrap around the file, instead of stopping at the end (or the beginning, for upwards searches). Wrapping is off by default. The Find and Replace dialogs now supports finding and replacing across all loaded files
- [Code Finder](#) now has columns for dispatch IDs and filenames. Code Finder now works across all loaded files.
- Added a drop-down combobox for [command-line parameters](#). The command lines are automatically restored when the IDE is reloaded. The Command Line dialog can now be resized.
- Ctrl+Alt+P can be used to open the [Select Primary File dialog](#).
- The [Open File dialog](#) for source files now allows selecting multiple files at a time.
- The "[Go To Bookmark](#)" dialog now includes a column showing the bookmark number.
- The IDE may be limited to a [single running instance](#).
- The Command Line dialog can now be resized. The dialog position and size are saved on exit and restored on the next use. The command lines are automatically restored when the IDE is reloaded.
- The Primary Source File dialog can now be resized. The files are shown in a full listbox, rather than a drop-down.
- The [Run menu](#) has a new command, "Set DLL Test File", which lets you specify an .EXE file to run when you select "Compile and Execute" for a [DLL](#). The .DLL will be copied to the .EXE's folder first, if the folders are different.
- The locations and sizes of the IDE and its edit windows are preserved when exiting the IDE and restored when you return.
- File backups can be customized. Rather than a .BAK extension, backup files are given a Backup prefix. This preserves normal file extension behavior. It also avoids conflicting backup files in cases where two source files differ only in the file extension, e.g., Test.Bas and Test.H. Backups may be numbered up to a selected maximum number, or saved with a timestamp code.
- Added /D command-line switch to launch the [debugger](#) as soon as files are loaded.
- Added a context menu to [Register Watcher](#). This allows selecting which registers to watch.
- The Register Watcher can now display FPU registers. The registers to watch may be selected via the new context menu for the Register Watcher.
- An optional [header](#) may be used with printed source code.

- [Margins](#) can now be set when printing source code.
- The Open File dialog for source files allows selecting multiple files at a time.
- [Syntax Coloring](#) can now be applied to
 - ALT+B accelerator for Toggling Bookmarks.
 - The IDE now supports up to 36 bookmarks.
 - Fixed an issue with fonts appearing clipped if Windows font smoothing (e.g., ClearType) was enabled.
 - Variable Watcher properly restores the sizes of its listview columns.
 - The display bounds checker fully supports the use of multiple monitors. The IDE will re-open on the appropriate display.
 - Fixed Code Finder handling of [PROPERTY SET](#). The Type information for PROPERTY now distinguishes between [PROPERTY GET](#) and PROPERTY SET.
 - The colors of the Output Window match better with Windows Themes.
 - Saving backup files with timestamps uses the correct timestamp again.
 - Double-click in Variable Watcher is ignored for empty rows. Evaluate Variable is enabled only if there is a symbol name at the caret.
 - The last specified file path is selected as the default path regardless of how the last file was loaded.
 - Backups may now be done to a specified directory. The IDE will attempt to create the directory if it does not already exist. The default setting is ".\", the path of the saved file.
 - Added Shift+Delete as "Cut" key.
 - Ctrl+F4 added as "Close File" key.
 - [Compiler options](#) now has a checkbox to specify if a .PBR file should be created when compiling an .RC file.
 - [File options](#) now has a checkbox to select which files are included when saving a project.
 - [General options](#) now has a check to select whether to display the IDE status bar.

See Also

[New Statements and Functions](#)

[Changes to existing Statements and Functions](#)

[Additional Changes](#)

Running PB/Win

Running PB/Win

Running PB/Win

The PowerBASIC for Windows Compiler (PB/Win) is comprised of two core applications: the [Integrated Development Environment](#) and the compiler itself. This chapter describes launching the compiler directly.

See Also

[Running PB/Win From Windows](#)

[Running PB/Win From DOS](#)

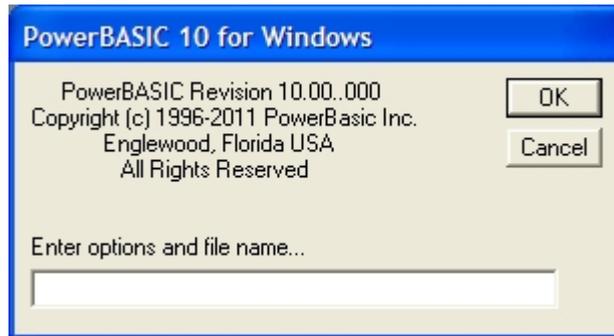
[PB/Win Command Line Switches](#)

[The Integrated Development Environment](#)

Running PB/Win From Windows

Running PB/Win From Windows

Double-click the PB/Win Compiler icon (PBWIN.EXE). A dialog box will appear asking for a file name and compile options:



Type the name of the BASIC source file, plus any desired options, and click the OK button. To abort, click the Cancel button. See below for command-line parameters that may be specified in the dialog box.

See Also

[Running PB/Win From Windows](#)

[Running PB/Win From DOS](#)

[PB/Win Command Line Switches](#)

[The Integrated Development Environment](#)

Running PB/Win From The Command Prompt

Running PB/Win From The Command Prompt

Run PBWIN.EXE from the command prompt, using a command-line with the following syntax:

```
PBWIN.EXE [/Ipath] [/L] [/Q] [/Cfilename] FileName
```

...where *FileName* is the name of the source file to compile. If you just type PBWIN (omitting *FileName*), you'll get a dialog box asking for the name of the file to compile.

PowerBASIC first attempts to open the source file using the *FileName* specified. If the file cannot be opened and *FileName* does not have an explicit .BAS extension, PowerBASIC appends .BAS to the specified file name, and attempts to open that file. If *FileName* is a Long File Name (LFN) or contains spaces, it must be enclosed in quotes.

PowerBASIC also supports Long File Names in all metastatements, for example:

```
#INCLUDE "C:\Program Files\PowerBASIC\LIBRARY.INC".
```

See Also

[Running PB/Win](#)

[Running PB/Win From Windows](#)

[PB/Win Command Line Switches](#)

[The Integrated Development Environment](#)

PB/Win Command Line Switches

PB/Win Command Line Switches

Include /I

The /I command-line option provides the compiler with a search path list when looking for [#INCLUDE](#) and [#RESOURCE](#) files. Multiple directories can be specified in this path list by separating each path with a semicolon (;).

During compilation, the compiler scans this path list for the necessary files before checking the current (default) directory. To ensure that the current (default) directory is searched ahead of this path list, specify a period followed by a backslash (\) at the beginning of the path list. For example:

```
/I.\;C:\PBWIN\WINAPI;D:\SOURCE
```

The Include parameter also works with Long File Name (LFN) paths, provided that individual LFNs are enclosed in quotes. For example:

```
/I"C:\Program files\My Applications\";C:\PB;"D:\Source Code\"
```

See [#INCLUDE](#) and [#RESOURCE](#) for additional details.

Log /L

The /L command-line option causes the compiler to generate a log file with all of the compile results, including [error](#) code and error line number, if an error occurs during compile-time.

Quiet /Q

The /Q command-line option causes the compiler not to display a message box when compiling is finished. This should only be used with the /L option.

Command /C

The /C command-line option specifies a filename that contains the complete command-line. This may be used to specify very long command lines to the compiler of up to 1024 bytes, which may otherwise exceed the operating system limits. This may be useful in situations where the /I path is very long, and the full path to the source file is very long. The /C option may not be used in conjunction with any other command-line options.

See Also

[Running PB/Win](#)

[Running PB/Win From Windows](#)

[Running PB/Win From DOS](#)

The PowerBASIC Integrated Development Environment

The PowerBASIC Integrated Development Environment

The PB/Win Integrated Development Environment

This topic will help you learn how to use all the options available in the PowerBASIC Integrated Development Environment (which we will refer to as the IDE). You will learn how to use the editor, move from window to window, menu to menu, and choose menu commands. See [Debugging PB/Win Programs](#) for information on the Integrated Debugger.

To launch the IDE, double-click the PBEDIT.EXE icon, type PBEDIT at the command-line, or use the START menu entry.

The PB/Win editor (PBEDIT.EXE) can also be launched from the command-line, and supports the following command-line options:

```
PBEDIT.EXE [/G:row,col:] [/P:MainFile] [/D filename] [Filename]
```

The command-line options may be prefixed with either a forward-slash (/) or a hyphen (-). Multiple files can be specified for the *Filename* parameter, each separated by space characters. Long file names should be enclosed in double-quote marks (").

Goto /G:

The /G: command-line option causes the IDE to move the caret to the row and column specified. For example, /G:10,20: cause the caret to start at line 10, column 20. The /G option must be terminated by a trailing colon.

```
PBEDIT.EXE /G:10,20: "Project Bluepad.bas"
```

Primary Source File /P:

The /P: command-line option specifies the name of the file that will be set as the Primary Source File. This option is useful when working on large applications that span multiple source code files, especially when loading multiple files at startup. When a compile/execute/debug operation begins, the IDE automatically uses the Primary Source File as the "main" file, regardless of which other files are loaded or have focus in the IDE.

The Primary Source File will be one of the files loaded into the IDE.

```
PBEDIT.EXE /P:Project.bas "Support Library.inc" Project.rc "Data file index.txt"
```

Debug File /D

The /D command-line option specifies the name of the file launch in the debugger when the IDE is loaded.

```
PBEDIT.EXE /D "My File.bas"
```

See Also

[The PowerBASIC User Interface](#)

[Toolbar Buttons](#)

[Editor Hot Keys](#)

[IDE Context Menu](#)

[Custom Help Files](#)

[File Templates](#)

[Code Finder Dialog Box](#)

[Command Line Dialog Box](#)

[Debugger Evaluate Dialog Box](#)

[Find Dialog Box](#)

[Go to Line Dialog Box](#)

[Primary Source File Dialog Box](#)

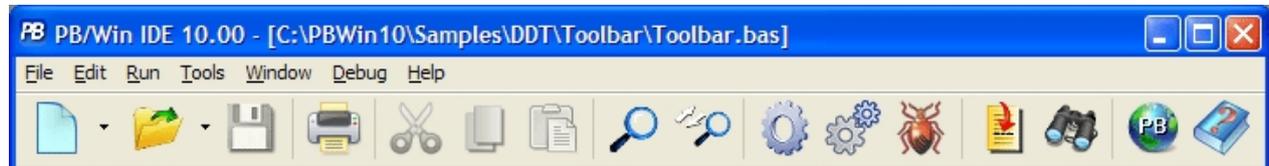
[Replace Dialog Box](#)

[IDE Options](#)

The PowerBASIC User Interface

The PowerBASIC User Interface

The [PowerBASIC IDE](#) was designed to provide you with the tools you need to quickly and intuitively develop high-performance applications. This section briefly describes each element of the IDE.



- [File Menu](#)
- [Edit Menu](#)
- [Run Menu](#)
- [Tools Menu](#)
- [Window Menu](#)
- [Debug Menu](#)
- [Help Menu](#)

Toolbar Buttons

Toolbar Buttons



Create a new empty document (file) in the [editor](#).



Use the Open File dialog box to load an existing document.



Save the current document if it has been modified and unsaved.



Print the current document to a printer.



Cut the selected text from the document to the clipboard.



Copy the selected text from the document to the clipboard.



Copy the text from the clipboard into the current document.



Search the current document for a word or phrase. See [Find dialog](#) for more information.



Search the current document for a word or phrase and replace it. See [Replace dialog](#) for more information.



Compile the current source document (or *Primary Source File* if specified).



Compile and Execute the current (or Primary) source document



Compile and Debug the current (or Primary) source document.



Launch the [Go to Line dialog](#) to jump to a specific line in the current document.



Launch the [Code Finder dialog](#), which presents a list of [Subs](#), [Functions](#), [Methods](#), [Properties](#), and [Macros](#) in current document, to quickly jump to a selected section of code.



Launches the PowerBASIC web site.



Display the PowerBASIC or the WIN32.HLP file.

See Also

[Debugger Toolbar Buttons](#)

[The PowerBASIC User Interface](#)

[Editor Hot Keys](#)

Editor Hot Keys

Editor Hot Keys

The following table summarizes the hot-keys available in the [PowerBASIC IDE](#) Editor Window:

| Keystroke | Description |
|----------------|---|
| F1 | Dynamic Help |
| F2 | Code Finder dialog |
| F3 | Find dialog/Find next |
| SHIFT+F3 | Find previous |
| F4 | Duplicate current line |
| CTRL+F4 | Close current document |
| ALT+F4 | Exit PBEDIT |
| F5 | Compile and debug (if in edit mode) or Run program (if in debug mode) |
| CTRL+F5 | Animate program. |
| F6 | Clear to end-of-line |
| CTRL+TAB | Switch to the next document window |
| CTRL+F6 | Switch to the next document window |
| SHIFT+CTRL+TAB | Switch to the previous document window |
| CTRL+SHIFT+F6 | Switch to the previous document window |
| F8 | Step into next program line (when debugging) |
| CTRL+SHIFT+F8 | Step out of current procedure (when debugging) |
| SHIFT+F8 | Step over next program line (when debugging) |
| CTRL+F8 | Run to caret (when debugging) |
| F9 | Break (stop the program being debugged) |
| CTRL++ | Increases the IDE's Font size |
| CTRL+- | Decreases the IDE's Font size |
| SHIFT+INSERT | Paste text from clipboard |
| SHIFT+DELETE | Cut text to clipboard |
| CTRL+DELETE | Cut text to clipboard |
| CTRL+INSERT | Copy text to clipboard |
| CTRL+HOME | Move to start of document |
| CTRL+END | Move to end of document |
| CTRL+PAGEUP | Move to start of document, maintaining caret position on screen |
| CTRL+PAGEDOWN | Move to end of document, maintaining caret position on screen |
| CTRL+ALT+G | Insert a GUID |
| CTRL+ALT+O | Display the Open Project dialog box. |
| CTRL+ALT+P | Primary Source File Dialog |
| SHIFT+CTRL+S | Save all opened files |
| CTRL+0 | Go to bookmark 0 |
| ALT+0 | Set bookmark 0 |
| CTRL+1 | Go to bookmark 1 |
| ALT+1 | Set bookmark 1 |
| CTRL+2 | Go to bookmark 2 |
| ALT+2 | Set bookmark 2 |
| CTRL+3 | Go to bookmark 3 |
| ALT+3 | Set bookmark 3 |
| CTRL+4 | Go to bookmark 4 |
| ALT+4 | Set bookmark 4 |
| CTRL+5 | Go to bookmark 5 |
| ALT+5 | Set bookmark 5 |

| | |
|--------------|--|
| CTRL+6 | Go to bookmark 6 |
| ALT+6 | Set bookmark 6 |
| CTRL+7 | Go to bookmark 7 |
| ALT+7 | Set bookmark 7 |
| CTRL+8 | Go to bookmark 8 |
| ALT+8 | Set bookmark 8 |
| CTRL+9 | Go to bookmark 9 |
| ALT+9 | Set bookmark 9 |
| TAB | Indent marked block by one tab level |
| SHIFT+TAB | Outdent marked block by one tab level |
| SPACE | Indent marked block by one space |
| SHIFT+SPACE | Outdent marked block by one space |
| CTRL+A | Select all |
| ALT+B | Toggle Bookmark |
| CTRL+B | Go to Bookmark dialog |
| ALT+C | Copy text to the clipboard as BB Code for posting in the PowerBASIC Forums . |
| CTRL+C | Copy text to the clipboard |
| CTRL+D | Duplicate current line |
| CTRL+E | Build and Execute |
| CTRL+F | Find dialog |
| CTRL+G | Go to Line dialog |
| CTRL+I | Toggle auto-indent mode |
| CTRL+K | Clear to end-of-line |
| CTRL+L | Select current line |
| CTRL+M | Compile the current document (or primary source file , if any) |
| CTRL+N | Create a new document, using the default file template |
| CTRL+O | Open an existing document |
| CTRL+P | Print the current source document |
| CTRL+Q | Comment -out marked block |
| CTRL+SHIFT+Q | Uncomment -out marked block |
| CTRL+R | Find and Replace dialog |
| CTRL+S | Save the current document |
| CTRL+T | Delete the word at the caret |
| CTRL+U | Paste text from clipboard |
| CTRL+V | Paste text from clipboard |
| CTRL+X | Cut text to clipboard |
| CTRL+Y | Cut current line to clipboard |
| CTRL+Z | Undo last change |

IDE Context Menu

IDE Context Menu

When editing a file in the PowerBASIC [IDE](#), a popup context menu is available by right-clicking the mouse within the edit window. The available content of the menu is automatically determined by position and text located at the point where the context menu is activated. The full context menu looks like this:

| | |
|-------------------|------------|
| Delete | |
| Cut | Ctrl+X |
| Copy | Ctrl+C |
| Copy as BBCode | Alt+C |
| Paste | Ctrl+V |
| Insert File... | |
| <hr/> | |
| Select Line | Ctrl+L |
| Select Block | |
| Select All | Ctrl+A |
| <hr/> | |
| Insert GUID | Ctrl+Alt+G |
| Run to Caret | Ctrl+F8 |
| <hr/> | |
| Watch Variable | |
| Evaluate Variable | |
| <hr/> | |
| Toggle Bookmark | Alt+B |
| Toggle Breakpoint | F9 |
| <hr/> | |
| Help | F1 |
| Open Include File | |
| <hr/> | |
| Close File | |

| | |
|--------------------------|---|
| Delete | Delete the currently selected block of text. |
| Cut | Copy the currently selected block of text to the clipboard, and delete the highlighted block from the file. |
| Copy | Copy the currently selected block of text to the clipboard. |
| Copy as BBCode | Copy text to the clipboard as BB Code for posting in the PowerBASIC Forums . |
| Paste | Paste the contents of the clipboard into the current file. |
| Insert File | Insert a document (file) at the caret position in the current document. |
| Select Line | Select (highlight) the complete line at the context-menu point. |
| Select Block | Select (highlight) a complete block of code. This menu item is available when the context menu is activated on the first line of a formal block. Formal blocks include those that begin with the #PBFORMS metastatement (PB/Win only), the FOR/NEXT and SELECT CASE blocks, plus the usual CALLBACK , CLASS , FUNCTION , METHOD , PROPERTY , SUB , TYPE , and UNION statements. |
| Select All | Select all the text in the current document. |
| Insert GUID | Inserts a new unique GUID at the current insertion point. |
| Run to Caret | Run the program until execution reaches the current caret position (debug mode only). |
| Watch Variable | Add the variable at the current caret position to the Variable Watcher window (or remove it, if it s already there). The Variable Watcher window is visible only in debug mode. |
| Evaluate Variable | Evaluate or modify the variable at the current caret position (debug mode only). |
| Toggle Bookmark | Add or remove a bookmark at the current caret position. |
| Toggle Breakpoint | Add or remove a breakpoint at the current caret position. Breakpoints only work in debug mode. |
| Help | Launch context-sensitive help. If the context menu point is on a PowerBASIC keyword, the appropriate topic is displayed in the PowerBASIC help file. If the context point is not a recognized keyword, the WIN32.HLP file is launched instead. This feature is useful for context-sensitive help on both reserved keywords, and API |

functions and data structures, etc.

- Open Include File** Open the file indicated in the [#INCLUDE](#) metastatement at the context menu point. The item is only enabled when the context menu point is targeting an [#INCLUDE](#) metastatement. Open File works even if the [#INCLUDE](#) metastatement is commented out.
- Close File** Closes the current document.

See Also

[The Integrated Development Environment](#)

[Debugging PB/Win Programs](#)

File Templates

File Templates

A *file template* is the framework for a new file, which you can load into the [IDE](#) with the "New File As..." option. While a template can contain anything you like, it is typically used to automate the basic boilerplate needed for a new document. For example, the "Generic PB program" template creates a new file with the following information already filled out:

```
#COMPILE EXE
#DIM ALL

FUNCTION PBMAIN ( ) AS LONG

END FUNCTION
```

What's more, the caret is conveniently placed in the middle of the [FUNCTION](#) block for you, letting you get right to programming!

You can readily build templates of your own, or modify the ones that come with the IDE. A template is simply a text file created according to a few simple rules. Let's look at the default template (you can load it into the IDE, NotePad, or any other text editor). PowerBASIC templates use ".PBTPPL" for their file extension. The default template is "Default.pbtpl", then. You can find it in the Bin subdirectory for your compiler ("C:\Program Files\PBWin10\Bin", by default).

The first line starts out with a number:

```
2
```

This is the template version number, 2 (two). Version 1 (one) templates are still supported.

The second line contains the target. The target may be PBCC, PBWIN, or CCWIN. If it is CCWIN, any following lines that start with [PBCC] are used for PB/CC, any lines that start with [PBWIN] are used for PB/Win, and any lines without a [target] apply to both compilers.

The third line contains the file extension to apply to files that are created with this template:

```
.bas
```

The fourth and fifth lines gives the name of the template, which will be used in the "New File As..." menu:

```
[PBCC]Console program
[PBWIN]Generic PB program
```

The following lines give the text to be filled into the file created by the template. There is one special character, the "|" vertical bar or pipe symbol. This indicates where the caret should be placed after the text is filled in.

```
#COMPILE EXE
#DIM ALL
```

```
FUNCTION PBMAIN ( ) AS LONG
```

```
|
```

```
END FUNCTION
```

That's all there is to it!

After creating a new template, save the .PBTPL file in the Bin subdirectory for your compiler. The default location for this is, typically, "C:\Program Files\PBWin10\Bin\". Now, the next time you start the PowerBASIC IDE, your custom template will be available on the "New File As..." menu.

See Also

[The Integrated Development Environment](#)

[Project Files](#)

Project Files

Keyword Template

Purpose

Syntax

Remarks

See also

Example

Project Files

A project file is used to speed up the process of loading multiple source code files, especially when the source files are saved in different directories. Project files support a list of files, their scrolling position and caret position, a primary file, the active tab, breakpoints, bookmarks, command line list, and the debug Watch list. When the IDE is closed, any open tabs are saved as a default project. When you open a project file all the individual source code files are opened in the IDE. There is no limit to the number of files that may make up a project.

A project file is saved with an extension of .PBPRJ extension, unless the list of project file extensions has been modified, see the [Editor Preferences](#) topic for information on modifying the extensions used for project files.

See Also

[The PowerBASIC Integrated Development Environment](#)

[File Templates](#)

Custom Help Files

Custom Help Files

The [PowerBASIC IDE](#) has built-in context-sensitive help for PowerBASIC keywords. If the caret is placed on a keyword when you invoke help, you will get help for that specific keyword. Now, you can add context-sensitive help for your own help files. Here's how.

For each help file, create a text file with a name of your choice, with a file extension of .PBKeys (using the PowerBASIC IDE, NotePad, or any other text editor). The first line of the text file must contain the name of the help file, as it will be shown in the IDE's help menu, like so:

```
MenuName="PowerTree 1.1"
```

The next line of the PBKeys file specifies the name and location of the help file. If the help file is in the same directory as the .PBKeys file, you can specify just the filename, without the path. Otherwise, you must provide a fully-qualified absolute path:

```
HelpFile="C:\PTreeW11\PwrTree.hlp"
```

Each following line specifies a help keyword. This keyword must be present in the index of the help file, in order for context-sensitive help to work.

```
HelpKey="AccessBlock"
HelpKey="ptCreateIndex"
HelpKey="ptAdd"
...and so forth.
```

When you're done, save the .PBKeys file in the Bin subdirectory for your compiler. The default location for this is, typically, "C:\PBWIN10\Bin\". Now, the next time you start the PowerBASIC IDE, your custom keywords will be recognized by the context-sensitive help system. You will also be able to load the help file from the Help menu.

If your help file does not appear in the Help menu when you start the IDE, make sure the HelpFile line of the .PBKeys file specifies the correct location and name for your help file.

The complete PowerTree .PBKeys file, "PowerTree 1.1.PBKeys", is already installed in your compiler's Bin subdirectory. **Please note** that the custom help list is only loaded if you have PowerTree 1.1, and it's installed at the location specified in the HelpFile line of the PBKeys file.

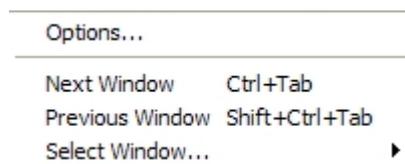
See Also

[The Integrated Development Environment](#)

IDE Options

IDE Options

IDE Options



The section describes the options that are available to customize the [IDE](#) environment, file paths, and compiler behavior. These options are divided into eight tabs:

| Tab Name | Description |
|----------|-------------|
|----------|-------------|

| | |
|------------------------------|---|
| File tab | Settings for backups, tab compression, and most recently used file list. |
| Editor tab | Settings for file extensions, editor preferences, and Keyword case changes. |
| Fonts tab | Font settings for the source code tabs. |
| Color tab | Syntax color settings for editing and printing |
| Compiler tab | Settings for the compiler. |
| Debugger tab | Settings for the debugger. |
| General tab | General configuration settings and options. |

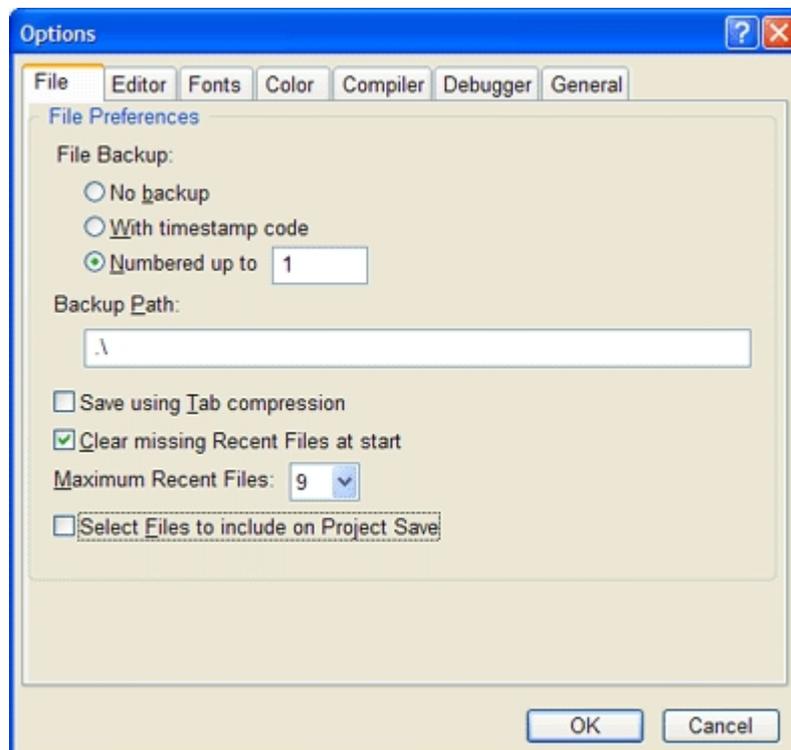
See Also

[The Integrated Development Environment](#)

[Debugging PB/Win Programs](#)

File tab

File Preferences

**No Backup**

When saving files, the IDE will create no backup.

With timestamp code

When saving files, the IDE will rename the previous disk file with Backup. *TimeStamp*. followed by the original filename and extension, and save the latest copy under the original filename. This option provides a simple method of preserving the previously saved versions of the source code.

Numbered up to

When saving files, the IDE will rename the previous disk file with Backup. #. followed by the original filename and extension, and save the latest copy under the original filename. You may specify the maximum number of backups to be from 0 to 99. This option provides a simple method of preserving the previously saved versions of the source code.

Backup Path

The default backup path is ".\", which is the current path of the file. That is, the backup file will go to the same location as the original file. You may enter either a relative path or absolute path here. For example, you may specify a backup path of

"C:\Backup\" to place all of your backup files in the C:\Backup folder. Or, you might specify a backup path of ".\Backup\" to place all of your backup files in a Backup folder underneath the location of the original file. If the specified backup path does not exist, the IDE will attempt to create the path when it is needed.

Save using tab compression

When saving files, the IDE can compress leading spaces on every line into tabs, using the tab size specified under Editor Preferences. This helps maintain your preferred indentation levels when working with others who choose different tab sizes. It also reduces your source file size.

Clear missing recent files at start

The IDE checks the Recent Files list (located in the *File* menu) at start up. If any file cannot be located and read, the corresponding entry in the Recent Files list is automatically removed. Where files are located across a network or removable media, this option may need to be unchecked.

Maximum Recent files

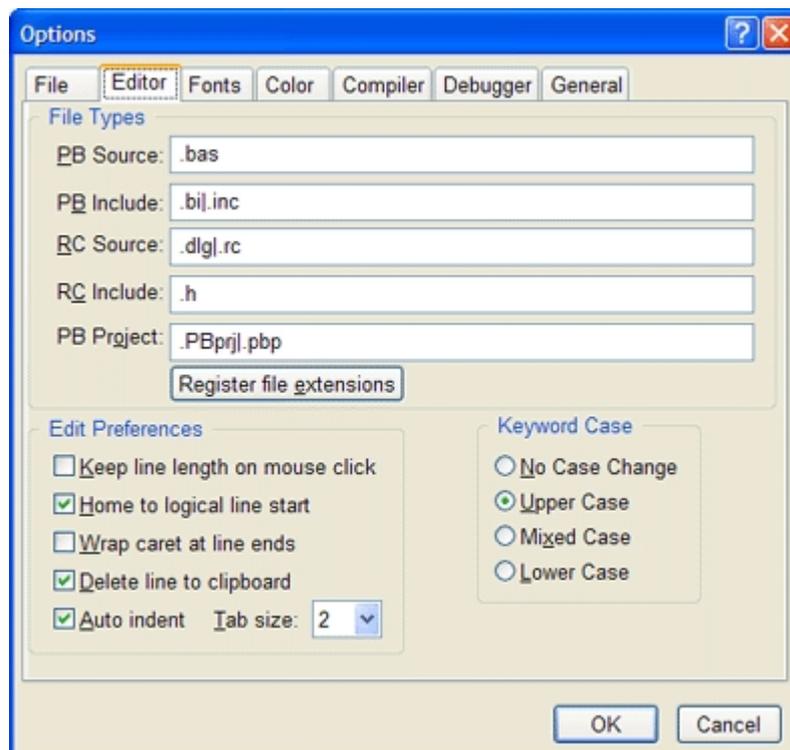
Specifies the maximum number of Recent Files tracked in the File menu, in the range of 0 through 9. Select 0 to disable the Recent Files list; otherwise, the selected number of previous files is tracked between sessions. Also see Reload previous file set at start.

Select Files to include on Project Save

When this option is selected you will be prompted to select which files should be included in the [project](#) when saving a project.

Editor tab

Editor Preferences



PB Source

This is the file extension, or list of extensions, you expect to use for main PowerBASIC source code modules: programs you can compile directly. You may enter multiple extensions by separating each with the vertical bar or "pipe" character, "|". The default setting for PB Source is ".bas".

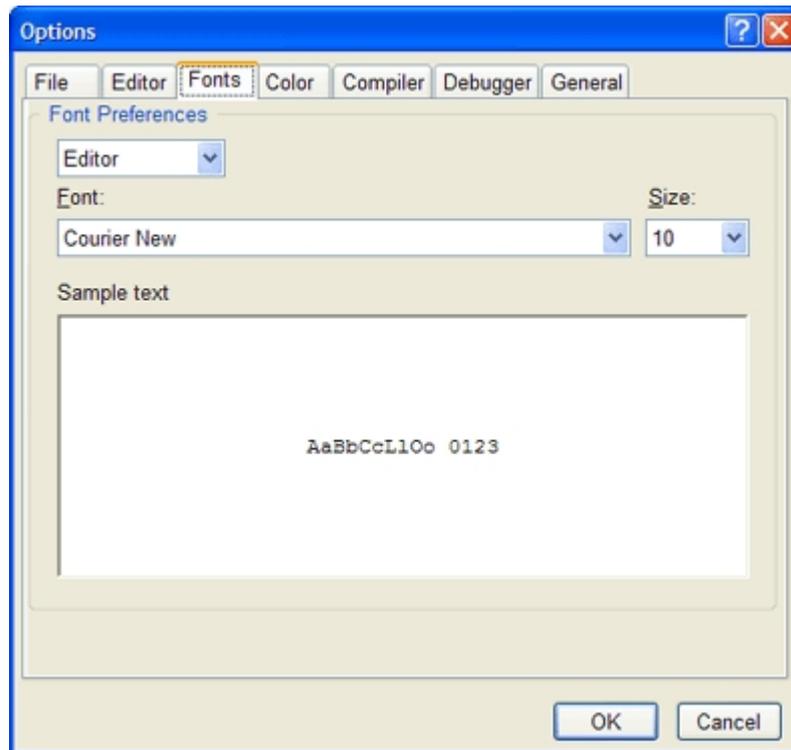
PB Include

This is the file extension, or list of extensions, you expect to use for PowerBASIC include files: bits of code that you will [#include](#) in a main module before compiling. You may enter multiple extensions by separating each with the vertical bar or "pipe"

| | |
|-----------------------------------|--|
| | character, " ". The default setting for PB Include is ".bjl.inc". |
| RC Source | This is the file extension, or list of extensions, you expect to use for resource scripts : programs that are compiled with the RC.EXE resource compiler . You may enter multiple extensions by separating each with the vertical bar or "pipe" character, " ". The default setting for RC Source is ".dlgl.rc". |
| RC Include | This is the file extension, or list of extensions, you expect to use for your PowerBASIC include files: bits of code that you will #include in a resource script before compiling with the RC.EXE resource compiler. You may enter multiple extensions by separating each with the vertical bar or "pipe" character, " ". The default setting for RC Include is ".h". |
| PB Project | This is the file extension, or list of extensions, you expect to use for your PowerBASIC Project files . You may enter multiple extensions by separating each with the vertical bar or "pipe" character, " ". The default setting for a project file Include is ".PBprj.prj". |
| Register file extensions | Check this box to register your selected file extensions with Windows. This allows Windows to automatically load files with these extensions into the PowerBASIC IDE when you click on a file in Explorer, or launch it from the Start menu, for example. |
| Keep Line Length | Clicking the mouse cursor beyond the right-most character of a line does not extend the line beyond the end of the actual text content. |
| Home to logical line start | The Home key functions according to VB6 rules if this option is selected. |
| Wrap Caret at Line Ends | Check this box to have left-arrow wrap to the previous line, and right arrow wrap to the next line, instead of stopping at the start or end of the current line. |
| Delete line to clipboard | When this option is selected a line deleted from the source code is placed on the clipboard. |
| Auto Indent | The IDE provides automatic indenting when <i>ENTER</i> is pressed, in order to assist with writing visually structured code. The Indent depth depends on the context of the text on the preceding line. For example, if the previous line starts with the word FUNCTION , the following line is automatically indented. Auto-indent can be toggled from within the editor with the <i>CTRL+I</i> hot-key combination. See Tab Size. |
| Tab Size | The number of characters between "tab stops", in the range 1 through 8 inclusive. When the <i>TAB</i> key is pressed, the IDE substitutes space characters to move the caret to the next tab stop position. Tab Size also affects the Auto Indent depth. |
| Keyword Case | The IDE automatically sets the capitalization of reserved keywords as directed by this option. The use of capitalization can help readability of code. By default, the IDE applies keyword capitalization to BASIC source code files only, which are determined by the file extensions set under Compiler Preferences. Use care when applying capitalization to resource files (for example, .RC files, .H, and .DLG files) as these usually contain case-sensitive keywords. Custom keyword colors can be configured in the Color Preferences page , and the editor font can be configured on the Font Preferences page . |

Fonts tab

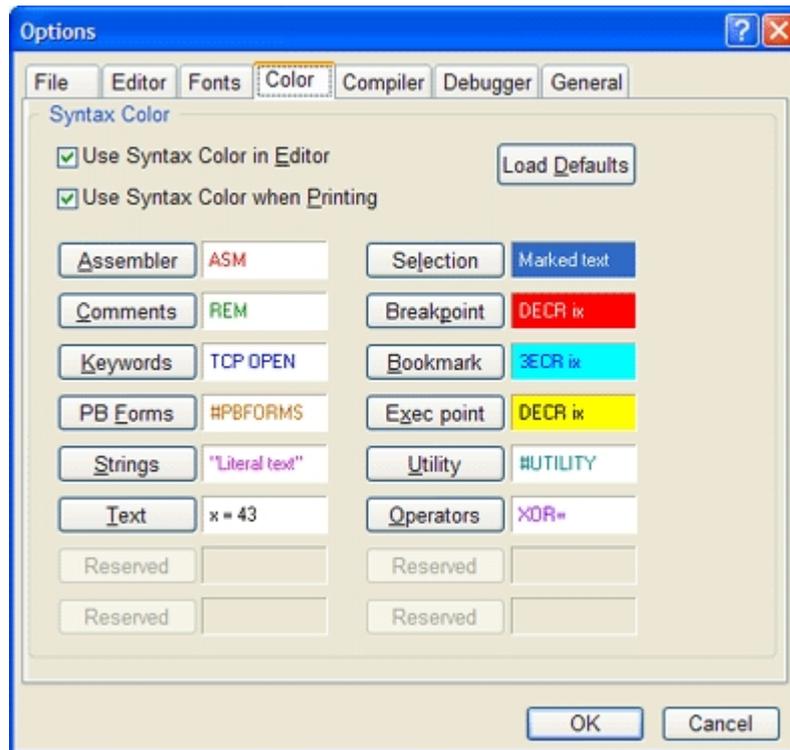
Font Preferences



- Combobox** Select the location (Editor, Dialogs, or Printer) of where you want to change the font.
- Font** The currently selected font.
- Size** The desired point size of the font.
- Sample Text** How the text will appear with the selected font and at the selected font size.

Color tab

Syntax Color Preferences



Use Syntax Color in Editor

The [IDE](#) can show colored reserved keywords and other types of syntax in the source code file. Both the text (foreground) and background colors can be individually customized for each syntax type. The use of highlighting can increase readability of code. Also see *Use Syntax Color when Printing*.

Use Syntax Color when Printing

The IDE can optionally print source code with coloring applied to the reserved keywords and other syntax types. Printing with syntax coloring enabled only affects the text (foreground) - background coloring is not printed. Also see *Use Syntax Color in Editor*.

Load Defaults

Reset the syntax color table back to the default color scheme.

Assembler

Launch the color selection dialog to choose the text (foreground) and background colors for inline assembler code.

Comments

[Comments and REM](#) statement syntax color.

Keywords

The syntax coloring applied to reserved keywords.

PB Forms

The coloring applied to [PowerBASIC Forms™](#) named-block metastatements. Note: PowerBASIC Forms™ is a GUI visual design tool, and therefore IDE support for it is currently restricted to the PowerBASIC for Windows product line. In the [Console Compiler's](#) IDE, the PB Forms syntax option is disabled, and reserved for future use.

Strings

The syntax coloring applied to [literal strings](#).

Text

The remaining types of syntax. Typically, this includes variable names, API function names, etc.

Selection

The color used when selecting (highlighting) blocks of text, for example, in anticipation of clipboard operations such as Cut/Copy/Paste, etc.

Breakpoint

The color used to highlight a [breakpoint](#).

Bookmark

The color used to highlight a bookmark.

Exec point

The color used to highlight the execution point, which is the next line to be executed in the [debugger](#).

Utility

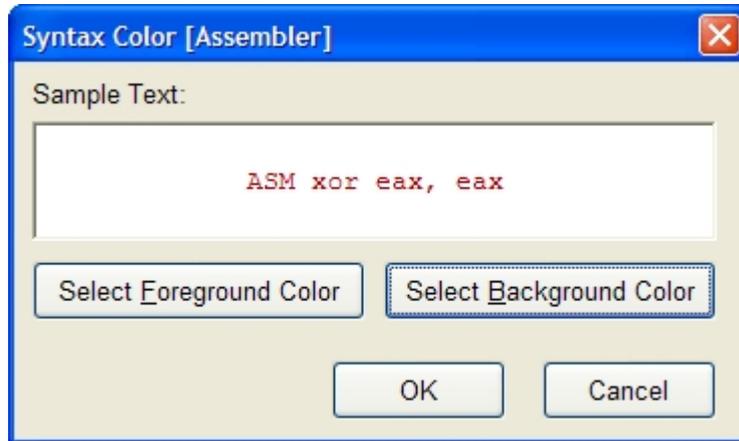
The syntax coloring applied to [#UTILITY](#) metastatements.

Operators

The syntax coloring applied to

Syntax Color Selector

Syntax Color Selector



Sample Text

Preview of the current foreground and background color selected.

Select Foreground color

The launches the [Syntax Custom Color Selector dialog](#) to adjust the text color.

Select Background color

The launches the [Syntax Custom Color Selector dialog](#) to adjust the background color.

OK

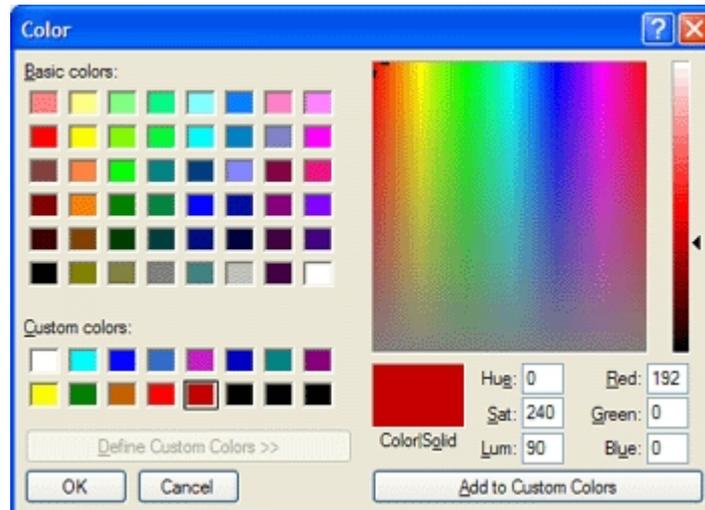
Accept the current text and background color selections, and return to the Options dialog.

Cancel

Abort the Syntax Color Selector dialog without making any changes to the color settings.

Syntax Custom Color Selector

Syntax Custom Color Selector



Basic Colors

Set of basic colors determined by the display driver.

Custom Colors

Displays any custom colors you have already defined. To Change a custom color, click on it and then click the Define Custom Colors button. When you have selected the color click the Add to Custom Colors button. To define a new custom color, click on an empty custom color and then click the Define Custom Colors button. Select the new color and then click the Add to Custom Colors button.

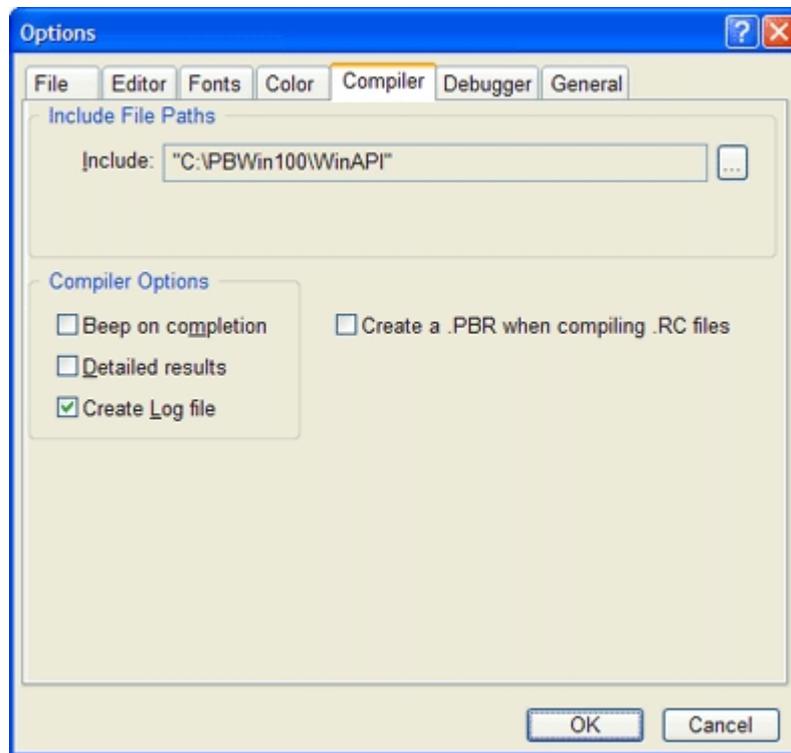
Define Custom colors

Displays the Color Map.

| | |
|--------------------|--|
| [Color Map] | A color map based on the current display color-depth, to facilitate easy selection of custom colors. To choose a color, click on the desired point in the color map. |
| Color Solid | Displays the color selected in the Color Map. |
| Hue | Displays the hue of the color selected in the Color Map. |
| Sat | Displays the saturation of the color selected in the Color Map. |
| Lum | Displays the hue of the color selected in the Color Map. |
| Red | Displays the red value of the color selected in the Color Map. |
| Green | Displays the green value of the color selected in the Color Map. |
| Blue | Displays the blue value of the color selected in the Color Map. |

Compiler tab

Compiler Preferences



Include File Paths

Include The path (or paths) where the Compiler may search for source code files referenced in [#INCLUDE](#) metastatements, and PBR and RES files referenced with [#RESOURCE](#) metastatements. Multiple paths are automatically separated with semi-colons. Use the Ellipsis button (...) to adjust the Include path settings - see [Browsing for Include folders](#) for more information. Note that this field behaves identically to the /I command-line compiler parameter.

Compiler Options

Beep on completion The *default system sound* is played when compilation is completed successfully. The default system sound can be changed in Control Panel.

Detailed results After compilation of PowerBASIC source code, the output pane will display detailed compilation results, providing details on compiled code size, data and [string literal](#) size, code extracted, etc. With this option turned off only a successful compilation message or [compile time error](#) message will be displayed.

Create log file

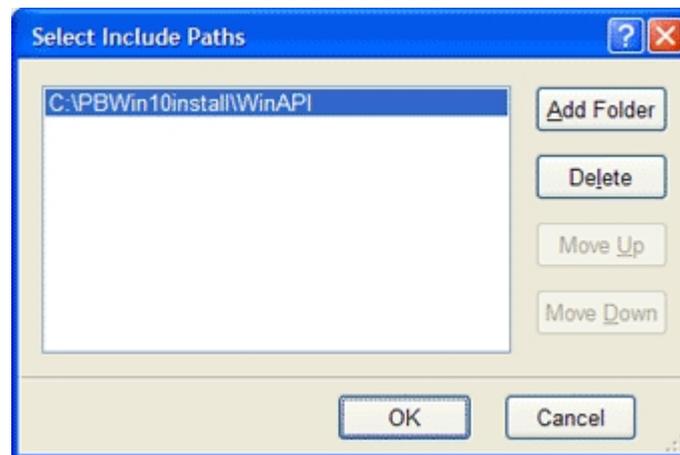
During compilation, a log file is created in the same directory as the [primary source file](#). The log file contains the same information as the Display Results dialog discussed above. The file is assigned the same "base name" as the main source code file, but with the extension .LOG (i.e., PROJECT1.LOG). In case of a compile-time error, this log file will contain details of the nature of the error (in addition to the compile-time error message display produced by the compiler itself).

Create a .PBR when compiling .RC files Specify this option to create a .PBR file when compiling a .RC [resource file](#).

Browsing for Include folders

Browsing for Include folders

The Include Paths Selection dialog provides a simple method of creating an Include file list for the PowerBASIC compiler, and the [Resource Compiler](#). The Include folder list specifies the search order that the compilers use to locate [#INCLUDE](#) and [#include](#) files. The Include Paths Selection Dialog box is launched by the Ellipsis buttons on the [Compiler Preferences](#) tab page.

**Folder list**

The list of folders in a drag list control. The folders appear in the order in which the compiler search for [#INCLUDE](#) (PowerBASIC) or [#include](#) (Resource Compiler) files. There are two ways to rearrange the order of folders:

1. Click and drag the individual folder names up and down in the Folders List; or...
2. Select (highlight) a folder and use the Move Up and Move Down buttons to reposition the folder in the list.

Add Folder

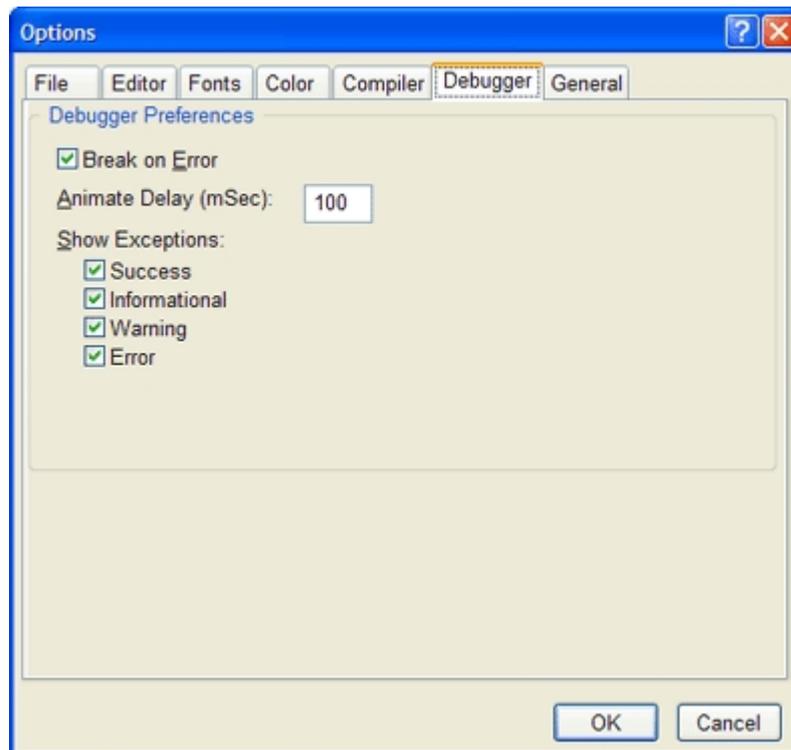
Launch the standard Windows "Browse for Folder" dialog, where the folder tree can be navigated. The default folder is the currently selected folder in the Folders list to the left of the Add Folder button or the current folder if none are selected. The Browse for Folder dialog looks like this:



- Delete** Delete the currently selected folder. If all folders are deleted, a new entry specifying the current folder is automatically created, ensuring at least one folder appears in the list.
- Move Up** Move the currently selected folder up one position in the Folders List, increasing the search priority of the selected folder. The compilers search the Folders List in the order they appear.
- Move Down** Move the currently selected folder up down position in the Folders List, decreasing the search priority of the selected folder. The compilers search the Folders List in the order they appear.
- OK** Accept all changes to the Folders List, and return to the Compiler Preferences dialog.
- Cancel** Cancel any changes made to the Folder List, and return to the Compiler Preferences dialog.

Debugger tab

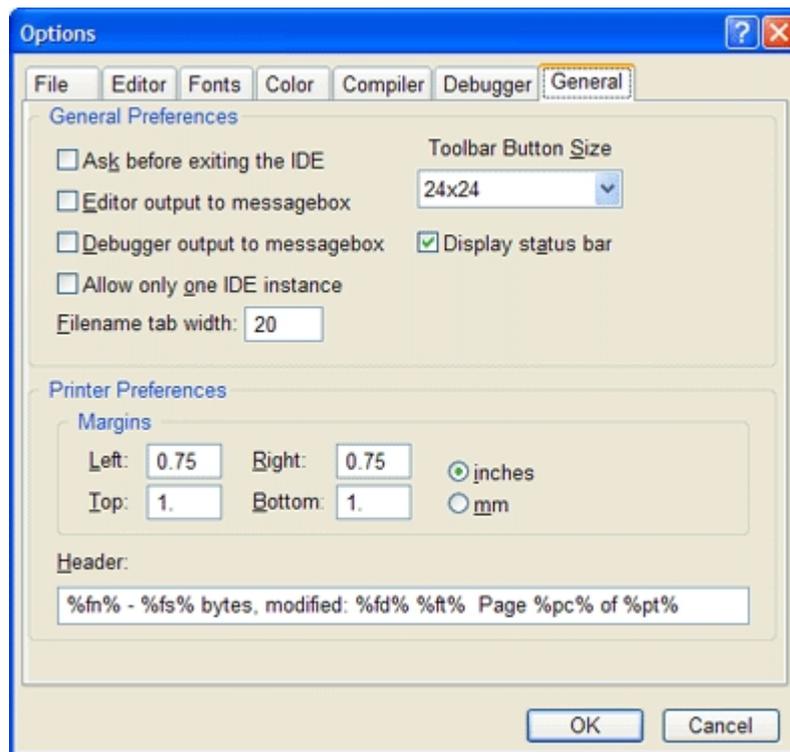
Debugger Preferences



- Break on Error** Causes the [debugger](#) to stop after every statement to check the error status and then automatically halt program execution when an error occurs (non-zero [ERR](#) value). In debugging with this setting enabled, programmed with larger iteration counts can reduce debugging speed to unacceptable levels. For best results, it is instead recommend to enable [#DEBUG ERROR ON](#) in your program instead of this option.
- Animate Delay** The debugger's *Animate* debug mode pauses for at least the given amount of time before execution of the next line of code occurs. Animation is very useful for watching the general flow of a program. The delay is specified in milliseconds (*mSec*). The larger the delay value, the greater the delay between execution of lines of code. The default value is set for 333 milliseconds (1/3 of a second).
- Show Exceptions** Choose the exceptions (Success, Informational, Warning, Error) you want the debugger to display.

General tab

General Preferences



General Preferences

Ask before exiting

When selected, a confirmation dialog will appear when the IDE is about to be closed. Canceling the dialog will prevent the IDE from closing. The IDE will always prompt to save any files that have not been saved since their last

| | |
|--------------------------------------|--|
| | <p>modification, regardless of whether this option is selected.</p> |
| Editor output to messagebox | <p>When selected, editor output (such as error codes and compilation status) is displayed using message boxes as well as the output window.</p> |
| Debugger output to messagebox | <p>When selected, debugger output (such as errors and #DEBUG PRINT information) is displayed using message boxes as well as the output window.</p> |
| Allow only one IDE instance | <p>If specified only one instance of the IDE is allowed</p> |

to be running at any one time.

Filename tab width

Specifies the width in characters that will be used to display the path and file name of the file loaded into a source code tab.

Toolbar button size

The IDE and [debugger toolbars](#) are displayed with buttons and icons at the specified size (16x16, 24x24, 32x32, or 48x48) or even with no toolbar at all, allowing the maximum amount of screen *real estate* for the editor windows. If

| | |
|----------------------------|---|
| | changed , this option comes into effect when the IDE is next launched. |
| Display status bar | Specifies if the IDE should display a status bar. |
| Printer Preferences | |
| Margins | Sets the distance between the text and the edge of the printed page (in inches). |
| inches | When selected the margins are specified in inches. |
| mm | When selected the margins are specified in millimeters. |
| Header | Sets the header to be printed on every page. If this entry is set to an empty |

string,
no
headers
are
printed.
Otherwi
se, the
header
value
may
contain
any
printable
characte
rs plus
any of
the
following
special
strings:

% C
p u
c r
% r
e
n
t
p
a
g
e
n
u
m
b
e
r

% T
p o
t t
% a
l
n
u
m
b
e
r
o
f
p
a
g
e
s

% F
f i
n l
% e

```
      n
      a
      m
      e
% F
f i
s l
% e
      s
      i
      z
      e
% F
f i
t l
% e
      t
      i
      m
      e
      (
      l
      a
      s
      t
      m
      o
      d
      i
      f
      i
      c
      a
      t
      i
      o
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      e
      )
% F
f i
d l
% e
      d
      a
      t
      e
      (
      l
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      t
      m
      o
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```

```
f
i
c
a
t
i
o
n
d
a
t
e
)
```

IDE Dialogs

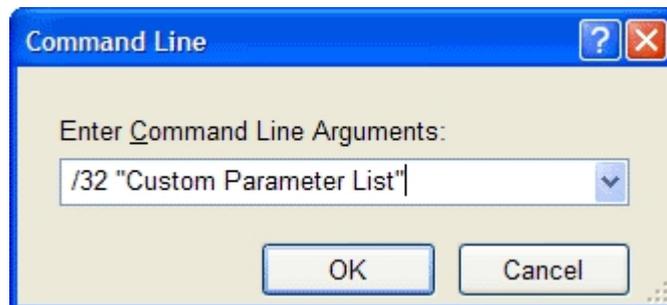
Code Finder Dialog

Command Line Dialog

Command Line Dialog Box

The Command Line Dialog allows the programmer to specify an arbitrary command-line parameter string that is passed to the application when the *Compile and Execute*, or *Compile and Debug* options are used.

The result can be read with `COMMAND$` within the program, for the purposes of testing the application.



| | |
|------------------|--|
| Arguments | An arbitrary string passed to the application in the <code>COMMAND\$</code> parameter. |
| OK | The text in the <i>Arguments</i> field is accepted and retained for the session. |
| Cancel | The previous command-line text, if any, is retained unaltered. |

See Also

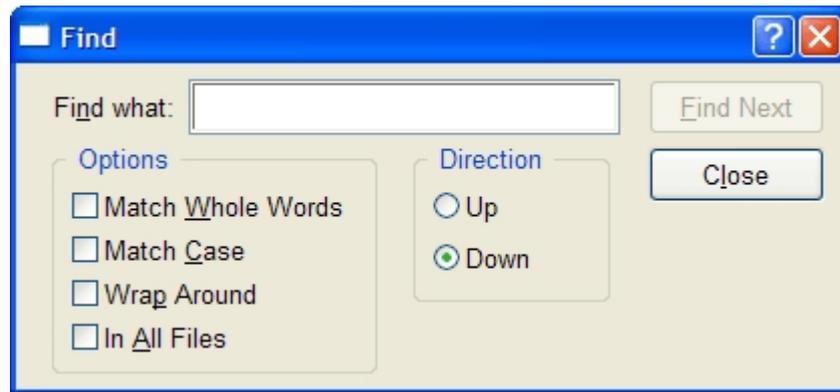
[The Integrated Development Environment](#)

Debugger Evaluate Dialog

Find Dialog

Find Dialog Box

The Find Dialog Box allows you to search the currently displayed source code file for a specific phrase or word. You can limit the number of matches by specifying options such as Match Whole Words or Match Case.



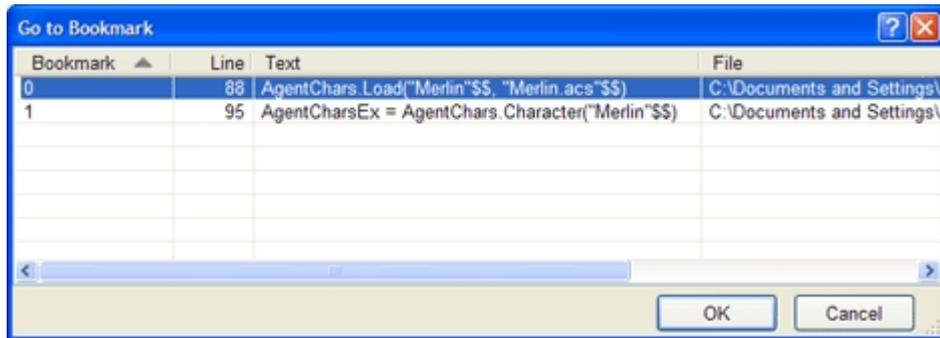
- Find What** Enter the phrase or word to search for. For example, searching for PRINT will locate every instance of that word in the current file. The text should be entered as it is anticipated to be formatted in the current file. For example, the number of spaces between words must match the number specified in the Find What field. Do not include quotes unless the anticipated match also includes quotes.
- Match Whole Words** This excludes matches that occur within a word. For example, with Match Whole Words enabled, searching for LOG will not match on DIALOG, but will match on LOG(x).
- Match Case** When Match Case is enabled, the Find What text must exactly match the capitalization of the word or phrase in the current file. For example, searching for Print will match Print, but not PRINT or print.
- Wrap Around** When enabled the Find what text you specify will be searched beginning at the place in the document where you are currently positioned, and will continue past the end (or beginning depending on the Direction specified), to the beginning (or end depending on the Direction specified) of the document. In other words, a wrap-around search will search the entire document irrespective of where you may be positioned within it.
- In All Files** The Find what text is searched across all files currently loaded in the IDE.
- Direction** By default, searching starts at the current caret position, and moves toward the end of the current file. The Direction options allow you to specify whether the search should proceed from the caret position upward toward the top of the file, instead of downward.
- Find Next** Instructs the editor to locate the next match in the current file. If no further matches are located, a notification appears. If a match is made, the matching text is highlighted in the file.
- Close** Cancel the Find Dialog. After the Find Dialog has been closed, you can repeat the last Find operation by pressing the F3 key, even if you have opened or switched to a new file. However, the Find What text is not preserved between sessions of the [IDE](#).
- Help** This help topic.

See Also

[The Integrated Development Environment](#)

Go to Line Dialog**Go to Bookmark Dialog****Go to Bookmark Dialog**

The Code Finder Dialog works from within the [editor](#) and [debugger](#), presenting a list of bookmarks that have been set with [Toggle Bookmark](#).



- Bookmark** The bookmark number.
- Line** The source code line number that contains this bookmark.
- Text** The source code text that contains this bookmark.
- File** The path and source code filename that contains this bookmark.
- OK** If valid, the IDE jumps to the line number indicated in the Line field, and the Go to Bookmark Dialog is dismissed. You can alternatively double click on a line and to jump to the indicated bookmark.
- Cancel** The Go to Bookmark Dialog is canceled, and the Caret position remains unaltered.

See Also

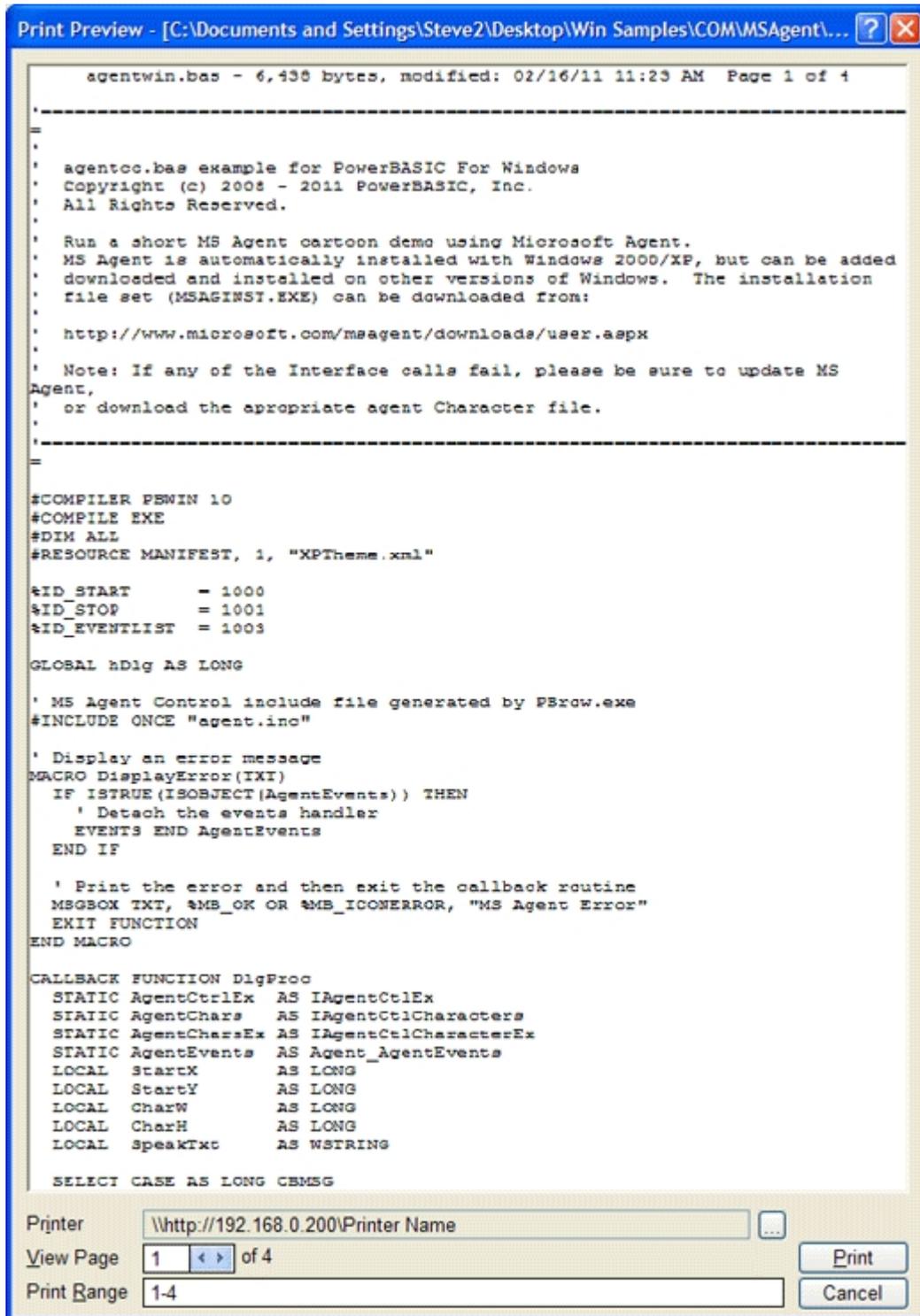
[The Integrated Development Environment](#)

[Debugging PB/Win Programs](#)

Print Preview Dialog

IDE Print Preview Dialog Box

The Print Preview dialog displays each page as it will look when printed.



[Preview Window]

Displays each page as it will look when printed.

Printer Ellipses button

Displays the name of the currently selected printer.

View Range

Displays the Printer Properties dialog box to select a new printer or change the current printers settings.

Print Range

Displays the currently previewed document page. Click the arrow buttons to preview a different page in the document.

Print Range

Allows you to limit the pages that are printed. For example 1-3 will only print pages 1, 2, and 3.

Print

Sends the selected range of pages to the printer.

Cancel

Cancels printing and closes the Preview window.

See Also

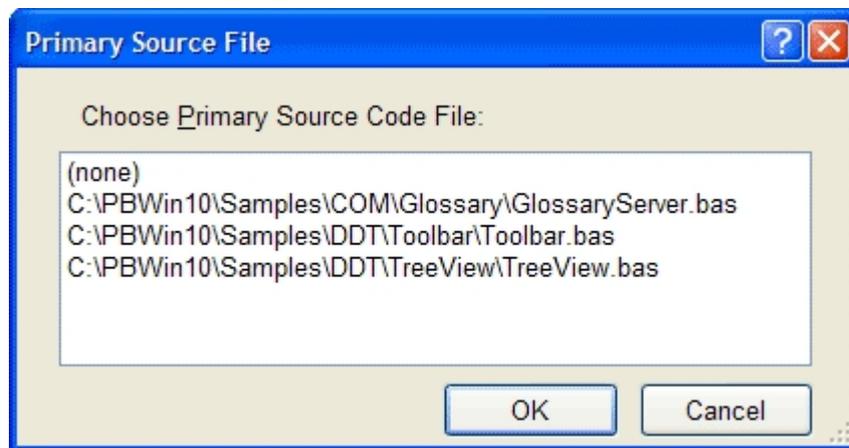
[The Integrated Development Environment](#)

Primary Source File Dialog

Primary Source File Dialog Box

The Primary Source File Dialog allows the programmer to define which source code module is regarded as the "main" program file. That is, when a compile/execute/debug operation begins, the [IDE](#) automatically uses the Primary Source File as the "main" file, regardless of which other files are loaded or have focus in the IDE.

The Primary Source File will be one of the files loaded into the IDE, and this can be via the Recent Files list (if the *Reload previous file set at start IDE* option is enabled).



Primary Source File The name of the file designated to be the main file to compile and/or debug, even when multiple files are open. Choose None to disable the Primary Source File usage.

OK The name in the Primary Source File list box is accepted and retained for the session as the "main" source code file.

Cancel The previous Primary Source File, if any, remains unaltered.

See Also

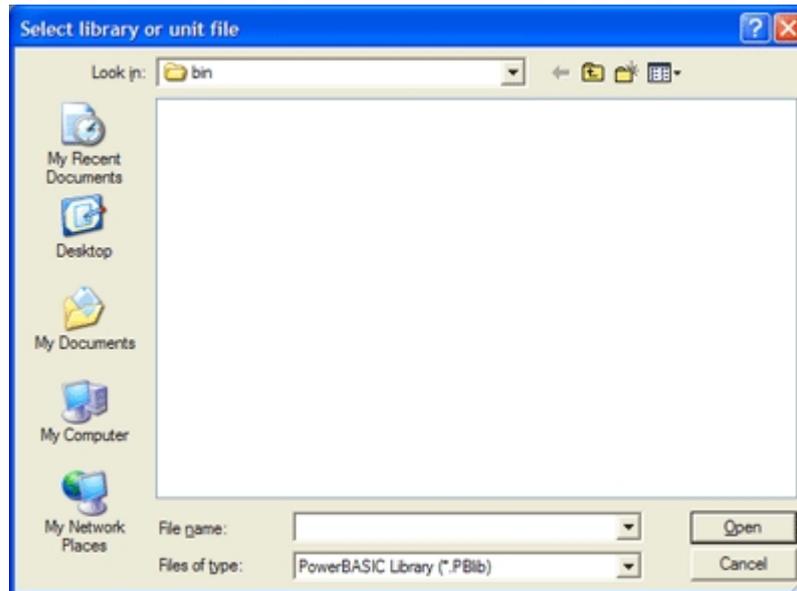
[The Integrated Development Environment](#)

Replace Dialog Box**PowerBASIC Library Manager**

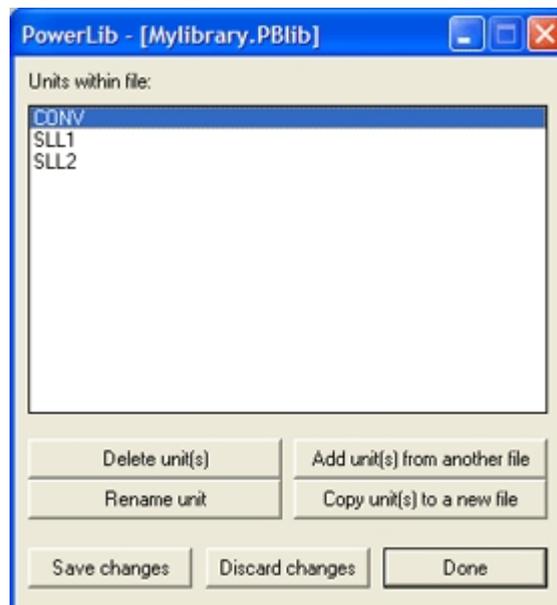
PowerBASIC Library Manager

For your convenience, multiple [SLL](#) modules may be collected into a Power Library, which is linked as a single item. You can readily add, remove, replace, or list the component SLL modules. However, the PowerBASIC Compiler treats the component modules individually, just as though they were each [linked](#) separately. A component SLL in a Power Library which is not needed is ignored entirely.

When you start the PowerBASIC Library manager you will be prompted to select a PowerBASIC Library (.PBLib) file. If you are creating a new Library file you enter the name of your new .PBLib file.



After specifying a new library or opening an existing one, you will be shown the Library Manager dialog.



| | |
|--------------------------------------|---|
| Delete unit(s) | Removes the selected file(s) from the library. |
| Add unit(s) from another file | Adds either a .SLL or .PLib file to the library. Adding a .PBLIB to the library causes all the individual units within the .PBLIB to be added to the library. If a unit is already within the library, the version within the library will be retained. |
| Rename unit | Renames a .SLL file in the library. |
| Copy unit(s) to a new file | Copies the selected SLL file out of the library and to a new SLL file name. |
| Save changes | Saves the changes to the library. |
| Discard changes | Discards any changes made in the Library Manager. |
| Done | Closes the Library Manager dialog. |

Optionally, you can also use the supplied command-line librarian Plib.exe with the following syntax:

```
plib library[.PBLIB] [commands] [,listfile [,newlibrary.PBLIB]]
```

Commands:

+filename Adds either a .SLL or .PLib file to the library.

| | |
|-----------------------------|---|
| -unitname | Removes an SLL file from the library. |
| -+filename | Replace an SLL file in library with another SLL file. |
| *unitname | Copy a SLL file out of the library. |
| -*unitname | Move a SLL file out of the library. |
| =oldunitname,newname | Renames a .SLL file in the library. |

See Also[What is an SLL?](#)[Creating a Static Link Library](#)[SLL example](#)[The PowerBASIC Integrated Development Environment](#)

Writing Programs in PB/Win

Line numbers and Labels

Line numbers and Labels

Line numbers are

in the range 1 to 65535, which serve to identify program lines. PowerBASIC takes a relaxed stance toward line numbers. They can be freely interspersed with labels, and used in some parts of a program and not others. In fact, they do not even need to follow in numeric sequence. No two lines can have the same number, and no line can have both a label and a number. Line numbers are essentially labels.

While line numbers and labels serve the same purpose, their usage is slightly different. Line numbers are just a concession to compatibility with Interpretive BASIC. Line numbering can lead to bad programming style. Since the numbers themselves can be in any order, they give a false sense of structure to a program. We recommend that you avoid line numbers, and use labels instead.

Using labels instead of numbers allows you to make the flow of your program much more readable. For example:

```
GOSUB BuildQuarks
```

tells you much more than

```
GOSUB 1723
```

Each label must appear on a line by itself (though a [comment](#) may follow) and it serves to identify the statement immediately following it. Labels must begin with a letter and contain any number of letters, digits, and an underscore. Case is insignificant - *THISLABEL*, *thislabel*, and *ThisLabel* are all the same. A colon must follow a label, however, and statements that refer to the label must not include the colon.

```
MSGBOX "Now Sorting Invoices"
```

```
GOSUB SortInvoices
```

```
MSGBOX "All Done!"
```

```
EXIT FUNCTION
```

```
SortInvoices: ' This is a legal label
```

```
{sorting code goes here}
```

```
RETURN
```

The following is illegal, however:

```
ExitPoint: a = a + 1 ' a label must be on a line by itself
```

Finally, it should be noted that symbol names must be unique: a label may not share the name of any other

symbol ([Sub](#) name, [Function](#) name, [Method](#) name, [Property](#) name, [user-defined type](#) or [union](#) definition, [variable](#) name, etc), and they are local to the Sub, Function, Method, or Property in which they appear.

See Also

[Long lines](#)

[Statement separation](#)

[Structured Programming](#)

[Variables](#)

Long lines

Long lines

The underscore character (`_`) can be used to split "logical" lines of source code, across physical lines in the source code file. The underscore character must be preceded by at least one white space character and is not supported in the [ASM statement](#).

The effect of using a line continuation character is for "visual" appearance only - the compiler itself treats lines split this way as only one contiguous line of code.

For example, if we take the following line of code:

```
DECLARE FUNCTION Call132& LIB "CALL32.DLL" ALIAS "Call132" (Param1 AS ANY, BYVAL id&)
```

We could rewrite this line to place its component parts on separate lines of code for clarity:

```
DECLARE FUNCTION Call132& _
    LIB "CALL32.DLL" _
    ALIAS "Call132" _
    (Param1 AS ANY, BYVAL id&)
```

The compiler treats text that appears after the line continuation character as a remark. However, we still recommend that such comments are preceded by a [REM](#) or an apostrophe (`'`) symbol to clearly distinguish remarks from the actual code.

```
DECLARE FUNCTION Call132& _ ' The prototype declaration
LIB "CALL32.DLL" _ ' The DLL name
ALIAS "Call132" _ ' The exported function name
(Param1 AS ANY, _ ' 1st parameter
BYVAL id&) ' 2nd parameter
```

See Also

[Line numbers and Labels](#)

[Statement separation](#)

[Structured Programming](#)

[Variables](#)

Statement separation

Statement separation

The colon character (`:`) can be used to separate multiple statements on a single (logical) line of source code. For example:

```
FOR x& = 1 TO 10 : INCR y& : NEXT x&
```

...is directly equivalent to:

```
FOR x& = 1 TO 10
  INCR y&
NEXT x&
```

In general, placing only one statement per line leads to more readable and maintainable source code; however, using the colon separator can be useful for combining statements on single-line [IF/THEN](#) statements, etc. For example

```
IF x! < 0 THEN INCR y# : INCR z# : DECR Count& : GOTO LastX
```

See Also

[Line numbers and Labels](#)

[Long lines](#)

[Structured Programming](#)

[Variables](#)

Variables

Variables

Variables represent

or values. Unlike constants, the value of a variable can change during program execution. Like [labels](#), variable names must begin with a letter and can contain up to 255 letters and digits (although in practical terms you really cannot exceed the length of a line). Be generous in naming important variables. In PowerBASIC, long variable names *do not* steal run-time memory.

The [Single-precision](#) variables, *EndOfMonthTotals* and *emt*, both require exactly four bytes of run-time storage. A good rule of thumb is to preserve a balance, keeping variable names short enough so that statements can fit on one line. Many programmers use single-letter variables for

counters (i, j, k, l and x, y, z are favorites). However, you can use names like *count*, *total*, *index*, and so on for greater clarity, especially if you have nested loops.

PowerBASIC has many built-in variable types: [Dynamic string](#); [Fixed-length string](#); [nul-terminated string](#); [Field](#), [Integer](#); [Long integer](#); [Quad integer](#); [Byte](#), [Word](#); [Double word](#); [Single](#); [Double](#); and [Extended floating point](#); [Currency and CurrencyX](#); [Variant](#), [Object](#), [Guid](#), plus [Pointer](#), [arrays](#), and [Bit and Sbit bitfield subtypes](#).

Declaring a variable as a specific type:

Use the [DIM](#) statement to declare a variable and use the AS *type* syntax:

```
DIM iVar AS INTEGER
```

Appending a type-specifier to the variable name:

```
bat# = 1.312 ' bat# is a Double-precision variable
hat% = 3     ' hat% is an Integer variable
DEFINT c    ' Variables beginning with c are now Integer
cats = 16   ' cats is an Integer variable by DEFINT
```

Bear in mind that *cat?*, *cat%*, *cat&*, *cat&&*, *cat!*, *cat#*, *cat###*, *cat@*, *cat@@*, and *cat\$* are ten separate variables. Although using *cat* over and over again to create different variables like this is legal, good programming practice suggests that you use somewhat different names for different variables. It is also much better to use descriptive and more easily understood names for your variables rather than single

letters. It's extremely difficult to [debug](#) a program in which `x@` has been entered instead of `x!` or `x#`. Imagine the confusion of trying to distinguish `x&&` and `x&`. If you had used variable names like *count!*, *result#*, *remain##*, and *company\$*, you would have had considerably less trouble keeping your variables (and their types) apart.

See Also

[Default Variable Typing](#)

[Variable Scope](#)

[INSTANCE statement](#)

Structured Programming

Structured Programming

For most applications, good programmers use an organized approach to programming called *structured programming*. The original interpreted BASICs did not really support this kind of programming. However, PowerBASIC, with its control structures and more advanced [functions](#), [subroutines](#), [methods](#), and [properties](#), is very well suited to structured programming style.

Structured programming is based on the theory that modularization makes for better programs. Modularization means grouping statements together (making modules) that have some relation to each other. In other words, you break up your program into logical functional sections. This makes it easier to write, [debug](#), and understand the program.

Ideally, modules should be no more than a page long. This seemingly arbitrary constraint makes it easier to absorb the entire module at a glance. It is easier to understand a series of ten single-page modules than it is a single ten-page program.

For some projects, after this initial breakup, you're ready to write the program. More complicated problems might require you to break the modules into subsidiary pieces. This process continues until you have refined the material enough so that you can write the code that corresponds to your ideas. This entire process is often described in books as "top-down design", since you start with a general description and work toward a more specific one.

Once you have the logical organization, you can start to design the overall structure of your program. For short, simple programs, these steps may only take a few minutes. For complex programs, it could take months.

To summarize the steps of structured programming (also known as 'top-down programming' or 'top-down design'):

1. Plan your program on paper. Ask yourself the following questions:
 - a. What is the overall purpose of the program?
 - b. What kind of input will it need?
 - c. How will it process that input?
 - d. What kind of output will the program produce? To where (screen, printer, disk)?
 - e. How should the input and output look?
 - f. How can the program be broken up into discrete processes (modules?)
 - g. How will those modules fit into the main program, and how will they communicate?
 - h. Can those modules be broken up into even smaller functional segments?
2. Next, write your main program. Don't worry about writing the individual modules that you separated out earlier. Instead, write *stubs*: Dummy statements that allow the main program to continue. This allows you to test the logic of your main program.

3. Finally (and this step will actually be several steps), write the modules *one at a time*. Test and debug each module thoroughly before proceeding to the next. If you've broken your module into even smaller processes, write the code for those processes *first*, test and debug each process, and then put them together to build your module.

See Also

[Line numbers and Labels](#)

[Long lines](#)

[Statement separation](#)

[Variables](#)

[Debugging PB/Win Programs](#)

Creating Dynamic Link Libraries

What is a DLL?

What is a DLL?

A Dynamic Link Library (DLL) is a Windows executable library module containing one or more [Subs](#), [Functions](#), or [classes](#) that can be called by executables or other DLLs. Unlike executables, DLLs do not have a single entry point. Instead, like libraries, DLLs have multiple entry points, one for each exported Sub, Function, or classes.

To get a better idea of how a DLL works, it helps to understand the difference between static and dynamic linking. Static linking is the process of writing one or more modules, and then linking them, along with whatever other run-time, third-party, etc., libraries that may be needed to create a complete, stand-alone executable program. When a program uses a Sub or Function from a static-link library, a copy of that Sub or Functions code is statically linked into the programs executable file.

If two programs that are running concurrently use the same routine from a library, they would each have their own copy of that routine. It would be more efficient if the two programs could share a single copy of the routine. DLLs provide that capability by resolving your application's references to external procedures at run-time.

In contrast to a static-link library, the code in a DLL is not linked into a program that uses the DLL. Instead, a DLLs code and resources are in a separate executable file, usually with a .DLL extension. This file must be present when the application runs. You will still have to write one or more modules to implement the functions that are specific to your application.

However, the linking process is divided into two stages. You first place [DECLARE](#) statements into your application to temporarily satisfy the references your program makes to the DLL services, in order to create an EXE (or DLL) file. The second stage happens at run-time, when your program calls one of the DLLs services.

At that time, the Function calls in the program are dynamically linked to their entry points in the DLL(s).

The operating system resolves external references by establishing a link between the application calls and the code, in the DLL, that implement the required functions. The Windows environment supports both static and dynamic linking.

See Also

[Why use DLLs?](#)

[Creating a Dynamic Link Library](#)

[Private and Exported Procedures](#)

[Dll example](#)

[LibMain](#)

[What is an object, anyway?](#)

[Just what is COM?](#)

[What is a COM component?](#)

Why use Dlls?

Why use DLLs?

There are a number of mitigating reasons to create a DLL. Among them are:

- **Performance**
Parts of your code, while functional, might not execute as fast as you would like. Once you've isolated the bottleneck area(s), a machine code DLL is an obvious choice for optimizing just those areas of your application that are running too slowly.
- **Resources**
Unlike conventional libraries, when a DLL is loaded into memory by the operating system, its Subs and Functions are accessible by all other programs (or DLLs). Only one copy of the DLL needs to be present in memory. This is possible because the library is not linked into any one of the programs permanently. It is present, in memory, making its services available to any program (or other DLL) which may need them.
- **Code re-use**
You might have a set of procedures that are common to a number of different applications. Instead of having those procedures appear in every application that needs them, it is better to put them in a DLL where they can be accessed by all the applications. This reduces the size of your executables while giving you the flexibility of updating the DLL itself, without having to re-compile every application that uses its services.
- **Maintenance**
A DLL can be updated and redistributed without having to re-compile any of the applications (or other DLLs) that use its services.

See Also

[What is a Dll?](#)

[Creating a Dynamic Link Library](#)

[Private and Exported Procedures](#)

[Dll example](#)

[LibMain](#)

[What is an object, anyway?](#)

[Just what is COM?](#)

[What is a COM component?](#)

Creating a Dynamic Link Library

Creating a Dynamic Link Library

A [DLL](#) contains one or more exported [Classes](#), [Subs](#), or [Functions](#) that may be called by applications or other DLLs. A DLL may also contain any number of private Subs or Functions that can only be called from within the library. Creating a DLL with PowerBASIC is straightforward. Below are the steps to follow to convert parts of a Visual Basic program to a DLL.

- Step 1:** The first step is to identify the sections of your application that are used in multiple programs, or in the case of Visual Basic, Subs and Functions that you need to execute faster.
- Step 2:** Save those Subs and Functions as text, and change the file extension to .BAS. This will become the source module that will be compiled into a DLL with PowerBASIC. You could also create the source file from scratch, if you so wish.
- Step 3:** Launch PBEDIT.EXE (the PowerBASIC IDE) and add the EXPORT keyword to any Sub or Function in the DLL source code (that you wish to be made accessible to external applications). Add [#COMPILE DLL](#) to the top of the source code file, and make any other changes to your .BAS source module. See the [SUB/END SUB](#) and [FUNCTION/END FUNCTION](#) topics for more information on the exact syntax.
- Step 4:** Click the [compile button](#) on the PowerBASIC IDE toolbar.

Any [compile-time errors](#) will be flagged at this point. Repeat steps 3 to 4 above until no more errors are reported. You are then ready to start testing and debugging your DLL. Debugging is done using the PowerBASIC symbolic Debugger built into the PowerBASIC IDE (PBEDIT.EXE). See the section on [Debugging](#) for more information.

See Also

[What is a DLL?](#)

[Private and Exported Procedures](#)

[Dll example](#)

[LibMain](#)

[What is an object, anyway?](#)

[Just what is COM?](#)

[What is a COM component?](#)

Private and Exported Procedures

Private and Exported Procedures

There are two basic types of procedures in a [DLL](#): private and exported. Exported are those which are made available to applications and other DLLs. Private, or local, procedures are support-type routines, accessible only from within the DLL.

In the following example, the first procedure defines an exported [Sub](#) that accepts two arguments: a [string](#) and an [Integer](#). The second procedure defines an exported function that accepts a single string argument, and returns an Integer. Finally, the third procedure defines a private Sub that accepts a single Integer argument. The first two routines are callable from an external .EXE or another DLL. The third one is not.

```
#COMPILE DLL
SUB MySub (sArg AS STRING, BYVAL iArg AS INTEGER) EXPORT
  ' Body goes in here
END SUB
FUNCTION MyFunc (sArg AS STRING) EXPORT AS INTEGER
  ' Body goes in here
END FUNCTION
SUB MyPrivateSub(BYVAL iArg AS INTEGER)
```

```
' Body goes in here
END SUB
```

Alternatively, you may specifically declare Subs and Functions as private, by using the PRIVATE keyword:

```
SUB MyPrivateSub(BYVAL iArg AS INTEGER) PRIVATE
' Body goes in here
END SUB
```

See Also

[What is a Dll?](#)

[Creating a Dynamic Link Library](#)

[Dll example](#)

[LibMain](#)

[What is an object, anyway?](#)

[Just what is COM?](#)

[What is a COM component?](#)

Dll example

An Example

A very simple example is a [DLL](#) with a [function](#) that will add one to any [Long-integer](#) passed to it as a parameter:

```
#COMPILE DLL
FUNCTION AddOne ALIAS "AddOne" (BYVAL x AS LONG) EXPORT AS LONG
    AddOne = x + 1
END FUNCTION
```

The ALIAS keyword is used to indicate the capitalization that PowerBASIC will assign the function. In Win32, all exported (and imported) [Sub](#) and Function names are case-sensitive. If the ALIAS keyword was omitted, PowerBASIC will capitalize the exported name and this could cause "Missing DLL entry point" errors if the calling code did not match the capitalization exactly.

By default, all Subs and Functions in PowerBASIC are private, which means they cannot be seen outside of the DLL. The EXPORT keyword is used on the Sub or Function definition line to indicate that the routine is to be exported, i.e., made accessible to applications and other DLLs.

When compiled into a DLL, *AddOne* is visible to outside applications. A Visual Basic program needs only include a prototype, or a [DECLARE](#) statement for the function, in order to call it as if it were a VB function:

```
DECLARE FUNCTION AddOne LIB "ADDONE.DLL" ALIAS "ADDONE" (BYVAL x&) AS LONG
```

AddOne is then accessible from within your Visual Basic code:

```
a& = 4
b& = AddOne( a& ) ' returns 5
```

If *AddOne* were not exported, Visual Basic would generate a [run-time error](#) when the example code attempts to call it.

If the EXPORT keyword is not used in the Sub or Function definition, the procedure will not be visible to outside applications. See the Visual Basic documentation for more information on calling DLLs from within Visual Basic code.

By using the ALIAS keyword in the DLL source code, you can have PowerBASIC export the Sub or Function using any capitalization you want. You can use the ALIAS clause to export the Sub or Function with a completely different name, in order to enhance or disguise the internal Sub or Function name:

```
' Exported as "ADDONE1"
FUNCTION AddOne1 (BYVAL x&) EXPORT AS LONG
```

```
' Exported as "AddOne2"
FUNCTION AddOne2 ALIAS "AddOne2" (BYVAL x&) EXPORT AS LONG
```

```
' Exported as "ExprtFnctn1"
FUNCTION AddOne3 ALIAS "ExprtFnctn1" (BYVAL x&) EXPORT AS LONG
```

Because the name after the ALIAS keyword is in quotes, the compiler will not convert it to upper case. Note that the name in the ALIAS clause is the name that you would use to access the Sub or Function from Visual Basic. Likewise, when importing Subs and Functions from external DLLs into PowerBASIC, the ALIAS clause must exactly match the capitalization of the exported name in the DLL.

See Also

- [What is a Dll?](#)
- [Creating a Dynamic Link Library](#)
- [Private and Exported Procedures](#)
- [LibMain](#)
- [What is an object, anyway?](#)
- [Just what is COM?](#)
- [What is a COM component?](#)

LibMain

LIBMAIN

In addition to the functions you want to export (plus any supporting private routines), a [DLL](#) can contain an optional function called [LIBMAIN](#) (or its synonyms [DLLMAIN](#) and [PBLIBMAIN](#)). Windows calls LIBMAIN when a DLL is loaded into and unloaded from memory by an application. The use of LIBMAIN in your code is optional.

See Also

- [What is a Dll?](#)
- [Creating a Dynamic Link Library](#)
- [Private and Exported Procedures](#)
- [Dll example](#)
- [What is an object, anyway?](#)
- [Just what is COM?](#)
- [What is a COM component?](#)

Creating Static Link Libraries

What is an SLL?

What is an SLL?

An SLL is a Static Link Library. It consists of a set of [Classes](#), [Subs](#), and [Functions](#) which are compiled

into a machine-code library. Since it is a library, the code cannot be executed standalone. It functions much like a [DLL](#) would, but the pre-compiled machine code is actually embedded into the final .EXE or .DLL to reduce the number of files in your project.

Why use SLLs?

A Static Link Library is the perfect vehicle for third-party code, because it creates a single final module while not requiring source code to be distributed. It allows you to create a group of your own libraries, which you know function correctly and don't require any further debugging. It also offers big advantages to larger group programming projects to control distribution of various elements.

See Also

[Creating a Static Link Library](#)

[SLL example](#)

Creating a Static Link Library

Creating a Static Link Library

Creation of an SLL couldn't be easier. All it takes is a single metastatement at the top of your module source code:

```
#COMPILE SLL
```

If your source code file is named "ABC.BAS", then your Static Link Library will automatically be named "ABC.SLL". (You can check the [#COMPILE](#) section for additional naming options.) When you wish to use the SLL code in a host program, you use:

```
#LINK "ABC.SLL"
```

and the contents are automatically embedded in the new .EXE or .DLL. It's just that simple.

Common Subs and Functions

A COMMON Sub or Function is one which is visible between the primary host program and one or more SLL unit modules. A [Sub/Function](#) is defined as COMMON by inserting that word as one of the descriptors:

```
FUNCTION MyFunc(Parm AS LONG) COMMON AS DOUBLE
  <Function code>...
END FUNCTION
```

When you create an SLL, you may find you need to reference a Sub or Function which is located in the main Host Module or another SLL. In that case, you must [DECLARE](#) it with the COMMON descriptor:

```
DECLARE FUNCTION MyFunc(Parm AS LONG) COMMON AS DOUBLE
```

It is not necessary to DECLARE a COMMON Sub or Function at all in the Host Module. If you choose to do so (for self-documentation or other reasons), it is generally advisable to omit the COMMON descriptor, as its presence will force the SLL to be linked, whether needed or not.

Of course, when the host module is compiled, all references to COMMON items must be resolved accurately, or an appropriate error will be generated. Any Sub/Function not defined as COMMON may not be shared between modules.

The EXPORT descriptor identifies a Sub/Function which may be accessed between Dynamic Link Libraries ([DLLs](#)), and/or the main executable which links them. If a procedure is not marked EXPORT, it is hidden from these other modules. Generally speaking, it's best not to mark a Sub/Function in an SLL as EXPORT. While it is syntactically acceptable, it may limit your future options when linking the SLL into host modules. PowerBASIC recommends that you mark them as COMMON in the SLL, and add the EXPORT attribute in

the host module.

It's easy to create an SLL which can be linked into an executable program or a dedicated DLL for the same purpose. To add the EXPORT attribute to a linked Sub/Function, just add the word EXPORT to the DECLARE statement in the host module or add an [#EXPORT](#) metastatement.

```
#EXPORT MyFunc
DECLARE FUNCTION MyFunc(Parm AS LONG) COMMON EXPORT AS DOUBLE
```

Using this technique, your SLL can be linked directly into an application executable without publishing the Subs/Functions as EXPORT. However, you can also link the same SLL into a DLL host module which adds the EXPORT attribute to any or all of the COMMON Subs and Functions in the corresponding DECLARE statements.

For example, let's say you want to make a library which publishes the SUB named XXX. You want to provide it in two forms, a linkable SLL and an industry standard DLL. So, first just create the SLL:

```
#COMPILE SLL = "XXXLib.SLL"

SUB xxx() COMMON
  MSGBOX "Hello"
END SUB
```

Just compile it, and you're ready to link it into your application. But now you want to create a DLL, too, since it might be used with other applications. It's just this easy:

```
#COMPILE DLL = "XXXLib.DLL"

#EXPORT xxx
#LINK "XXXLib.SLL"
```

That's all there is to it. You now have an SLL and an equivalent DLL to do the job of the XXX procedure.

Common Classes and Objects

A COMMON Class is one which is visible between the primary host module and one or more SLL unit modules. A Class is defined as COMMON by inserting that word as a Class Descriptor:

```
CLASS MyClass $MyGuid COMMON
  <Class code>...
END CLASS
```

A class which is declared AS COM makes it available to external programs through the COM services of Windows. You can define a class to be both COM and COMMON by adding both descriptors. However, a COM Class is automatically considered to be COMMON as well.

```
CLASS MyClass $MyGuid COMMON AS COM
  <Class code>...
END CLASS
```

Unreferenced Code

Any code in an SLL marked COMMON, COM, or EXPORT is always included in your compiled SLL module. Any additional code referenced by them is also included. All other unused code is automatically extracted at the time the SLL is compiled. Keep in mind that the resulting SLL module is pre-compiled, and cannot be modified further.

When you link an SLL into a host module, it is examined carefully by the compiler. If it is determined that no code in the SLL is needed, the SLL is simply not linked. This can reduce the size of your final program substantially. However, if even one procedure in an SLL is used, the entire SLL is included. Therefore, it may be in your best interest to split up your code into multiple SLL modules. The PowerBASIC Compiler will pick and choose exactly which ones are needed and ignore the rest. This assures the smallest possible size of the resulting application.

Managing Multiple SLL Modules

For your convenience, multiple SLL modules may be collected into a Power Library, which is linked as a single item. However, the PowerBASIC Compiler treats the component modules individually, just as though

they were each linked separately. A component SLL in a Power Library which is not needed is ignored entirely.

SLL modules are collected into a Power Library with the [PowerLib](#) utility librarian. This GUI application can readily add, remove, replace, or list the component SLL modules. Optionally, you can also use a command line librarian if that better serves your needs. The file extension for Power Libraries is ".PBLIB".

See Also

[What is an SLL?](#)

[SLL example](#)

[PowerBASIC Library Manager](#)

SLL example

SLL example

Below is a very simple example of a [Static Link Library](#) (SLL). This SLL unit module contains only one function that converts millimeters to inches.

```
#COMPILE SLL "conversion.sll"
#DIM ALL

FUNCTION MillimetersToInches(BYVAL mm AS DOUBLE) COMMON AS DOUBLE
    FUNCTION = mm * 0.03937#
END FUNCTION
```

The [#COMPILE SLL](#) metastatement tells the compiler to create an SLL named conversion.sll.

By default, all procedures in PowerBASIC are private, which means they cannot be seen outside of the SLL. The COMMON keyword is used on the procedure definition line to indicate that the procedure is to be visible to the host application. If the COMMON keyword is not used in the procedure definition, the procedure will not be visible to the host application. If the MillimetersToInches function did not contain the COMMON keyword any attempt to reference it from a host program would result in a Missing Declaration error when the host program is compiled.

Below is a sample host program that links in the compiled conversion.sll into our program.

```
#COMPILE EXE
#DIM ALL

#LINK "conversion.sll"

FUNCTION PBMAIN () AS LONG
    LOCAL Inches AS DOUBLE
    LOCAL MilliMeters AS DOUBLE

    MilliMeters = 1000.0#
    Inches = MillimetersToInches(MilliMeters)
END FUNCTION
```

The [#LINK](#) metastatement is used to link the pre-compiled conversion.sll into our host program. Any procedure in the SLL that contains the COMMON keyword may be called by our host program. We call the MillimetersToInches function in the SLL just like any other function call.

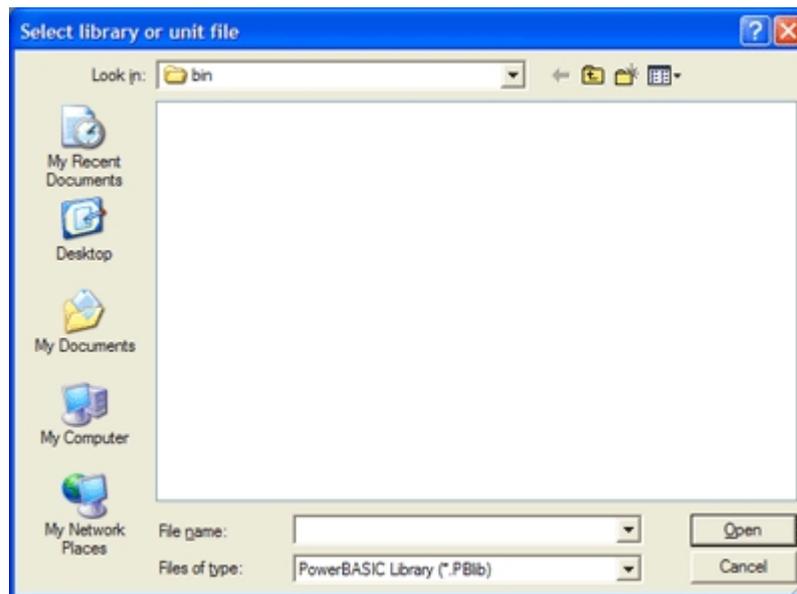
See Also

[What is an SLL?](#)

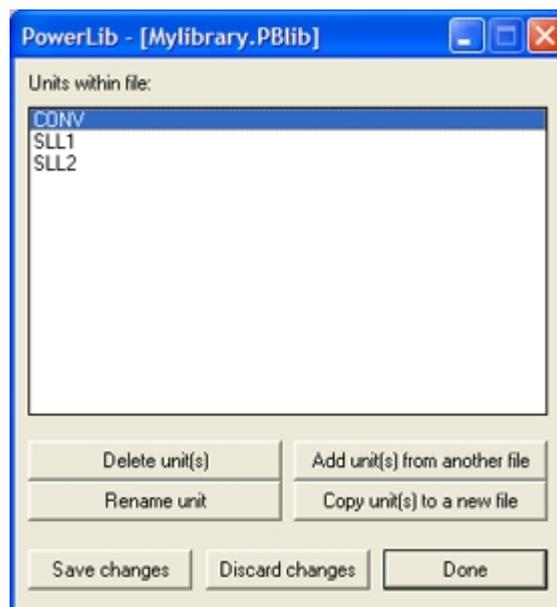
[Creating a Static Link Library](#)**PowerBASIC Library Manager****PowerBASIC Library Manager**

For your convenience, multiple [SLL](#) modules may be collected into a Power Library, which is linked as a single item. You can readily add, remove, replace, or list the component SLL modules. However, the PowerBASIC Compiler treats the component modules individually, just as though they were each [linked](#) separately. A component SLL in a Power Library which is not needed is ignored entirely.

When you start the PowerBASIC Library manager you will be prompted to select a PowerBASIC Library (.PBLib) file. If you are creating a new Library file you enter the name of your new .PBLib file.



After specifying a new library or opening an existing one, you will be shown the Library Manager dialog.

**Delete unit(s)**

Removes the selected file(s) from the library.

Add unit(s) from another file

Adds either a .SLL or .PBLib file to the library. Adding a .PBLIB to the library causes all the individual units within the .PBLIB to be added to the library. If a unit

| | |
|-----------------------------------|---|
| | is already within the library, the version within the library will be retained. |
| Rename unit | Renames a .SLL file in the library. |
| Copy unit(s) to a new file | Copies the selected SLL file out of the library and to a new SLL file name. |
| Save changes | Saves the changes to the library. |
| Discard changes | Discards any changes made in the Library Manager. |
| Done | Closes the Library Manager dialog. |

Optionally, you can also use the supplied command-line librarian Plib.exe with the following syntax:

```
plib library[.PBLIB] [commands] [,listfile [,newlibrary.PBLIB]]
```

Commands:

| | |
|-----------------------------|---|
| +filename | Adds either a .SLL or .PBLib file to the library. |
| -unitname | Removes an SLL file from the library. |
| -+filename | Replace an SLL file in library with another SLL file. |
| *unitname | Copy a SLL file out of the library. |
| -*unitname | Move a SLL file out of the library. |
| =oldunitname,newname | Renames a .SLL file in the library. |

See Also

[What is an SLL?](#)

[Creating a Static Link Library](#)

[SLL example](#)

[The PowerBASIC Integrated Development Environment](#)

Debugging PB/Win Programs

Debugging PB/Win Programs

Debugging PowerBASIC Programs

Once your code is written, the next step is to test it to make sure it performs according to specifications. Regardless of the computer language used, certain programming [errors](#) are common: misspelled or misused [variables](#), inverted logical tests, mistakes in syntax, and "reasonable" tests that cause disastrous failures when unreasonable data is supplied. Each language also has its own common errors, unique because of the peculiarities of its language.

Some of BASIC's unique problems include the free conversion of most

, side effects of [global](#) variables, default data types, and overuse of [GOTO](#) causing problems with incorrect branching. These are well known to the experienced BASIC programmer but are not generally found in other languages.

The [PowerBASIC Integrated Development Environment](#) (PBEDIT.EXE) can be used to find, and correct, both general programming errors and errors specific to BASIC. Nearly every program has bugs at least at first. To find them, you may need to check any statement in the program, display the value of any variable, and observe the program flow from line to line. PBEDIT has all these capabilities and more.

This section explains how to use PBEDIT to find and fix errors in a sample program, by providing a list of the debugging commands, a description of each, and then showing how each is invoked. If you follow certain guidelines when creating your program, you will find debugging easier (and less necessary). The procedures

we describe here will help you form your own set of guidelines that will make your programs easier to write and maintain.

See Also

- [How the integrated debugger works](#)
- [The DEBUG Menu](#)
- [Debugging a simple program](#)
- [The Integrated Development Environment](#)
- [Debugger Settings](#)

How the integrated debugger works

How the integrated debugger works

The integrated debugger works in conjunction with the PowerBASIC editor and is a part of the PowerBASIC environment. The debugger allows you to debug at the PowerBASIC level rather than at the machine level. That makes it a source-level debugger.

To debug a PowerBASIC program using the integrated debugger, first load the program into the editor and choose *Compile and Debug* from the [toolbar](#) or menu. Your program will be compiled, and if there are no compile-time errors, it will begin executing.

Breakpoints are places where the program will stop. In most cases, you will want to set one or more breakpoints in your program. The program executes up to (but not including) the line containing the breakpoint and then passes control of the debugger over to you. Breakpoints that you set remain in place until you clear them or exit the [IDE](#).

Once at a breakpoint you can:

- Display the value of a [variable](#) (with the Evaluate Variable button or [menu item](#))
- Set up a list of variables (in the Variable Watch window) and see how their values change as the program executes
- Clear breakpoints, set new ones, or both
- Single-step the program (run it one line at a time)
- Run the program to the next breakpoint

See Also

- [Debugging PB/Win Programs](#)
- [The DEBUG Menu](#)
- [Debugging a simple program](#)
- [Debugger Settings](#)

Debugger Toolbar Buttons

Debugger Toolbar Buttons



Create a new empty document (file) in the [editor](#).



Use the Open File dialog box to load an existing document.



Print the current document to a printer.



Copy the selected text from the document to the clipboard.



Search the current document for a word or phrase. See [Find dialog](#) for more information.



Launch the [Go to Line dialog](#) to jump to a specific line in the current document.



Launch the [Code Finder dialog](#), which presents a list of [Subs](#), [Functions](#), [Methods](#), [Properties](#), and [Macros](#) in current document, to quickly jump to a selected section of code.



Begin running the program. It will continue to run until the [debugger](#) either encounters a [breakpoint](#), or runs out of code to execute. F5 is the hot-key for the Run option.



The debugger runs the program using an [automated Step-Into](#) technique. Execution continues until a breakpoint is reached, the Stop button is pressed, or the program completes. The Animate delay can be set through the [IDE's Options Dialog](#).



The debugger executes the current line of code. If the line contains a reference to a Sub, Function, Method, or Property, the debugger executes that code without tracing into the procedure. SHIFT+F8 is the Step Over hot-key.



If the current line contains a call to a [Sub](#), [Function](#), [Method](#), or [Property](#), the debugger traces execution into that procedure. You cannot step into an API call, or into an external module. F8 is the Step Into hot-key.



The debugger runs the code until the current Sub, Function, Method, or Property exits. If the current function is [PBMAIN](#) or [WINMAIN](#), the code is executed until the program is finished or another breakpoint is encountered. CTRL+SHIFT+F8 is the Step Out hot-key.



Halt the debugger. If the debugger is already halted, this has no effect.



Show or hide the Register Watcher window, which lets you see the state of the [CPU registers](#) and flags when debugging.



Show or hide the Variable Watcher window, which lets you see the state of the [ERR function](#) and any variables you choose to watch when debugging.



Halts the current program and terminates the debugger. The variable list in the Watch window is retained between debugging sessions, until the [IDE](#) is closed.



Launches the PowerBASIC web site.



Display the PowerBASIC or the WIN32.HLP file.

See Also[Toolbar Buttons](#)[The Debug Menu](#)**The Debug Menu****The DEBUG Menu**

The Debug Menu provides the essential tools for [debugging](#) a PowerBASIC program. We will run through these in their order of appearance:

| | |
|---|---------------|
| Run | F5 |
| Run to Caret | Ctrl+F8 |
| Animate | Ctrl+F5 |
| Stop | |
| <hr/> | |
| Step Into | F8 |
| Step Over | Shift+F8 |
| Step Out | Shift+Ctrl+F8 |
| <hr/> | |
| Evaluate Variable | |
| Clear all Watches | |
| <hr/> | |
| Toggle Breakpoint | F9 |
| Clear all Breakpoints | |
| <hr/> | |
| Watch CPU Registers | |
| <input checked="" type="checkbox"/> Variable watch window | |
| <hr/> | |
| Program Restart | Shift+F5 |
| Exit Debugging | |

- Run** Begin running the program. It will continue to run until the [debugger](#) either encounters a breakpoint, or runs out of code to execute. F5 is the hot-key for the Run option.
- Run to Caret** Begin running the program. It continues to run until the debugger either reaches the current line, or encounters a [breakpoint](#), etc. CTRL+F8 is the hot-key for the Run to Caret option.
- Animate** The debugger runs the program using an [automated](#) Step-Into technique. Execution continues until a breakpoint is reached, the Stop button is pressed, or the program completes. The Animate delay can be set through the [IDE's Options Dialog](#).
- Stop** Halt the debugger. If the debugger is already halted, this has no effect.
- Step Into** If the current line contains a call to a [Sub](#), [Function](#), [Method](#), or [Property](#), the debugger traces execution into that procedure. You cannot step into an API call, or into an external module. F8 is the Step Into hot-key.
- Step Over** The debugger executes the current line of code. If the line contains a reference to a Sub, Function, Method, or Property, the debugger executes that code without tracing into the procedure. SHIFT+F8 is the Step Over hot-key.
- Step Out** The debugger runs the code until the current Sub, Function, Method, or Property exits. If the current function is [PBMAIN](#) or [WINMAIN](#), the code is executed until the program is finished or another breakpoint is encountered. CTRL+SHIFT+F8 is the Step Out hot-key.

| | |
|------------------------------|--|
| Evaluate Variable | Evaluate or modify a variable , or add/remove a variable in the Watch window. It is not possible to use this to change the length of a string. Also see Watch CPU Registers. |
| Clear all Watches | Remove all variables from the Watch window. |
| Toggle Breakpoint | Set or release a breakpoint on the current line. F9 is the Toggle Breakpoint hot-key. |
| Clear all Breakpoints | Release all breakpoints in the program. |
| Watch CPU registers | Show or hide the Register Watcher window, which lets you see the state of the CPU registers and flags when debugging. |
| Variable watch window | Show or hide the Variable Watcher window, which lets you see the state of the ERR function and any variables you choose to watch when debugging. |
| Program Reset | If the current program is halted/stopped, the program will be reset, ready for debugging to commence again. SHIFT+F5 is the Reset hot-key. |
| Exit Debugger | Halts the current program and terminates the debugger. The variable list in the Watch window is retained between debugging sessions, until the IDE is closed. |

See Also[Debugging PB/Win Programs](#)[How the integrated debugger works](#)[Debugger Toolbar Buttons](#)[Debugging a simple program](#)[Debugger Settings](#)

Debugging a simple program

Debugging a simple program

Debugging a simple program

For our first example, we'll use a simple program designed to read a text file and display it. Along the way, the program counts the number of words and tabulates the lengths of all words found - how many words are one character long, how many are exactly two characters long, and so on. The sample program, TWORD.BAS (\PBWin10\Samples\TWord\TWORD.BAS), contains a number of bugs; you will be using the [PowerBASIC integrated debugger](#) to find each of them.

Be sure to make copies of the TWORD.DAT data file; TWORD.BAS reads that file and makes specific errors because of the data. While another data file may work as well, it is possible that one or more of the bugs will not occur if you use a different data file.

Here is a [listing of the TWORD.BAS program](#).

When you have loaded TWORD.BAS into the editor, click on the [Debugger button](#) on the [toolbar](#), or select [Run from the menu](#), then [Compile and Debug](#).

At this point, the debugger will have scrolled the program and highlighted the line containing the definition of the [variable](#) *MaxWordLen*, since that will be the first line executed when the program begins to run. The highlight is called the *execution bar* and marks the line of code at the execution position. In other words, that line will be executed next.

To make the program run, click on the Run button in the toolbar or press [F5](#). The program's output appears

in the User screen, which allows you to see how the program would look if you weren't using the debugger. If the User screen is not visible you may have to select it by using the Windows Taskbar, ALT+TAB, or by re-sizing the [PowerBASIC IDE](#) to a smaller size and different location until the User screen is visible.

TWORD prompts you for the name of the file to read. Enter TWORD.DAT and press ENTER. TWORD displays the first line of the file then locks up because of one of the bugs in the program. To regain control, click on the [Stop button](#). You can choose [Program Reset](#) (or press the [SHIFT+F5](#) hot-key) to quit running the flawed program. Clicking the Run button lets you restart the program.

Next See: [Setting and using breakpoints](#)

See Also

- [Debugging PB/Win Programs](#)
- [How the integrated debugger works](#)
- [The DEBUG Menu](#)
- [The Integrated Development Environment](#)
- [Debugger Settings](#)

TWORD.bas Source Listing

TWORD.BAS

```
'=====
'
'  Test Word (Debugging) example for PowerBASIC for Windows
'  Copyright (c) 1998-2011 PowerBASIC, Inc.
'  All Rights Reserved.
'
'  Read a text file and count the number of words of length 1, 2, 3, and so
'  on. THIS PROGRAM CONTAINS INTENTIONAL BUGS. Use it in conjunction with the
'  PowerBasic On-line help (PBWIN.CHM - "Debugging PowerBASIC Programs") to
'  learn about the PowerBasic integrated debugger.
'
'=====
#COMPILER PBWIN 10
#COMPILE EXE
#IF NOT %DEF(%WINAPI)
    DECLARE FUNCTION GetModuleFileName LIB "KERNEL32.DLL" ALIAS
"GetModuleFileNameA" (BYVAL hModule AS LONG, lpFileName AS ASCIIZ, BYVAL nSize AS
LONG) AS LONG
    %MB_YESNO = &H00000004&
    %IDNO = 7
#ENDIF
DEFLNG A-Z
FUNCTION AppPath () AS STRING
    LOCAL p AS ASCIIZ * 256
    LOCAL ix AS LONG
    GetModuleFileName 0, p, SIZEOF(p)
    FOR ix = LEN(p) TO 1 STEP -1
        IF MID$(p, ix, 1) = "\" OR MID$(p, ix, 1) = "/" THEN
            FUNCTION = LEFT$(p, ix)
            EXIT FUNCTION
        END IF
    NEXT
    FUNCTION = ""
END FUNCTION
```

```

END FUNCTION
FUNCTION PBMAIN () AS LONG
    MaxWordLen = 16          ' count words up to a length of 16 characters
                             ' longer words will go into Overlong
    DIM WordLength(MaxWordLen) ' the array used to hold the counts
    Blank$ = CHR$(32)       ' a space marks the end of a word.
    FilePath$ = AppPath
    IF LEN(FilePath$) THEN
        CHDRIVE FilePath$
        CHDIR FilePath$
    END IF
    WHILE InFile$ = ""
        InFile$ = INPUTBOX$("Enter the name of the input file: ")
        IF InFile$ <= SPACE$(LEN(InFile$)) THEN InFile$=""
        IF InFile$ = "" _
            AND MSGBOX ("No file name entered! Do you want to try again?", _
                %MB_YESNO, _
                "Tword input") = %IDNO THEN
            EXIT FUNCTION
        END IF
    WEND
    ERRCLEAR
    OPEN InFile$ FOR INPUT AS #1
    'If the file can't be opened, give the user an error message.
    IF ERR THEN
        MSGBOX InFile$,"Unable to open file"
        EXIT FUNCTION
    END IF
    WHILE NOT(EOF(1))      ' read the file until nothing is left
        LINE INPUT #1,FirstString$ ' get a line
        MSGBOX FirstString$      ' display it
        WHILE FirstString$ <> ""
            GOSUB GetAWord      ' pull a word for FirstString$ and
                                ' put it in SecondString$
            Test = LEN(SecondString$)
            IF Test <= 16 THEN
                WordLength(Test) = WordLength(Test) + 1
            ELSE
                Overlong = Overlong + 1
            END IF
        WEND
    WEND
    CLOSE 1
    MSGBOX "Length Count"
    FOR Count% = 1 TO 16
        MSGBOX FORMAT$(Count%) + STR$(WordLength(Count%))
    NEXT
    MSGBOX "Greater" + STR$(OverLong)
    EXIT FUNCTION
GetAWord:
    position = INSTR(FirstString$, Blank$) ' a word is a sequence of
                                           ' characters ended by a
                                           ' blank or the end of the line
    IF position = 0 THEN
        'the word is the remainder of the line
        SecondString$ = FirstString$
        FirstString$ = ""
    ELSE
        'pull the word from the line
        SecondString$ = LEFT$(FirstString$, position - 1)
    END IF

```

```

END IF
RETURN
END FUNCTION

```

Setting and using breakpoints

Setting and using breakpoints

We know the program did not fail within the first few lines; it requested the name of the input file, and it successfully opened that file. Therefore, the problem must have been caused by something further along in the code.

The first suspicious line concerns the *GetAWord* [subroutine](#). Set a breakpoint at the line reading:

```
position = INSTR(FirstString$, Blank$)
```

Use the arrow keys to move to that line. As you do, you'll notice that the execution bar doesn't move. That is because you are not executing the program; you are just using the source browser to move within the program source.

To set a breakpoint at the line to which you moved, double-click on it or press the F9 key. The line is highlighted, indicating that the breakpoint has been set. If you wanted to remove the breakpoint at that line, double-click on it or press the F9 key again. The breakpoint highlighting differs from the execution highlighting, and this difference helps you to avoid confusion over highlighted breakpoints and the current program position.

Once more, click on the [Run button](#) (or press F5). TWORD starts running again, and things happen just as before, with one exception: after the first line from the data file has been displayed on the User screen, TWORD halts and waits for further commands. PowerBASIC has reached the breakpoint. The caret and the execution bar are on the line containing the breakpoint.

The breakpoint line cannot be doubly highlighted, so the execution bar obscures the breakpoint highlighting until the program executes further. The program stops each time it reaches the breakpoint line.

You can also stop a program running within the debugger by clicking the Stop button. When you do this, the program executes the current line and stops at the beginning of the next. Control is then returned to the PowerBASIC debugger, and the execution bar highlights the next line to be executed. You may now use debugger commands to step through the program or resume execution.

Next See: [Tracing execution](#)

See Also

[Debugging PB/Win Programs](#)

[How the integrated debugger works](#)

[The DEBUG Menu](#)

[Debugging a simple program](#)

[Debugger Settings](#)

Tracing execution

Tracing execution

Now that you have executed [TWORD](#) to the first breakpoint, you can trace the execution one line at a time by pressing F8 or by clicking on the Step-Into button. When you press F8, the [debugger](#) runs the execution line and stops at the beginning of the next line.

Perhaps there is something wrong with that [INSTR](#) function call? You could not check the value of the

variable *position* while the [breakpoint](#) line was highlighted, because the breakpoint line had not yet executed. After pressing F8 and executing the breakpoint line, the value of the [variable](#) *position* should be known. The value of *position* is critically important, so let's check it.

Next See: [Evaluating a variable](#)

See Also

[Debugging PB/Win Programs](#)

[How the integrated debugger works](#)

[The DEBUG Menu](#)

[Debugging a simple program](#)

[Debugger Settings](#)

Evaluating a variable

Evaluating a variable

To see the value of *position* right-click on the variable and choose the Evaluate variable item from the context-menu - since this is a context-sensitive menu, it will actually read "Evaluate position". In either case, this opens the Evaluate dialog containing two data entry fields. The [variable](#) name *position* should be automatically filled in the Variable Name field, and the content of the variable shown in the *Value* field. In this case, *position* is expected to contain 3, and it does. There is no error so far. To return from the pop-up window to the main part of the debugger, click on the Close button or press ESCAPE.

The next few lines are supposed to remove the word from the beginning of the line and put the word into *SecondString\$*. To check if that routine functions correctly, you should examine the values of *FirstString\$* and *SecondString\$* before and after the routine alters them. The debugger should display:

```
To be or not to be; that is the question.
```

From the appearance of the string, you can see that the first blank should appear in position 3, and that the program has correctly determined that position. The variable *SecondString\$* ought to contain the last word processed and should have no value yet. You can check that by entering *SecondString\$* in the *Variable Name* field; if you do, you will find no error.

Everything seems normal so far. Press ESCAPE to return to the main part of the debugger, then press F8 to step the program one more line. Since you already know *position* is not 0, you'll find out what you need to know by pressing F8 several more times, stopping when the execution bar is over the final [END IF](#) of that routine. At that point, both *FirstString\$* and *SecondString\$* have been processed.

Once more, evaluate *SecondString\$*. This time, *SecondString\$* does contain data: the word "To". This seems correct. When you ask to see the value of *FirstString\$*, though, you get a surprise: *FirstString\$* has not been changed at all! This explains the lockup for the first line; subroutine *GetAWord* was correctly [supplying](#) the first word, but was [not removing](#) that first word from the entry string. Therefore, the first line never actually became shorter, so it was being processed and reprocessed endlessly.

To correct the bug, exit the debugger and insert a routine in the editor that shortens *FirstString\$* by the length of *SecondString\$*. Insert a line reading something like:

```
FirstString$ = MID$(FirstString$, position + 1)
```

...immediately before the END IF in *GetAWord*. Make this correction, then save it. Click on the *Compile and Debug* icon in the toolbar and run the program through the debugger again.

Next See: [Summary](#)

See Also

- [Debugging PB/Win Programs](#)
- [Debugging a simple program](#)
- [Setting and using breakpoints](#)
- [Tracing execution](#)
- [Debugger Settings](#)

Summary

Debugging TWORD.BAS Summary

TWORD fails because the program goes into an infinite

. The infinite loop was caused by the fact that the number of characters removed was not shortening the input .

While tracking down this bug, you learned to:

- Set and use [breakpoints](#)
- Run a program without stopping at each line
- Step through your source one line at a time
- [Evaluate](#) the values of variables

See Also

- [Debugging PB/Win Programs](#)
- [How the integrated debugger works](#)
- [The DEBUG Menu](#)
- [Debugging a simple program](#)
- [Debugger Settings](#)

Data Types

Data Types

Data Types

The care of numbers constitutes an important part of every programming system. Fortunately, PowerBASIC allows you to ignore most technical considerations about internal number handling. If you never give a thought to such matters as calculation speed, precision, and memory requirements, your programs will usually continue to work as you expect. However, an understanding of the underlying issues will help when you need to write programs that are faster, more accurate, and require less memory.

For efficiency, PowerBASIC stores and processes data in different forms. It supports eleven unique numeric types, three string types, and also pointers. The following tables summarize the most important features and distinctions of these data types. The rest of this section explains these features in detail.

Numeric Data storage requirements and ranges

| Data Type | Size | Decimal Range | Binary Range |
|-------------------------|---------------------------|-------------------|-------------------------|
| Integer | 16 bits (2 bytes), signed | -32,768 to 32,767 | -2^{15} to $2^{15}-1$ |

| | | | |
|------------------------------------|--------------------------------|--|-------------------------|
| Long-integer | 32 bits (4 bytes), signed | -2,147,483,648 to 2,147,483,647 | -2^{31} to $2^{31}-1$ |
| Quad-integer | 64 bits (8 bytes), signed | -9.22×10^{18} to $+9.22 \times 10^{18}$ | -2^{63} to $2^{63}-1$ |
| Byte | 8 bits (1 byte), unsigned | 0 to 255 | 0 to $2^8 - 1$ |
| Word | 16 bits (2 bytes), unsigned | 0 to 65,535 | 0 to $2^{16} - 1$ |
| Double-word | 32 bits (4 bytes), unsigned | 0 to 4,294,967,295 | 0 to $2^{32} - 1$ |
| Single-precision | 32 bits (4 bytes) | 8.43×10^{-37} to 3.40×10^{38} | |
| Double-precision | 64 bits (8 bytes) | 4.19×10^{-307} to 1.79×10^{308} | |
| Extended-precision | 80 bits (10 bytes) | 3.4×10^{-4932} to 1.2×10^{4932} | |
| Currency | 64 bits (8 bytes) | -9.22×10^{14} to $+9.22 \times 10^{14}$ | |
| Extended-currency | 64 bits (8 bytes) | -9.22×10^{16} to $+9.22 \times 10^{16}$ | |
| Variant | 128 bits (16 bytes) | {data-dependent} | {data-dependent} |

Variable type-specifiers and keywords

| Variable type | Type specifier | Element size | DEF type | Type keyword |
|--|----------------|--------------|----------|-----------------|
| Pointer | N/A | 4 | N/A | PTR/POINTER |
| Integer | % | 2 | DEFINT | INTEGER |
| Long-integer | & | 4 | DEFLNG | LONG |
| Quad-integer | && | 8 | DEFQUD | QUAD |
| Byte | ? | 1 | DEFBYT | BYTE |
| Word | ?? | 2 | DEFWRD | WORD |
| Double-word | ??? | 4 | DEFDWD | DWORD |
| Single-Float | ! | 4 | DEFSNG | SINGLE |
| Double-Float | # | 8 | DEFDBL | DOUBLE |
| Extended-Float | ## | 10 | DEFEXT | EXT/EXTENDED |
| Currency | @ | 8 | DEFCUR | CUR/CURRENCY |
| Extended-currency | @@ | 8 | DEFCUX | CUX/CURRENCYX |
| String | \$ | 4 | DEFSTR | STRING |
| Fixed-length string | N/A | N/A | N/A | STRING * x |
| Null-terminated String | N/A | N/A | N/A | ASCIIZ, STRINGZ |
| FIELD string | \$ | 16 | N/A | FIELD |
| Wide String | \$\$ | 4 | N/A | WSTRING |
| Wide Fixed length String | N/A | N/A | N/A | WSTRING * x |
| Wide Nul-Terminated String | N/A | N/A | N/A | WSTRINGZ |
| Wide Field String | N/A | 16 | N/A | WFIELD |
| Variant | N/A | 16 | N/A | VARIANT |
| GUID | N/A | 16 | N/A | GUID |
| IAUTOMATION | N/A | 4 | N/A | IAUTOMATION |
| IDISPATCH | N/A | 4 | N/A | IDISPATCH |
| IUNKNOWN | N/A | 4 | N/A | IUNKNOWN |

Integral Data Types

Byte (?)

Byte (?)

Bytes are 8-bit (1 byte) unsigned integers ranging in value from 0 to 255 (0 to 2^8-1). The type-specifier

character for a Byte is: ?.

Byte variables are identified by following the variable name with a question mark (i.e., *var?*), or by using the [DEFBYT](#) statement as described in the previous discussion of Integers. You can also declare Byte variables using the BYTE keyword with the [DIM](#) statement. For example:

```
DIM I AS BYTE
```

Byte variables are particularly useful for storing small, unsigned integral quantities like the number of days in a month. You should not use Byte variables in [FOR/NEXT](#) loops, as they are highly inefficient.

A PowerBASIC Byte variable is equivalent to a bool data type (in lowercase) used by most modern C compilers. A bool is a non-traditional 8-bit unsigned data type, whereas a BOOL data type (in capital letters) is equivalent to a [Long-integer](#) in PowerBASIC. Be aware that some older C compilers may freely interchange bool and BOOL keywords.

A Delphi byte is equivalent to a PowerBASIC Byte.

See Also

[Double-word \(???\)](#)

[Integers \(%\)](#)

[Long integers \(&\)](#)

[Quad integers \(&&\)](#)

[Word \(??\)](#)

Word (??)

Word (??)

Words are 16-bit (two [byte](#)) unsigned integers with a range of 0 to 65535 (0 to $2^{16}-1$). The [type-specifier](#) character for a Word is: ??.

Word [variables](#) are identified by following the variable name with two question marks (i.e., *var??*), or by using the [DEFWRD](#) statement as described in the previous discussion of Integers. You can also declare word variables using the WORD keyword with the [DIM](#) statement. For example:

```
DIM I AS WORD
```

Word values effectively extend the positive range for Integer, but still only require two bytes for storage.

A C/C++ UINT16 and a Delphi word are equivalent to a PowerBASIC Word.

See Also

[Byte \(?\)](#)

[Double-word \(???\)](#)

[Integers \(%\)](#)

[Long integers \(&\)](#)

[Quad integers \(&&\)](#)

Integers (%)

Integers (%)

To PowerBASIC, an Integer is a number with no decimal point (what mathematicians would call whole

numbers) with a range of -32,768 to +32,767 (-2^{15} to $2^{15} - 1$). These values stem from the underlying 16-bit representation of an Integer: 32,768 is 2^{15} , and are therefore 2 bytes (16-bits) wide. The type-specifier character for Integer is: %.

Integers are identified by following the variable name with a percent sign (eg: *var%*), or by using the [DEFINT](#) statement. For example, if you use this declaration in your program code:

```
DEFINT I, J, K
```

...then all [variables](#) following this declaration that start with the letter I, J, or K will be an Integer by default. You can also declare an Integer variable using the INTEGER keyword with the [DIM](#) statement. For example:

```
DIM I AS INTEGER
```

A C/C++ short variable and a Delphi smallint are both equivalent to a PowerBASIC Integer.

See Also

[Byte \(?\)](#)

[Double-word \(???\)](#)

[Long integers \(&\)](#)

[Quad integers \(&&\)](#)

[Word \(??\)](#)

Long integers (&)

Long integers (&)

Like regular [Integers](#), Long integers cannot contain decimal points. However, they span a much greater range, from -2,147,483,648 to +2,147,483,647 (-2^{31} to $2^{31} - 1$) yet occupy just 4 [bytes](#) (32-bits). The [type-specifier](#) character for a Long integer is: &.

Long integers are identified by following the [variable](#) name with an ampersand (i.e., *var&*) or by using the [DEFLNG](#) statement as described in the previous discussion of Integers. You can also declare Long-integer variables using the LONG keyword with the [DIM](#) statement. For example:

```
DIM I AS LONG
```

Long integers are the most efficient

data type in PowerBASIC and should be used in all cases where speed is important and a greater numeric range is not required. (Using [Byte](#) and Integer variables in [FOR/NEXT](#) loops is actually slower than using a Long integer.)

A PowerBASIC Long-integer variable is equivalent to the BOOL data type (in capital letters) commonly used by C/C++ compilers. Note that a bool (lowercase) is a non-traditional data type, equivalent to a Byte in PowerBASIC. Be aware that some older C compilers may freely interchange bool and BOOL keywords.

A C/C++ int and a Delphi longint variable are also equivalent to a PowerBASIC Long integer.

See Also

[Byte \(?\)](#)

[Double-word \(???\)](#)

[Integers \(%\)](#)

[Quad integers \(&&\)](#)

[Word \(??\)](#)

Double-word (???)

Double-word (???)

Double-words are 32-bit (four [byte](#)) unsigned

with a range of 0 to 4,294,967,295 (0 to $2^{32}-1$). The [type-specifier](#) character for a Double-word is: ???.

Double-word [variables](#) are identified by following the [variable](#) name with three question marks (i.e., *var???*), or by using the [DEFDWD](#) statement as described in the previous discussion of Integers. You can also declare Double word variables using the `DWORD` keyword with the [DIM](#) statement. For example:

```
DIM I AS DWORD
```

As for [Word](#) values and Integers, Double-word values have a larger positive range than a [Long-integer](#), and still require only four bytes. Double-word values are useful for indicating absolute memory addresses, such as may be used to store [pointer](#) values.

A PowerBASIC Double-word is equivalent to a `UINT32` in C/C++. In 32-bit C/C++ code, a `UINT` is also equivalent to a PowerBASIC Double-word variable. Note that 16-bit C/C++ code uses `UINT` to describe a 16-bit Word variable.

A C++ unsigned int and a Delphi longword are equivalent to a PowerBASIC Double-word.

See Also

[Array Data Types](#)

[Bit Data Types](#)

[Constants and Literals](#)

[GUID Data Types](#)

[Object Data Types](#)

[Pointers](#)

[User Defined Types](#)

[Unions](#)

[Variant Data Types](#)

Quad integers (&&)

Quad integers (&&)

Quad-integers are 64-bit (8 [byte](#)) signed integers (twice as many bits as [Long integers](#)) with a range of -9.22×10^{18} to 9.22×10^{18} (-2^{63} to $2^{63}-1$). The [type-specifier](#) character for a Quad integer is: &&.

Quad-integer [variables](#) are identified by following the variable name with two ampersands (i.e., *var&&*), or by using the [DEFQUAD](#) statement as described in the previous discussion of Integers. You can also declare Quad-integer variables using the `QUAD` keyword with the [DIM](#) statement. For example:

```
DIM I AS QUAD
```

Although a Quad integer actually has 19 digits of precision, only 18 digits of accuracy can be "displayed" with [STR\\$](#). A 19-digit value will be rounded to 18 digits in scientific notation when used with [STR\\$](#). [STR\\$](#) works with up to 16 significant digits by default, so the enhanced form of [STR\\$](#) (eg: [STR\\$\(var,18\)](#)), must be used to generate the 17th and 18th digits of a Quad integer for display purposes.

A C/C++ `LARGE_INTEGER` and a Delphi `int64` are both equivalent to a PowerBASIC Quad integer.

See Also

[Byte \(?\)](#)[Double-word \(???\)](#)[Integers \(%\)](#)[Long integers \(&\)](#)[Word \(??\)](#)

Floating Point Data Types

Single-precision floating-point (!)

Single-precision floating-point (!)

Single-precision floating-point numbers (or more simply, Single-precision) may be the most versatile numeric type supported by PowerBASIC. Single-precision values can contain decimal points and have a range of $\pm 8.43 \times 10^{-37}$ to 3.40×10^{38} . The [type-specifier](#) character for a Single-precision floating-point is: !.

Single-precision variables are identified by following the variable name with an exclamation point (i.e., *var!*) or by using the [DEFSNG](#) statement as described in the previous discussion of integers. You can also declare Single-precision variables using the SINGLE keyword with the [DIM](#) statement. For example:

```
DIM I AS SINGLE
```

While Single-precision numbers can represent both enormous and microscopic values, they are limited to six digits of precision. In other words, Single-precision does a good job with figures like \$451.21 and \$6,411.92, but \$671,421.22 cannot be represented exactly because it contains too many digits. Neither can 234.56789 or 0.00123456789. A Single-precision representation will come as close as it can in six digits: \$671,421, or 234.568, or 0.00123457. Depending on your application, this rounding off can be a trivial or crippling deficiency. Like most modern compilers, PowerBASIC uses the IEEE standard for all floating-point arithmetic.

C/C++, Delphi, and Visual Basic all offer a single data type that is identical to the PowerBASIC Single-precision variable.

See Also

[Currency \(@\) and Extended-currency \(@@\)](#)[Double-precision floating-point \(#\)](#)[Extended-precision floating-point \(##\)](#)

Double-precision floating-point (#)

Double-precision floating-point (#)

Double-precision floating-point numbers are to [Single-precision](#) numbers what [Long-integers](#) are to [Integers](#). They take twice as much space in memory (8 [bytes](#) versus 4 bytes), but have a greater range ($\pm 4.19 \times 10^{-307}$ to 1.79×10^{308}) and a greater accuracy (15 to 16 digits of precision versus the 6 digits of Single-precision). A Double-precision, 5,000-element [array](#) requires 40,000 bytes. An Integer array with the same number of elements occupies only 10,000 bytes. The [type-specifier](#) character for a Double-precision floating-point is: #.

Double-precision [variables](#) are identified by following the variable name with a Number symbol (i.e., *var#*) or by using the [DEFDBL](#) statement as described in the previous discussion of Integers. You can also declare Double-precision variables using the DOUBLE keyword with the [DIM](#) statement. For example:

```
DIM I AS DOUBLE
```

C/C++, Delphi, and Visual Basic all offer a double data type that is identical to the PowerBASIC Double-precision variable.

See Also

[Array Data Types](#)
[Bit Data Types](#)
[Constants and Literals](#)
[GUID Data Types](#)
[Object Data Types](#)
[Pointers](#)
[User Defined Types](#)
[Unions](#)
[Variant Data Types](#)

Extended-precision floating-point (##)

Extended-precision floating-point (##)

Extended-precision

numbers are the basis of computation in PowerBASIC. The [type-specifier](#) character for an Extended-precision floating-point is: ##. In PowerBASIC, all floating point calculations are performed in extended precision for maximum accuracy. Extended-precision has also been provided as a declarable variable type, so you can take advantage of its extra exponent range and precision.

Extended-precision variables require 10 [bytes](#) of storage each. They have a range of approximately +/- 3.4×10^{-4932} to 1.2×10^{4932} , and offer 18 digits of precision. All 18 digits can be "displayed" using the extended [STR\\$](#) format (eg, STR\$(var##,18)).

Extended-precision [variables](#) are identified by adding two Number symbols following a variable name (i.e., var##) or by using the [DEFEXT](#) statement.. You can also declare Extended-precision variables using the EXT or EXTENDED keywords with the [DIM](#) statement. For example:

```
DIM I AS EXT
DIM J AS EXTENDED
```

See Also

[Array Data Types](#)
[Bit Data Types](#)
[Constants and Literals](#)
[GUID Data Types](#)
[Object Data Types](#)
[Pointers](#)
[User Defined Types](#)
[Unions](#)
[Variant Data Types](#)

Currency (@) and Extended-currency (@@)

Currency (@) and Extended-currency (@@)

Currency [variables](#) are 8 [byte](#) binary representations of

numbers, which are considered to always have a fixed number of digits to the right of the decimal point. Currency numbers have a range of approximately -9.22×10^{14} to $+9.22 \times 10^{14}$, and Extended-currency have a range of -9.22×10^{16} to $+9.22 \times 10^{16}$.

The type-specifier character for Currency and Extended-currency floating-point is: @ and @@ respectively.

You can also use the [DEF CUR](#) or [DEF CUX](#) statement as described under [Integers](#). They can also be declared using the CUR/CURRENCY or CUX/CURRENCYX keywords with the [DIM](#) statement. For example:

```
DIM I AS CUR
DIM J AS CURRENCYX
```

Currency variables (@) have up to 4 digits of precision after the decimal point, and are useful for prices and quantities where fractions of a cent are desired. Extended-currency variables (@@) have two digits of precision after the decimal point. They are optimized for financial calculations where fractions of a cent are *not* required.

The currency data types are especially useful for financial calculations, as they avoid the round-off errors associated with Single, Double, and Extended-precision numbers (which must be an exact power of two in order to be represented exactly). While many numbers can be represented exactly as a power of two, there are also many that cannot. For example, 1.10000002384185791 is the closest power of two to 1.1, in single precision.

So, when assigning [numeric literal](#) values to a Currency or Extended-currency variable, we recommend using a type specifier to ensure the value is given the intended precision. For example:

```
DIM x1 AS CUR
x1 = 1.0001@

DIM x2 AS CUX
x2 = 1.01@@
```

Internally, Currency and Extended-currency numbers are stored as [Quad-integers](#) with an implied decimal point (at 4 places for Currency, and at 2 places for Extended-currency). This approach ensures that all of the digits of the variables can be represented exactly.

Currency and Extended Currency perform a similar role as BCD variables in some BASIC dialects to ensure monetary values can be represented exactly; however, the internal storage of BCD variables and CUR/CUX differs substantially.

Delphi and Visual Basic both offer a *currency* data type that is identical to the PowerBASIC Currency variable.

See Also

[Array Data Types](#)

[Bit Data Types](#)

[GUID Data Types](#)

[Object Data Types](#)

[Pointers](#)

[User Defined Types](#)

[Unions](#)

[Variant Data Types](#)

String Data Types

Characters, Strings, and Unicode

Characters, Strings, and Unicode

A

consists of a set of zero or more characters. A character is an alphabetic letter, a number, a punctuation mark, or even non-printing control codes, which usually aid in formatting the text. On a computer, a character is represented by a specific number associated with it. For example, the character "A" is usually represented by the number 65, while the character "3" is usually associated with the number 51.

This representation is convenient, since a string of text characters can be readily stored as a series of small integral numbers. For example, the word "Hello" is stored as 72, 105, 108, 108, 111. Couldn't be any simpler. How are the numbers assigned and associated? It's just a matter of mutual consent by those who use them. As long as everyone agrees on the associations, the system works well. That said, we have experienced a certain amount of growing pains over the years. With the global growth of computer use, larger character sets are needed to represent the necessary characters. We have clearly reached the point where every programmer must consider alternate character sets for his applications. Failure to do so can carry severe penalties. When you find you can no longer read data files from an outside source, or can no longer read text from the Internet, it will be too late. The following sections describe the most-common and most-used character sets.

ASCII

ASCII was the first character set to be used on small computers. In fact, all of the other sets described here use ASCII codes as-is for a base. ASCII is a set of 128 characters, numbered from 0 to 127. It was designed for American English, so it defines only unaccented letters, numbers, punctuation, and control codes. As long as you only need English text, ASCII works fairly well.

ASCII needs just 7 bits of storage per character, so it was convenient to store each character in a [byte](#). The last bit was simply ignored. Of course, that meant that the values from 128 to 255 were unused. That void wouldn't last long.

OEM

OEM is the acronym for "Original Equipment Manufacturer". IBM introduced the IBM PC in 1981. Along with it came their version of an expanded character set. It's been known as the OEM character set ever since. In fact, that character set is still the default for the Windows Console Device on the very latest version of Windows.

The first 128 characters are identical to ASCII. However, IBM decided to use the remaining 128 characters for other purposes. They defined them for the most common accented characters, line drawing characters, and special symbols and punctuation. Of course, this was an improvement, but many characters in non-English languages were unavailable. This led to new OEM character sets (German, Cyrillic...), with many different interpretations for that second set of character codes. Of course, this caused a good amount of confusion trying to understand the contents of strings from an external source. Not an ideal solution.

ANSI

Some time later, the ANSI character set evolved. Once again, the first 128 characters are the same as ASCII. But there are many ways to handle the second set. The decoding system, called "code pages", handles these items accurately, even if cumbersome. In reality, many languages need hundreds or thousands of characters. Clearly, the character codes can't possibly be squeezed into a byte. The solution? Multi-byte characters. Some characters are one byte, and some are more. If a particular character needs a multi-byte representation, a special ID byte is inserted, followed by the identifying data. A multi-byte character may consist of two, three, or even more bytes. That special ID byte determines

what data will follow.

Multi-byte ANSI imposes a unique problem. You can't just scan your way through a string, byte-by-byte.

Some characters are multi-byte! You must use care to treat them accurately, or your data will be destroyed. A word of warning... it's virtually impossible to scan backwards through a multi-byte string.

That's because ANSI uses the same numeric values for both the ID byte, and the data which follows. When you look backwards and find an ID value, you can't tell if it's an ID or data. It just won't work well.

UNICODE

Unicode was created to represent every language into a single character set. While there are several Unicode formats, we'll concentrate on the only two varieties with real usage: UTF-8 and UTF-16.

PowerBASIC uses UTF-16, which stores each character as a two-byte unsigned word. UTF-16 is used natively by Windows, [COM](#), Visual Basic, Java, etc.

UTF-16 UNICODE

Just as before, the first 128 values represent ASCII characters. Other characters, primarily in non-English languages, have been assigned the higher values. At this time, and for the foreseeable future, UTF-16 is the character set of choice for all of your applications. It is the best way to store all of your data to keep it secure and understandable.

UTF-8 UNICODE

UTF-8 is somewhat of a hybrid between ANSI and UTF-16. It is used when the size of the text is of utmost importance. That makes it an obvious choice for downloading from the Internet. UTF-8 uses the same single byte characters for ASCII values. Further, it even uses the identical algorithm for multi-byte character, with one glowing exception: the ID byte and the data bytes are always unique! With that knowledge in hand, it is possible to scan backwards from any position. PowerBASIC does not support the use of UTF-8 within standard code. That's because UTF-8 is much slower in performance than UTF-16. That said, PowerBASIC does provide conversion functions to/from UTF-8, so you have it readily available for all of your Internet applications. UTF-8 files are byte orientated and should be [opened](#) as an ANSI file (CHR=ANSI).

See Also

[#OPTION metastatement](#)

[ACODE\\$ function](#)

[ChrToOem\\$ function](#)

[ChrToUtf8\\$ function](#)

[OemToChr\\$ function](#)

[UCODE\\$ function](#)

[UCODEPAGE statement](#)

[Utf8ToChr\\$ function](#)

[Dynamic \(Variable-length\) strings \(\\$\)](#)

[FIELD strings](#)

[Fixed-length strings](#)

[Nul-Terminated Strings](#)

Dynamic (Variable-length) strings (\$)

Dynamic (Variable-length) strings (\$) (\$\$)

Dynamic

[variables](#) (also known as variable-length) may contain an arbitrary number of characters. Internally, each variable uses four [bytes](#) that contain a handle number, which is used to identify and locate information about the string. The type-specifier character is \$ for an [ANSI](#) dynamic string, or \$\$ for a wide [Unicode](#) string.

String variables are automatically declared when the variable name is followed by one or two dollar signs (\$). You can also declare dynamic string variables using the STRING or WSTRING keywords with the [DIM](#) statement. For example:

```
DIM MyStr AS WSTRING
```

PowerBASIC allocates strings using the Win32 OLE string engine. This allows you to pass strings from your program to [DLLs](#), or API calls that support OLE strings. The address of the contents of a non-empty string can be obtained with the [STRPTR](#) function. The address of the string handle can be obtained with [VARPTR](#) function. An empty (null) string may not return a valid STRPTR value. Dynamic strings move in memory with each assignment statement: that is, STRPTR will return a different address when the content of the string is changed. However, the associated string handle obtained by VARPTR stays constant for the duration of the life ([scope](#)) of the string variable.

[LOCAL](#) dynamic string memory and handles are released when the associated [Sub](#), [Function](#), [Method](#), or [Property](#) ends. Subsequent calls to a routine will result in new storage locations for both the handle and the string data. The address of the handle of a [STATIC](#) or [GLOBAL](#) dynamic string stays constant for the duration of the module. Dynamic strings and field strings cannot be part of [UDT](#) (User-Defined Type) or [UNION](#) structures. In [C/C++](#), a dynamic wide string (\$\$) is referred to as a BSTR data type.

See Also

[Nul-Terminated Strings](#)

[FIELD strings](#)

[Fixed-length strings](#)

[String expressions](#)

FIELD strings

FIELD strings

Field strings are a special form of [dynamic string](#), which have all the capabilities of a dynamic string, but may also represent a defined part of a [random file](#) buffer or a defined part of a dynamic string.

Field strings must always be declared using [DIM](#), [INSTANCE](#), [LOCAL](#), [STATIC](#), [GLOBAL](#), or [THREADED](#). They may be used in the same manner as a dynamic string [variable](#), or they can be bound to a file buffer for an *open* random-access file or a dynamic string using a corresponding [FIELD](#) statement. Each field string occupies sixteen [bytes](#) of memory, and requires slightly more general overhead than a regular dynamic string variable. As with other strings, FIELD variables may be declared as either [ANSI](#) characters (FIELD) or [wide](#), Unicode characters (WFIELD).

When used with a file

A random-access file buffer is automatically created for use when [GET](#) or [PUT](#) statements are used without a target variable. In this case, the file data is read or written using this file buffer, and the buffer is accessed with one or more field strings.

If a field is defined by a single field (*nSize*) parameter, it represents the length of the field, with the start position implied by the preceding field within the statement. If two parameters are used, they represent the start (*nStart*) and end (*nEnd*) positions, indexed to one.

If a string value shorter than the declared size is assigned to a field string, it is padded with blank spaces and placed into the file buffer. There is no requirement to use [LSET](#) for assignment. When used with a file

buffer, the field string is only valid when the nominated file is open. Once the file has been closed, field strings bound to the file buffer will be empty (zero length), rather than a string of the length defined in the FIELD statement. For example:

```

LOCAL fld1, fld2, fld3 AS FIELD
OPEN "test.dat" FOR RANDOM AS #1 LEN = 30
FIELD #1, 5 AS fld1, 10 AS fld2, 15 AS fld3
fld1 = "Bob"      ' Stores "Bob  "
CSET fld2 = "Zale" ' Stores "  Zale  "
RSET fld3 = "#1"  ' Stores "          #1"
? STR$(LEN(fld1)) ' Displays 5
? STR$(LEN(fld2)) ' Displays 10
? STR$(LEN(fld3)) ' Displays 15
CLOSE #1
? STR$(LEN(fld1)) ' Displays 0

```

When used with a dynamic string

A field variable bound to a dynamic string works very much like a

, so the programmer must use care in field variable selection. For example, if you bind a GLOBAL FIELD variable to a LOCAL string variable, then attempt to reference the global string after the local is destroyed (i.e., released when the owning [Sub/Function/Method/Property](#) exits), a fatal exception error (GPF) is likely to occur. The same could happen after an array has been [erased](#), or a [REDIM](#) is used to change the memory allocation. To avoid problems with [scope](#), it is suggested that field variables be bound only with strings within the same scope (LOCAL, GLOBAL, etc.).

In addition, the dynamic string must contain data for the bound field strings to reference the data. For example:

```

LOCAL x$, sFirst AS FIELD, sSecond AS FIELD
FIELD x$, 3 AS sFirst, 3 AS sSecond
x$ = ""
? STR$(LEN(sFirst)) ' Displays 0 since x$ is empty
x$ = SPACE$(6)      ' Allocate data to the string
sFirst = "111"
sSecond = "222"
? STR$(LEN(sFirst)) ' Displays 3 as x$ now contains data

```

Field strings and dynamic strings cannot be part of [UDT](#) (User-Defined Type) or [UNION](#) structures.

See Also

- [Nul-Terminated Strings](#)
- [Dynamic \(Variable-length\) strings \(\\$\)](#)
- [Fixed-length strings](#)
- [String expressions](#)

Fixed-length strings

Fixed-length strings

As their name implies, fixed-length

have a pre-defined length, and any attempt to assign a string longer than the defined length will result in truncation. If you assign a string to a fixed-length string that is shorter than the defined length, the string will be padded on the right with spaces. The major difference between [dynamic strings](#) and fixed-length strings is that once defined, the length of a fixed-length string cannot be changed. It is "fixed" for the

duration of program execution.

You declare fixed-length string variables using `STRING * x` (for [ANSI](#) characters) or `WSTRING * x` (for [WIDE](#) characters). For example

```
DIM MyStr1 AS STRING * 10 ' occupies 10 bytes
DIM MyStr2 AS WSTRING * 10 ' occupies 20 bytes
```

The declared length refers to the number of characters, not the number of [bytes](#). Unlike dynamic strings, the length of fixed-length strings is determined at compile-time, not run-time. In addition, unlike dynamic strings, fixed-length strings do not use handles. When you pass a fixed-length string to a

as a parameter, you are actually passing a to the string data.

In PowerBASIC (and most versions of BASIC), new fixed-length strings (and all variables) are initialized by filling with nuls, `CHR$(0)`. When you assign a value, that text is padded to the right with the fill character, which defaults to a space).

A declaration of a fixed-length string or fixed-length string pointer must explicitly state the length of the variable, because the compiler must know it to allocate memory, and to pad the variable with spaces upon assignment.

The address of the contents of a fixed length string can always be obtained with the [VARPTR](#) function.

[LOCAL](#) fixed-length string memory is released when the associated [Sub](#), [Function](#), [Method](#), or [Property](#) ends. Subsequent calls to the routine will result in new storage locations for the fixed-length string data; however, the location of a LOCAL fixed-length string does not move until the string memory is released when the routine terminates.

LOCAL fixed-length strings are created on the stack frame, so LOCAL fixed-length strings will be limited to available stack space. Typically this is less than 1 MB unless a larger stack frame has been allocated with the [#STACK](#) metastatement. If larger fixed-length strings are required, it is advisable to make them [INSTANCE](#), [STATIC](#), or [GLOBAL](#), since those are not created within the stack frame.

The address of the contents of [STATIC](#) and [GLOBAL](#) fixed-length strings stays constant for the duration of the module. [STATIC](#) and [GLOBAL](#) Scalar (non-[array](#)) fixed-length strings may be up to 16,777,216 bytes each.

See Also

[Nul-Terminated Strings](#)

[Dynamic \(Variable-length\) strings \(\\$\)](#)

[FIELD strings](#)

[String expressions](#)

Nul-Terminated Strings

Nul-Terminated Strings

A Nul-Terminated

is called a `STRINGZ` with [ANSI](#) characters, or `WSTRINGZ` with [WIDE](#), Unicode characters. When declared with ANSI characters, they are commonly known as ASCIIZ strings. You can think of NulTerm strings as [fixed-length strings](#) where the last character is always a nul (binary zero) terminator.

This allows the data to be variable length, but only up to a predefined maximum. Any attempt to assign a string longer than the defined length will result in truncation.

If you assign a string that is shorter than the defined length, the string will not be padded on the right. The contents of the remainder of the string buffer are undetermined. Because a NulTerm string requires a NUL terminator, they are usually defined with a length of at least two characters.

You declare `STRINGZ` variables using the `STRINGZ` or `WSTRINGZ` keywords with the [DIM](#) statement. For example:

```
DIM MyStr1 AS STRINGZ * 40
DIM MyStr2 AS WSTRINGZ * 40
```

This creates a 40 [byte](#) STRINGZ (ASCIIZ) string named MyStr1, and an 80 byte WSTRINGZ string named MyStr2. The declared size always refers to the number of characters, not the number of bytes. The number of characters you can actually store is always one less than the defined length of the string. One character position is used to hold the NUL terminator. Therefore, MyStr1 and MyStr2 can each hold up to 39 characters.

When assigning string data to a NulTerm string, the assignment will stop if an embedded [CHR\\$\(0\)](#) (nul) is encountered. For example:

```
DIM a AS STRING
DIM b AS STRINGZ * 10
a = "ABC" + CHR$(0) + "DEF"
b = a ' b will contain "ABC"
```

Like Fixed-Length strings, the length of NulTerm strings is determined at compile-time, not run-time. In addition, unlike [dynamic strings](#), NulTerm strings do not use handles. When you pass a NulTerm string to a as a parameter, you are actually passing a pointer to the string data.

The address of the contents of a NulTerm string can always be obtained with the [VARPTR](#) function. [LOCAL](#) NulTerm string memory is released when the enclosing procedure ends. Subsequent calls to the procedure will result in new storage locations for them. However, the location of a LOCAL STRINGZ or WSTRINGZ does not move until the string memory is released when the procedure terminates.

LOCAL NulTerm strings are created on the stack frame, so they will be limited to the available stack space.

Typically this is less than 1MB, unless a larger stack frame has been allocated with the [#STACK](#) metastatement. If larger NulTerm strings are required, it is advisable to make them [INSTANCE](#), [STATIC](#) or [GLOBAL](#) since those are not created within the stack frame.

The address of STATIC and GLOBAL NulTerm strings stays constant for the duration of the module. STATIC and GLOBAL Scalar (non-[array](#)) NulTerm strings may be up to 16,777,216 bytes each.

See Also

[Dynamic \(Variable-length\) strings \(\\$\)](#)

[FIELD strings](#)

[Fixed-length strings](#)

[String expressions](#)

String expressions

String expressions

A string expression consists of [string literals](#),

, and [string functions](#), optionally combined with the concatenation operators (+ or &). String expressions always produce strings as their result. Note that when the ampersand (&) is used as a string concatenation operator, it must be surrounded by white space, to differentiate it from the Long-integer type-specifier (i.e., *LongVar&*) and the number base prefix (i.e. &H0FF, &O77). Examples of string expressions include:

```
"Cats and dogs"           ' string constant
firstname$                 ' string variable
firstname$ + lastname$    ' string concatenation
a$ = "Cats " & "and " & "dogs" ' string concatenation
LEFT$(a$ + z$,7)          ' string function
a$ + MID$("Cats and dogs",5,3)
RIGHT$(MID$(a$ + z$,1,6),3)
```

Note that [fixed-length strings](#) are always a fixed length (defined in the corresponding [DIM](#) statement), string concatenation involving these strings works differently than you might expect. For instance, the following program fragment:

```
DIM Greeting AS STRING * 40
Greeting = "hello"
Greeting = greeting + "there"
```

This appends (adds) the five-character string "there" to the 40-character fixed-length string ("hello", followed by 35 spaces), but the result is truncated to 40 characters (the predefined length of the string variable Greeting), which causes the newly appended string to be lost. One solution to this problem is to use the [RTRIM\\$](#) function to remove the trailing spaces from "hello" before appending "there":

```
DIM Greeting AS STRING * 40
Greeting = "hello"
Greeting = RTRIM$(Greeting) + " there"
```

Variables of [user-defined types](#) may be used as string operands without any need to specify the individual UDT members:

```
TYPE MyType
  ItemOne AS STRING * 10
  ItemTwo AS STRING * 10
END TYPE
DIM SomeData AS MyType
SomeData.ItemOne = "hello"
SomeData.ItemTwo = "world!"
X$ = "Look at this!" + $CRLF + SomeData
```

See Also

- [Nul-Terminated Strings](#)
- [Dynamic \(Variable-length\) strings \(\\$\)](#)
- [FIELD strings](#)
- [Fixed-length strings](#)
- [String Operations](#)

String Operations Commands

String Operations

The following functions manipulate and manage

data:

| | |
|------------------------------|---|
| ACODE\$ | Translate a Unicode string into an ANSI string. |
| ARRAY ASSIGN | Assign a number of values to successive elements of an array . |
| ARRAY DELETE | Delete a single item from a given array. |
| ARRAY INSERT | Insert a single item into a given array. |
| ARRAY SCAN | Scan all or part of an array for a given value. |
| ARRAY SORT | Sort all or part of a given array. |
| BIN\$ | Return a string with the binary (base 2) representation of a value. |
| BITS\$ | Copies string contents without modification. |
| BUILD\$ | Concatenate multiple strings with high efficiency. |
| CHOOSE\$ | Return one of several values, based upon the value of an index. |
| CHR\$ | Convert one or more character codes into ASCII character(s). |
| CHR\$\$ | Convert one or more character codes into Unicode character(s). |
| CHRBYTES | Determine the size of a single character in a string variable. |
| ChrToOem\$ | Translates a string of ANSI/WIDE characters to OEM byte characters. |
| ChrToUtf8\$ | Translates a string of ANSI/WIDE characters to UTF-8 byte characters. |

| | |
|--|---|
| CLIP\$ | Deletes characters from a string. |
| CLSID\$ | Return a 16-byte (128-bit) GUID string containing a CLSID. |
| COMM LINE | Receive a CR/LF terminated "line" of data from a serial port . |
| COMM PRINT | Send a "line" of binary data through a serial port. |
| COMM RECV | Receive binary data from a serial port. |
| COMM SEND | Send a string of binary data through a serial port. |
| COMMAND\$ | Return the command-line used to start the program. |
| CSET | Center a string within the space of another string or UDT . |
| CSET\$ | Return a string containing a centered (padded) string. |
| CURDIR\$ | Return the current directory for a given drive. |
| DATA | Declare an array of constants to be read by READ\$. |
| DATACOUNT | Return the total count of the number of local data items. |
| DATE\$ | Set and retrieve the system date. |
| DEC\$ | Convert an integral value to a decimal string. |
| DIM | Declare and dimension arrays, scalar variables , and pointers . |
| DIR\$ | Return a filename that matches the given mask. |
| DIR\$ CLOSE | Force the release the operating system FindNext handle. |
| ENVIRON | Modify the current program's environment table.. |
| ENVIRON\$ | Retrieve strings from the operating system's environment table. |
| ERASE | Deallocate array memory. |
| ERL\$ | Return the last label, line number, or procedure name executed prior to the most recent error. |
| ERROR\$ | Return a string containing the descriptive name of an error . |
| EXTRACT\$ | Return up to the first occurrence of a specified character. |
| EXE | Return the path and/or name of the executing program. |
| FIELD | Bind a field string variable to a particular sub-section of a random file buffer or a dynamic string variable. |
| FIELD RESET | Reset the FIELD string to a nul (zero-length) dynamic string. |
| FIELD STRING | Change the FIELD string to a dynamic string, but first assigns the current sub-section of the random file buffer to a dynamic string. |
| FILENAME\$ | Return the file-system name of an open file. |
| FORMAT\$ | Return a string containing formatted numeric data. |
| FUNCNAME\$ | Return the name of the current Sub/Function/Method/Property . |
| GET | Read a record from a random-access file . |
| GET\$ | Read a string from a file opened in binary mode . |
| GET\$\$ | Reads WIDE string data from a file opened in binary mode. |
| GRAPHIC SPLIT | Splits a string into two parts for display on a graphic target . |
| GUID\$ | Return a 16-byte (128-bit) Globally Unique Identifier GUID. |
| GUIDTXT\$ | Return a 38-byte human-readable GUID/UUID string. |
| HEX\$ | Hexadecimal (base 16) string representation of an argument. |
| IIF\$ | Return one of two values based upon a True/False evaluation. |
| INPUT# | Load variables with data from a sequential file . |
| INPUTBOX\$ | INPUTBOX\$ displays a dialog box containing a prompt. |
| INSTR | Search a string for the first occurrence of a character or string. |
| ISNOTNULL | Determine if a string is not nul (contains 1 or more characters). |
| ISNULL | Determine if a string is nul (zero-length). |
| IStringBuilderA.Add | Appends an ANSI string to the object. |
| IStringBuilderA.Capacity <Get> | Retrieves the size of the internal buffer. |
| IStringBuilderA.Capacity <Set> | Sets the size of the internal buffer. |
| IStringBuilderA.Char <Get> | Returns the numeric character code of the character at the specified position. |
| IStringBuilderA.Char <Set> | Changes the numeric character code of the character at the specified position. |
| IStringBuilderA.Clear | All data in the object is erased. |
| IStringBuilderA.Delete | Deletes a specified number of characters starting at a specified position. |
| IStringBuilderA.Insert | Inserts a string at a specified position. |
| IStringBuilderA.Len | Returns the number of characters stored in the object. |
| IStringBuilderA.String | The ANSI string stored in the object is returned to the caller. |
| IStringBuilderW.Add | Appends an WIDE string to the object. |
| IStringBuilderW.Capacity <Get> | Retrieves the size of the internal buffer. |

| | |
|--|--|
| IStringBuilderW.Capacity <Set> | Sets the size of the internal buffer. |
| IStringBuilderW.Char <Get> | Returns the numeric character code of the character at the specified position. |
| IStringBuilderW.Char <Set> | Changes the numeric character code of the character at the specified position. |
| IStringBuilderW.Clear | All data in the object is erased. |
| IStringBuilderW.Delete | Deletes a specified number of characters starting at a specified position. |
| IStringBuilderW.Insert | Inserts a string at a specified position. |
| IStringBuilderW.Len | Returns the number of characters stored in the object. |
| IStringBuilderW.String | The WIDE string stored in the object is returned to the caller. |
| JOIN\$ | Return a string consisting of all of the strings in a string array . |
| LCASE\$ | Return a lowercase version of a string argument. |
| LEFT\$ | Return the left-most <i>n</i> characters of a string. |
| LEN | Return the logical length of a variable, UDT, or Union . |
| LET | Assign a value to a variable. |
| LET (with Types) | Assign data to a user-defined type variable. |
| LET (with Variants) | Assign a value or an object reference to a variant variable. |
| LINE INPUT# | Read line(s) from a sequential file into a string variable or array. |
| LPRINT | Output text and data to a printer device. |
| LPRINT\$ | Return the current printer device used for LPRINT operations. |
| LSET | Left-align a string within the space of another string or UDT . |
| LSET\$ | Return a string containing a left-justified (padded) string. |
| LTRIM\$ | Return a string with leading characters or strings removed. |
| MAX\$ | Return the argument with the largest (maximum) value. |
| MCASE\$ | Return a mixed case version of a string argument. |
| MID\$ | Return a portion of a string. |
| MID\$ | Replace characters in a string with characters from another string. |
| MIN\$ | Return the argument with the smallest (minimum) value. |
| MKBYT\$ | Convert a Byte value into a binary encoded string. |
| MKCUR\$ | Convert a Currency value into a binary encoded string. |
| MKCUX\$ | Convert an Extended Currency value into a binary encoded string. |
| MKD\$ | Convert a Double-precision value into a binary encoded string. |
| MKDWD\$ | Convert a Double-word value into a binary encoded string. |
| MKE\$ | Convert an Extended-precision value into a binary encoded string. |
| MKI\$ | Convert a integral value into a binary encoded string. |
| MKL\$ | Convert a Long-integer value into a binary encoded string. |
| MKQ\$ | Convert a Quad-integer value into a binary encoded string. |
| MKS\$ | Convert a Single-precision value into a binary encoded string. |
| MKWRD\$ | Convert a Word value into a binary encoded string. |
| MKDIR | Create a subdirectory/folder (like the DOS MKDIR command). |
| NUL\$ | Return a string containing a specified number of \$NUL characters. |
| OBJRESULT\$ | Returns a string which describes an OBJRESULT (hResult) code. |
| OCT\$ | Return a string that is a octal (base 8) representation of a value. |
| OemToChr\$ | Translates a byte string of OEM characters into ANSI/WIDE characters. |
| PARSE | Parse a string and extract all delimited fields into an array. |
| PARSE\$ | Return a delimited field from a string expression . |
| PARSECOUNT | Return the count of delimited fields in a string expression. |
| PATHNAME\$ | Parse a path/file name to extract component parts. |
| PATHSCANS\$ | Find a file on disk and return the path and/or file name parts.. |
| PEEK\$ | Returns consecutive 1-byte characters starting at a specific memory location. |
| PEEK\$\$ | Returns consecutive 2-byte wide characters starting at a specific memory location. |
| POKE\$ | Store a sequence of bytes starting at a specific memory location. |
| POKE\$\$ | Store a sequence as 2-byte wide characters starting at a specific memory location. |
| PRINT# | Write a complete array to a sequential file. |
| PROGID\$ | Return the alphanumeric PROGID string (text) of a given CLSID. |
| PUT | Write a record to a random-access file or variable to a binary file. |
| PUT\$ | Writes an ANSI string to a file opened in binary mode. |
| PUT\$\$ | Writes a WIDE Unicode string to a file opened in binary mode. |

| | |
|-------------------------------|---|
| READ\$ | Retrieve string data from a local DATA list. |
| REGEXPR | Scan a string for a matching "wildcard" or regular expression. |
| REGREPL | Scan a "wildcard" match in a string with a new string. |
| REMAINS | Returns the portion of a string which follows the first occurrence of a character or group. |
| REMOVES | Return a copy of a string with characters or strings removed. |
| REPEAT\$ | Return a string consisting of multiple copies of a specified string. |
| REPLACE | Replace all occurrences of one string with another string. |
| RESET | Clear a string, string array subscript , or an entire array. |
| RESOURCES\$ | Returns predefined resource data. |
| RETAINS\$ | Return a string with all non-specified characters removed. |
| RIGHT\$ | Return the rightmost <i>n</i> characters of a string. |
| RSET | Right justify a string into the space of a string variable or UDT. |
| RSET\$ | Return a string containing a right-justified (padded) string. |
| RTRIM\$ | Return a copy of a string with trailing characters/strings removed. |
| SHRINK\$ | Shrinks a string to use a consistent single character delimiter. |
| SIZEOF | Return the total or physical length of any PowerBASIC variable. |
| SPACE\$ | Return a string consisting of a specified number of spaces. |
| SPLIT | Splits a string into two parts. |
| STR\$ | Return the string representation of a number in printable form. |
| STRDELETES | Delete a specified number of characters from a string expression. |
| STRING\$ | Returns an ANSI string consisting of multiple copies of a specified character. |
| STRING\$\$ | Returns a WIDE string consisting of multiple copies of a specified character. |
| STRINSERT\$ | Insert a string at a specified position within another string. |
| STRPTR | Return the address of the data held by a variable length string . |
| STRREVERSE\$ | Reverse the contents of a string expression. |
| SWAP | Exchange the values of two strings, pointers, or pointer targets. |
| SWITCH\$ | Return one item of a series based upon a True/False evaluation. |
| TAB\$ | Return a string with TAB characters expanded with spaces. |
| TALLY | Count the number of occurrences of specified characters/strings. |
| TIME\$ | Read and/or set the system time. |
| TRIM\$ | Return a string with leading and trailing characters removed. |
| TYPE SET | Assign the value of a UDT or string expression to a UDT. |
| UCASE\$ | Return an all-uppercase (capitalized) version of a string. |
| UCODE\$ | Translate an ANSI string into a Unicode string. |
| UCODEPAGE | Set the default codepage used for ANSI / UNICODE conversions. |
| UNWRAP\$ | Removes paired characters from the beginning and end of a string. |
| USINGS | Format string/numeric expressions using a mask string. |
| Utf8ToChr\$ | Translates a byte string of OEM characters into ANSI/WIDE characters. |
| VAL function | Returns the equivalent of a string argument. |
| VAL statement | Converts a text string to a numeric value with additional information. |
| VARIANT\$ | Returns the ANSI dynamic string contained in a Variant variable. |
| VARIANT\$\$ | Returns the Unicode dynamic string contained in a Variant variable. |
| VARPTR | Return the 32-bit address of a string handle. |
| VERIFY | Determine if each character of a string is in another string. |
| WRAP\$ | Adds paired characters to the beginning and end of a string. |

Array Data Types

Array Data Types

Array Data Types

It is often useful to treat a set of [variables](#) as a group. This lets you perform repetitive operations more easily. An array is a group of

or data sharing the same variable name. The individual values that make up an array are called elements. An element of an array can be used in a statement or expression wherever you would use a regular string or numeric variable. In other words, each element of an array is itself a variable.

PowerBASIC provides several statements that perform operations on an array as a whole, allowing you to sort its contents, scan its contents for data that matches a certain condition, and insert data into or delete data from the existing structure.

You can think of an array as a row of boxes, numbered from zero to a predetermined number: four, in the example figure below. Each box holds a distinct value, which may or may not differ from the values in the other boxes. The boxes and their numbers are represented by parentheses surrounding a number; for example, *item%(3)* represents box number three of the array *item%*. Thus, if the *value* held within box number 3 is 1952, the statement *total%=item%(3)* would place the value 1952 into the variable *total%*.

| <i>item%(n)</i> | | | | |
|-----------------|-----------------|-----------------|-----------------|-----------------|
| <i>item%(0)</i> | <i>item%(1)</i> | <i>item%(2)</i> | <i>item%(3)</i> | <i>item%(4)</i> |
| 50 | 10 | -5 | 1952 | 104 |

Dimensioning a dynamic array with [DIM](#) or [REDIM](#) also clears each element, unless the [PRESERVE](#) option is present. Each element of each numeric array is set to zero; [string arrays](#) are set to the null string ("", length zero). Declaring the name and type of an array, as well as the number and organization of its elements, is performed by the DIM statement. For example:

```
DIM payments(55) AS CURRENCYX
```

...creates an array variable *payments*, consisting of 56 [Extended-currency](#) elements, numbered 0 through 55. Array *payments* and an Extended-currency variable also named *payments* are separate variables. If this is confusing, you'll understand why we suggest that you use different variable names.

See Also

[Subscripts](#)

[String arrays](#)

[Multidimensional arrays](#)

[Array storage requirements](#)

[Internal representations of arrays](#)

[Arrays within User-Defined Types](#)

[Array operations](#)

[POWERARRAY Object](#)

Subscripts

Subscripts

Individual [array](#) elements are selected with subscripts or index numbers, which are [Long-integer](#) expressions within parentheses to the right of an array [variable's](#) name. For example, *payments(3)* and *payments(44)* are two of *payments* 56 elements. Normally, the first element of an array has a subscript value of zero, although this can be changed with the [DIM](#) statement. Some examples follow:

```
' This DIM statement declares a 56-element array
' with subscript bounds of 0 TO 55.
DIM payments1(55) AS CURRENCY
```

```
' This DIM statement declares a 56-element array
' with subscript bounds of 1 TO 56
DIM payments2(1 TO 56) AS CURRENCYX
```

You must DIM all arrays before you can use them. This is a different approach than that used by some

BASIC dialects, which assume that an array contains 10 elements (0 to 9) if the array is not explicitly dimensioned.

PowerBASIC allows you to define a range of subscript values rather than just setting an upper limit. The statement:

```
DIM clouds(50 TO 60, 25 TO 45) AS LONG
```

creates the two-dimensional Long-integer array named *clouds*, containing 231 (11 * 21) elements. PowerBASIC's subscript range declaration capability allows you to model a program's data structures more closely to the problem at hand.

For example, consider a program tracking 19th-century birth statistics. This program's central data structure is a Long-Integer array of 100 elements that contain the number of babies born in each year of the last century. Ideally, you would create an array that used subscript values equal to the year in which the births occurred (for example, *births*(1851) represents how many babies came into the world in 1851), so that a code passage like:

```
DIM births(1899) AS LONG
FOR year& = 1800 TO 1899
  INCR Total&, births(year&)
NEXT year&
```

would be as straightforward as possible. Unfortunately, `DIM births(1899) AS LONG` creates a 1900-element array (from 0 to 1899), of which the first 1800 are wasted. Traditionally, BASIC programmers have tackled this problem by declaring the array as:

```
DIM births&(99)
```

and by playing games with subscripts:

```
FOR year& = 1800 TO 1899
  INCR Total&, births&(year&-1800)
NEXT year&
```

While this sort of thing works, it complicates things and slows programs down because suddenly there are 100 subtractions that weren't there before. It's better to declare a range, like this:

```
DIM births&(1800 TO 1899) ' array births has subscripts
                          ' ranging from 1800 to 1899

FOR year& = 1800 TO 1899
  Total& = Total& + births&(year&)
NEXT year&

DIM birth1&(99)          ' Array has 100 elements from 0 TO 99
DIM birth2&(1 TO 99)    ' Array has 99 elements from 1 TO 99
DIM birth3&(3 TO 99)    ' Array has 97 elements from 3 TO 99
```

See Also

[Array Data Types](#)

[String arrays](#)

[Multidimensional arrays](#)

[Array storage requirements](#)

[Internal representations of arrays](#)

[Arrays within User-Defined Types](#)

[Array operations](#)

[POWERARRAY Object](#)

String arrays

String arrays

The elements of

arrays hold strings instead of . Each string can be a different length. For example `DIM words$(50)` creates a sequence of 51 independent string variables:

```
DIM words$(50)
words$(0) = "Daniel likes cats."      ' 18-character string
words$(1) = ""                       ' a null string
words$(2) = "Nicki is a sweet child." ' 23-character string
' assign more array values here
words$(50) = SPACE$(200)             ' 200-character string
```

See Also

[Array Data Types](#)

[Multidimensional arrays](#)

[Array storage requirements](#)

[Internal representations of arrays](#)

[Arrays within User-Defined Types](#)

[Array operations](#)

[POWERARRAY Object](#)

Multidimensional arrays

Multidimensional arrays

[Arrays](#) can have one or more dimensions, up to a maximum of eight. A one-dimensional array such as payments is a simple list of values. A two-dimensional array represents a table of numbers with rows and columns of information. Some examples of multidimensional arrays are:

```
DIM one!(15)      ' a one-dimensional list
DIM two!(15,20)  ' a two-dimensional table
DIM three!(7,9,1) ' an 8 by 10 game board with room in the third
                  ' dimension for 2 items: piece type and color
```

Arrays of four to eight dimensions are possible, but they become more difficult to conceptualize and keep straight. You can define:

```
DIM five%(5,5,10,20,3) ' a five-dimensional array
```

...but it's probably better to redesign this array into several smaller ones with fewer dimensions, or use an array of [User-Defined Types](#).

See Also

[Array Data Types](#)

[Subscripts](#)

[String arrays](#)

[Array storage requirements](#)

[Internal representations of arrays](#)

[Arrays within User-Defined Types](#)

[Array operations](#)

[POWERARRAY Object](#)

Array storage requirements

Array storage requirements

A PowerBASIC [array](#) may contain up to 4,294,967,295 elements, and the data may occupy as much as all available memory. However, all individual index numbers must fall within the range of a Long-integer variable (-2,147,483,648 to +2,147,483,647).

PowerBASIC stores array data in main memory for all array types (including [LOCAL](#) arrays). Therefore, there is no arbitrary array size limit imposed by the amount of free [stack](#) space, such as can be experienced with large LOCAL [nul-terminated](#), and [Fixed-length string](#) variables. The availability of main memory is the prime consideration (typically up to 2 Gb can be used). However, LOCAL arrays do require the storage of around 128 bytes on the stack for the array descriptor table.

See Also

[Array Data Types](#)[Subscripts](#)[String arrays](#)[Multidimensional arrays](#)[Internal representations of arrays](#)[Arrays within User-Defined Types](#)[Array operations](#)[POWERARRAY Object](#)

Internal representations of arrays

Internal representations of arrays

PowerBASIC stores [arrays](#) in column-major order: *Array*(0,0) is first (lowest) in memory, then *Array*(1,0), then *Array*(2,0), and so on through all the rows of the array. After the rows are taken care of, the next column is stored.

While PowerBASIC supports lower boundary values that are non-zero, PowerBASIC generates the most efficient code if the lower boundary parameter is omitted (i.e., the array uses the default lower boundary of zero).

Array boundary values can be obtained at run-time via the [LBOUND](#) and [UBOUND](#) functions. Descriptive attributes of an array can be retrieved with the [ARRAYATTR](#) function. These attributes include such information as the

and the number of [dimensions](#), etc.

See Also

[Array Data Types](#)[Subscripts](#)[String arrays](#)

[Multidimensional arrays](#)[Array storage requirements](#)[Arrays within User-Defined Types](#)[Array operations](#)[POWERARRAY Object](#)

Arrays within User-Defined Types

Arrays within User-Defined Types

In prior versions of this compiler, arrays could not be part of a [UDT](#) structure. However, we now support both [one](#) and [two-dimensional arrays](#) of variables that have a fixed-length (for each element) - this includes [nul-terminated strings](#), [fixed-length strings](#), and all numeric variable classes. Individual arrays within a UDT may be up to 16 Megabytes each (although UDTs themselves are limited to 16 Megabytes).

Two-dimensional arrays within [Types](#) work exactly as do any other array in PowerBASIC, except that their dimensions are specified by positive numeric constant values, and are therefore not dynamically alterable. That is, the dimension sizes must be specified with [numeric equates](#) or [numeric literal](#) values, and these cannot be altered at run-time.

Like conventional arrays, the default lower array boundary is zero, but positive non-zero values may be used to specify a specific range of [subscript](#) index values for the array, separated from the upper array boundary subscript with the TO keyword. Additionally, both the lower and upper subscript index values must be zero or greater (ie, negative subscript values are not permitted). Examples of valid syntax follow:

```

TYPE MYTYPE
  id AS INTEGER           ' Scalar UDT member
  styles(6)              AS DWORD ' 7 elements (0 TO 6)
  Yrs(1980 TO 2010) AS LONG ' 31 elements
  Team(100 TO 101) AS BYTE ' 2 elements
  Rating(1 TO 10) AS DWORD ' 10 elements
  X(1 TO 5, 0 TO 5) AS EXT ' 30 elements (5x6)
  Y(4,3) AS QUAD ' 20 elements (5x4)
END TYPE

```

See Also

[Array Data Types](#)[Subscripts](#)[String arrays](#)[Multidimensional arrays](#)[Array storage requirements](#)[Internal representations of arrays](#)[Array operations](#)[POWERARRAY Object](#)

Array operations

Array Operations

The following functions can be used to manipulate and manage arrays:

| | |
|--|--|
| #DEBUG ERROR | Control generation of error checking code |
| #DIM | Specify if variables must be declared before use |
| ARRAY ASSIGN | Assign a number of values to successive elements of an array |
| ARRAY DELETE | Delete a single item from a given array |
| ARRAY INSERT | Insert a single item into a given array |
| ARRAY SCAN | Scan all or part of an array for a given value |
| ARRAY SORT | Sort all or part of a given array |
| ARRAYATTR | Return descriptive attributes of a given array |
| BIT CALC | Set or reset a bit in an implied bit-array |
| BIT | Return the value of a particular bit in an implied bit-array |
| BIT | Manipulate individual bits of an implied bit-array |
| DATA | Declare an array of constants to be read by READ\$ |
| DATACOUNT | Return the total count of the number of local data items |
| DIM | Declare and dimension arrays, scalar variables, and pointers |
| ERASE | Deallocate array memory |
| FILESCAN | Rapidly scan an open file , before loading into an array with GET |
| GET | Read a complete array from a binary file |
| IPowerArray.ARRAYBASE | Returns the address of the first element of the array. |
| IPowerArray.ARRAYDESC | Returns the address of the SAFEARRAY descriptor. |
| IPowerArray.ARRAYINFO | Retrieves the info string, if one is present. |
| <Get> | |
| IPowerArray.ARRAYINFO | Assigns the info string. |
| <Set> | |
| IPowerArray.CLONE | An exact duplicate of the SafeArray is created, and stored in the specified PowerArray object. |
| IPowerArray.COPYFROM | An exact copy is made of the specified SafeArray and stored in this PowerArray object. |
| VARIANT | |
| IPowerArray.COPYTOVAR | An exact copy is made of the SafeArray in this object and stored in the specified Variant. |
| IANT | |
| IPowerArray.DIM | Dimensions (creates) a new array. |
| IPowerArray.ELEMENTPT | Retrieves the address of the specified data element. |
| R | |
| IPowerArray.ELEMENTSIZ | Retrieves the storage size (in bytes) of each data element of the array. |
| E | |
| IPowerArray.ERASE | Destroys the contained array and empties the object. |
| IpowerArray.LBOUND | Retrieves the lower bound number for the dimension specified. |
| IPowerArray.LOCK | Increments the lock count of the SAFEARRAY. |
| IPowerArray.MOVEFROM | Transfers ownership of the specified SafeArray to the PowerArray object. |
| VARIANT | |
| IPowerArray.MOVETOVAR | Transfers ownership of the SafeArray contained in this PowerArray object to a variant parameter. |
| IANT | |
| IPowerArray.REDIM | Allows the SafeArray to be erased and re-dimensioned to a new size. |
| IPowerArray.REDIMPRES | Allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. |
| ERVE | |
| IPowerArray.RESET | All elements in the SafeArray are set back to their initial, default value. |
| IPowerArray.SUBSCRIPTS | Retrieves the number of dimensions (subscripts) for this array. |
| IPowerArray.UBOUND | Retrieves the upper bound number for the dimension specified. |
| IPowerArray.UNLOCK | Decrements the lock count of the SAFEARRAY. |
| IPowerArray.VALUEGET | Retrieves the value of the specified array element. |
| IPowerArray.VALUESET | Assigns the specified value to the specified array element. |
| IPowerArray.VALUETYPE | Retrieves the %VT code which describes the data contained in this array. |
| JOINS\$ | Return a consisting of all of the strings in a string array |

| | |
|-----------------------------|---|
| LBOUND | Return the lowest subscript of an array's specific dimension |
| LET | Assign a Variant to an array or an array to a Variant |
| LINE INPUT# | Read line(s) from a sequential file into a string variable or array |
| MAT | Matrix calculations on arrays |
| PARSE | Parse a string and extract all delimited fields into an array |
| PRINT# | Write a complete array to a sequential file |
| PUT | Write a complete array to a binary file |
| READ\$ | Retrieve string data from a local DATA list |
| REDIM | Declare dynamic arrays, allocate, reallocate, deallocate memory |
| RESET | Set an array subscript or an entire array to zero or null/empty |
| UBOUND | Return the highest subscript of an array's specific dimension |

POWERARRAY Object

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object **New!**

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of [arrays](#). It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a [VARIANT](#) variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

| | | | |
|---------------------------|------|------------------------------|-------|
| <code>%vt_i2</code> | = 2 | <code>%vt_ui4</code> | = 19 |
| <code>%vt_i4</code> | = 3 | <code>%vt_i8</code> | = 20 |
| <code>%vt_r4</code> | = 4 | <code>%vt_int</code> | = 22 |
| <code>%vt_r8</code> | = 5 | <code>%vt_uint</code> | = 23 |
| <code>%vt_cy</code> | = 6 | <code>%vt_ptr</code> | = 26 |
| <code>%vt_date</code> | = 7 | <code>%vt_userdefined</code> | = 29 |
| <code>%vt_bstr</code> | = 8 | <code>%vt_filetime</code> | = 64 |
| <code>%vt_dispatch</code> | = 9 | <code>%vt_astr</code> | = 201 |
| <code>%vt_bool</code> | = 11 | <code>%vt_stringfix</code> | = 203 |
| <code>%vt_variant</code> | = 12 | <code>%vt_wstringfix</code> | = 204 |
| <code>%vt_unknown</code> | = 13 | <code>%vt_stringz</code> | = 205 |
| <code>%vt_decimal</code> | = 14 | <code>%vt_wstringz</code> | = 206 |

| | | | |
|----------------------|-------------------|-----------------------|--------------------|
| <code>%vt_i1</code> | <code>= 16</code> | <code>%vt_type</code> | <code>= 211</code> |
| <code>%vt_ui1</code> | <code>= 17</code> | <code>%vt_ext</code> | <code>= 221</code> |
| <code>%vt_ui2</code> | <code>= 18</code> | <code>%vt_curx</code> | <code>= 222</code> |

The array dimensions are stated at the time the array is created by executing the [DIM](#) method. The `ByRef Bounds` parameter refers to a `PowerBounds` UDT which is predefined in the compiler. `Bound` is a `PowerBOUND` UDT for use with [RedimPreserve](#). It is also predefined in the compiler.

```

TYPE PowerBounds
  Elements1 AS LONG
  LowBound1 AS LONG
  Elements2 AS LONG
  LowBound2 AS LONG
  Elements3 AS LONG
  LowBound3 AS LONG
  Elements4 AS LONG
  LowBound4 AS LONG
END TYPE

TYPE PowerBound
  Elements AS LONG
  LowBound AS LONG
END TYPE

```

This class is named `PowerArray`, and the interface is named `IPowerArray`. If any of the following operations should fail, the [OBJRESULT](#) function will return a non-zero result rather than `%S_OK` (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the `SAFEARRAY` descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a [wide text](#) string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = WString <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a [wide dynamic string](#) to the array.

METHOD CLONE (PowerArray) <4>

The parameter `PowerArray` is another object of the same class as this object, which is `PowerArray`. An exact duplicate of the `SafeArray` in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef Variant) <5>

An exact copy is made of the `SafeArray` contained in the parameter `Variant`. The array copy is stored in this `PowerArray` object.

METHOD COPYTOVARIANT (ByRef Variant) <6>

An exact copy is made of the `SafeArray` in this object. The array copy is stored in the parameter `Variant`. Only arrays of data items which are Automation compatible may be stored in a `Variant`. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <9>

Dimensions (creates) a new array. The `VT&` parameter is specified by one of the `%VT` values listed in remarks. `Subscripts&` is the number of dimensions (1 to 4), `Bounds` is a `PowerBounds` UDT which is prefilled with the lower bound and size of each dimension. The optional parameter `SIZE` tells the size (in bytes) of each element. `SIZE` is only used with `%vt_stringfix`, `%vt_wstringfix`, `%vt_stringz`, `%vt_wstringz`, and `%vt_type`.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

**METHOD ELEMENTPTR (ByVal Index1&, Opt ByVal Index2&, _
Opt ByVal Index3&, Opt ByVal Index4&)
AS LONG <11>**

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (Subscript&) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef Variant) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETO VARIANT (ByRef Variant) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

**METHOD REDIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds,
OPTIONAL ByVal SIZE) <19>**

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef Bound) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (Subscript&) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef GetVar, ByVal Index1&, Opt ByVal
Index2&, _
Opt ByVal Index3&, Opt ByVal Index4&) AS
LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

- [Arrays within User-Defined Types](#)
- [Using arrays of User-Defined Types](#)
- [Using User-Defined Types with procedures and functions](#)
- [Storage requirements and restrictions](#)
- [Unions](#)

Defining User-Defined Types

Defining User-Defined Types

The definition of a [User-Defined Type](#) begins with the reserved word `TYPE` and ends with the keywords `END TYPE`. In between, you define the names and

of the member elements (fields) that are to be part of the new Type. For example:

```
TYPE StudentRecord
  LastName      AS STRING * 20 ' A 20-character string
  FirstName     AS STRING * 15 ' A 15-character string
  IDnum         AS LONG       ' Student ID, a Long-integer
  Contact       AS STRING * 30 ' Emergency contact person
  ContactPhone  AS STRING * 14 ' Their phone number
  ContactRel    AS STRING * 8  ' Relationship to student.
  AverageGrade AS SINGLE     ' Single-precision % grade
END TYPE
```

Remember that the definition of a User-Defined Type does not set aside memory for storing data of that Type. Rather, it defines a template for the new Type *StudentRecord*. Then when the compiler encounters a statement declaring (or creating) a [variable](#) of the new Type, it will "know" how many bytes of storage to set aside for the variable. In order to use this new Type, you must declare variables of that Type with the [DIM](#) statement:

```
DIM Student AS StudentRecord
```

See Also

- [User-Defined Types \(UDTs\)](#)
- [Accessing the fields of a User-Defined Type](#)
- [Nesting User-Defined Types](#)
- [Arrays within User-Defined Types](#)
- [Using arrays of User-Defined Types](#)
- [Using User-Defined Types with procedures](#)
- [Storage requirements and restrictions](#)
- [Unions](#)

Accessing the fields of a User-Defined Type

Accessing the fields of a User-Defined Type

To work with the individual fields within a record variable, separate the field name from the variable name with a period. Here are some examples using the *Student* variable in the above [DIM](#) statement:

```
Last$      = Student.LastName
Message$   = "Id number is: " + STR$(Student.IdNum)
Student.FirstName = "Bob"
Student.LastName  = "Smith"
```

```

FullName$ = Student.LastName + " " + Student.FirstName
FullName$ = RTRIM$(Student.LastName) + ", " + RTRIM$(Student.FirstName)

```

Note that the last two statements above produce slightly differing results. The former produces a string that contains the text plus any [\\$SPC](#) (space) characters that pad the text in each of the `Student.LastName` and `Student.FirstName` members. Comparatively, the latter statement returns a string with these padding characters removed. In many cases, it can be easier to use a [nul-terminated](#) string members to alleviate the need to frequently trim such [fixed-length strings](#), but allowance must be made for the additional [\\$NUL](#) terminator byte required by nul-terminated strings.

See Also

- [User-Defined Types \(UDTs\)](#)
- [Defining User-Defined Types](#)
- [Accessing the fields of a User-Defined Type](#)
- [Nesting User-Defined Types](#)
- [Arrays within User-Defined Types](#)
- [Using arrays of User-Defined Types](#)
- [Using User-Defined Types with procedures](#)
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Nesting User-Defined Types

Nesting User-Defined Types

The fields within a [User-Defined Type](#) can be made up of other User-Defined Types. Just like a set of Chinese boxes, with each box containing a smaller box, you can nest one User-Defined Type within another. The result is that you create data structures that have a hierarchy similar to the directory tree structure of your hard drive.

Instead of storing the student names as two separate fields, we could instead define a Type called *NameRec* as follows:

```

TYPE NameRec
    Last    AS STRING * 20
    First   AS STRING * 15
    Initial AS STRING * 1
END TYPE

```

Then, when we define our *Student Record* Type, we can define the field containing the individual student's name as *NameRec*:

```

TYPE StudentRecord
    FullName    AS NameRec
    IdNum       AS LONG
    Contact     AS NameRec
    ContactPhone AS STRING * 14
    ContactRel  AS STRING * 8
    AverageGrade AS SINGLE
END TYPE

```

You could, of course carry this idea a step further, and define other components of the student record as nested records. For instance, a *ContactRecord* or even a *PhoneRec* but we'll leave that refinement up to you. To access the fields of a nested record, simply extend the dot notation. Just as the backslash (\) is used to separate the individual subdirectory names in a path (i.e., `C:\PROJECTS\PROGRAM`), the period is used within record variable names to separate the member elements from the base Type. For instance:

```
StudentRecord.FullName
```

refers to the *FullName* field (which happens to be of Type *NameRec*) within *Student Record*, and:

```
StudentRecord.FullName.First
```

refers to the sub-field *First* within the *FullName* field.

You can nest User-Defined Types as deeply as you want to, as long as the entire name used to refer to a field is within the maximum identifier length of 255 characters. In practical terms however, you probably would not want to carry nesting beyond two or, at most, three levels. Beyond that, it becomes clumsy, difficult to remember, and you are more likely to make typing errors. Note that User-Defined Types cannot contain circular references - for example, a UDT called *StudentRecord* cannot contain a field of Type *StudentRecord*.

See Also

- [User-Defined Types \(UDTs\)](#)
- [Defining User-Defined Types](#)
- [Accessing the fields of a User-Defined Type](#)
- [Arrays within User-Defined Types](#)
- [Using arrays of User-Defined Types](#)
- [Using User-Defined Types with procedures](#)
- [Storage requirements and restrictions](#)
- [Unions](#)

Arrays within User-Defined Types

Arrays within User-Defined Types

In prior versions of this compiler, arrays could not be part of a [UDT](#) structure. However, we now support both [one](#) and [two-dimensional arrays](#) of variables that have a fixed-length (for each element) - this includes [nul-terminated strings](#), [fixed-length strings](#), and all numeric variable classes. Individual arrays within a UDT may be up to 16 Megabytes each (although UDTs themselves are limited to 16 Megabytes).

Two-dimensional arrays within [Types](#) work exactly as do any other array in PowerBASIC, except that their dimensions are specified by positive numeric constant values, and are therefore not dynamically alterable. That is, the dimension sizes must be specified with [numeric equates](#) or [numeric literal](#) values, and these cannot be altered at run-time.

Like conventional arrays, the default lower array boundary is zero, but positive non-zero values may be used to specify a specific range of [subscript](#) index values for the array, separated from the upper array boundary subscript with the TO keyword. Additionally, both the lower and upper subscript index values must be zero or greater (ie, negative subscript values are not permitted). Examples of valid syntax follow:

```
TYPE MYTYPE
  id AS INTEGER           ' Scalar UDT member
  styles(6)              AS DWORD ' 7 elements (0 TO 6)
  Yrs(1980 TO 2010) AS LONG ' 31 elements
  Team(100 TO 101) AS BYTE ' 2 elements
  Rating(1 TO 10) AS DWORD ' 10 elements
  X(1 TO 5, 0 TO 5) AS EXT ' 30 elements (5x6)
  Y(4,3) AS QUAD ' 20 elements (5x4)
END TYPE
```

See Also

- [Array Data Types](#)
- [Subscripts](#)

[String arrays](#)[Multidimensional arrays](#)[Array storage requirements](#)[Internal representations of arrays](#)[Array operations](#)[POWERARRAY Object](#)

Using arrays of User-Defined Types

Using arrays of User-Defined Types

You can create arrays of [User-Defined Types](#) just as you can create [arrays](#) of or or any of PowerBASIC's other data types. For example:

```
DIM Class(1 TO 30) AS StudentRecord
```

To access the individual elements of the *Class* array, you use [subscript](#) index values just as you do with any other array. The third student record is *Class(3)*, for instance. The period separator and the field name follows the array subscript:

```
Class(3).FullName.First
```

This would access the first name of the third student in the class array. Think of it this way: the array is made up of elements of the Type *Student Record*, so the subscript belongs with the name of the [variable](#) as a whole.

You can create [multidimensional arrays](#) of User-Defined Types just as you can with any other PowerBASIC data type. The limit on the number of elements and dimensions in such arrays is governed by the same rules as well: The limits are defined by the amount of data storage required for each element. Additionally, arrays within structures must contain a static subscript list, defined at compile-time. Therefore, arrays within structures cannot be [redimensioned](#) at run-time.

See Also

[User-Defined Types \(UDTs\)](#)[Defining User-Defined Types](#)[Accessing the fields of a User-Defined Type](#)[Arrays within User-Defined Types](#)[Nesting User-Defined Types](#)[Using User-Defined Types with procedures](#)[Storage requirements and restrictions](#)[Unions](#)

Using User-Defined Types with procedures

Using User-Defined Types with procedures

[Subroutines](#), [functions](#), [Methods](#), and [Properties](#) can process [User-Defined Types](#) as well as any other data type. This topic covers the following topics:

- Passing fields as arguments

- Passing records as arguments
- Passing record arrays as arguments

Passing fields as arguments

Members in User-Defined Types that are one of the built-in PowerBASIC types ([INTEGER](#), [WORD](#), [STRING](#), and so on) can be passed to procedures and functions as if they were simple variables. For example, given the User-Defined Type *PatientRecord*, as follows:

```
TYPE PatientRecord
  FullName AS STRING * 32
  AmountDue AS DOUBLE
  IdNum AS LONG
END TYPE
DIM Patient AS PatientRecord
```

...you could use a procedure *PrintStatement*:

```
SUB PrintStatement(Id AS LONG, AmountPastDue AS DOUBLE)
  ' access Id and AmountPastDue
END SUB
```

...like this:

```
CALL PrintStatement(Patient.IdNum, Patient.AmountDue)
```

Passing records as arguments

You can also write your procedures to accept arguments of User-Defined Types. This is especially useful if you want to pass many arguments; rather than have a long argument list, you can pass a single User-Defined Type. For example, given the *PatientRecord* User-Defined Type discussed in the previous section, you could write your *PrintStatement* procedure as follows:

```
SUB PrintStatement(Patient AS PatientRecord)
  ' access Patient.IdNum and Patient.AmountDue
END SUB
```

You'd call *PrintStatement* like this:

```
CALL PrintStatement(Patient)
```

Passing record arrays as arguments

Procedures can accept [arrays](#) of records as easily as they can accept arrays of other Types. For example, if you had an array of *PatientRecords*, each containing a patient record with an amount due, you could write a function that returns the total amount due for all the patient records in the array:

```
FUNCTION TotalAmountDue(Patients() AS PatientRecord)
  DIM total AS DOUBLE
  RESET total
  FOR ix = LBOUND(Patients) TO UBOUND(Patients)
    total = total + Patients(ix).AmountDue
  NEXT
  TotalAmountDue = total
END FUNCTION
```

You might call the function like this:

```
DIM Patients(1 TO 100) AS PatientRecord
' more code here
x$ = "Total amount due:" + STR$(TotalAmountDue(Patients()))
```

See Also

[User-Defined Types \(UDTs\)](#)

[Storage requirements and restrictions](#)

[Unions](#)

Storage requirements and restrictions

Storage requirements and restrictions

You can determine the amount of storage required for a variable of a [User-Defined Type](#) using the [LEN](#) function. To determine the requirements for a student record, for example, use:

```
RecordSize = LEN(Student)
```

The address of a record [variable](#), as returned by the [VARPTR](#) function, is the address in memory of the first byte of data in the record. You can also obtain the starting address of the fields within the record by passing the full name of the field (*Student.IdNum*, for example) to the [VARPTR](#) function.

A single UDT structure is limited to 16 MB (16,777,216 bytes). [Locally](#) dimensioned [UDT](#) structures are limited to the amount of free stack space available, typically less than 1 MB. If larger UDT structures are required, use a [STATIC](#) or [GLOBAL](#) declaration instead (since these are not stored on the stack). The same rules apply to [Unions](#) (and LOCAL [fixed-length](#) and [nul-terminated](#) strings).

Note that the

statements cannot be directly used on [arrays](#) within UDTs. However, you can use [DIM..AT](#) to define an array (of the same data type) at the address of the UDT array, and employ [ARRAY](#) statements on that array. The [ARRAY](#) statements can be used on arrays of UDT structures. An individual array within a UDT may occupy as much as the full 16 MB UDT size limit.

See Also

[User-Defined Types \(UDTs\)](#)

[Unions](#)

Built-in User Defined Types

Built-in User-Defined Types

The compiler provides a set of built-in User-Defined Types, including:

```
TYPE DispParams
  VariantArgs AS VARIANT
  NamedDispID AS VARIANT
  CountArgs   AS DWORD
  CountNamed  AS DWORD
END TYPE
```

DispParams is used internally by the compiler to send parameters to [Dispatch](#) methods and properties.

```
TYPE DirData
  FileAttributes AS DWORD
  CreationTime   AS QUAD
  LastAccessTime AS QUAD
  LastWriteTime  AS QUAD
  FileSizeHigh   AS DWORD
  FileSizeLow    AS DWORD
  Reserved0      AS DWORD
  Reserved1      AS DWORD
  FileName       AS WStringZ * 260
  ShortName      AS WStringZ * 14
END TYPE
```

DirData is used with the [DIR\\$](#) function to retrieve file or directory information.

```
TYPE Point
```

```

x AS LONG
y AS LONG
END TYPE

```

Used with various API routines.

```

TYPE NMHDR
  HwndFrom AS DWORD
  IdFrom   AS DWORD
  Code     AS LONG
END TYPE

```

NMHDR is used with [CB.NMHDR](#) and contains information about notification messages.

```

TYPE NMCHAR
  Hdr      AS NMHDR
  Ch       AS DWORD
  dwItemPrev AS DWORD
  dwItemNext AS DWORD
END TYPE

```

NMCHAR is used with [CB.NMHDR](#) and contains information about a character notification messages.

```

TYPE NMKEY
  Hdr      AS NMHDR
  nVKey    AS DWORD
  uFlags   AS DWORD
END TYPE

```

NMKEY is used with CB.NMHDR and contains information about key notification messages.

```

TYPE NMMOUSE
  Hdr      AS NMHDR
  dwItemSpec AS DWORD
  dwItemData AS DWORD
  Pt       AS POINT
  dwHitInfo AS LONG
END TYPE

```

NMMOUSE is used with CB.NMHDR and contains information about key notification messages.

```

TYPE NMTOOLTIPS_CREATED
  Hdr      AS NMHDR
  HwndToolTips AS DWORD
END TYPE

```

NMTOOLTIPS_CREATED is used with CB.NMHDR and contains information about %
NM_TOOLTIPS_CREATED messages.

```

TYPE PowerBounds
  Elements1 AS LONG
  LowBound1 AS LONG
  Elements2 AS LONG
  LowBound2 AS LONG
  Elements3 AS LONG
  LowBound3 AS LONG
  Elements4 AS LONG
  LowBound4 AS LONG
END TYPE

```

PowerBounds is used with a [PowerArray](#) Object to dimension the array.

See Also[Built-in numeric equates](#)[Built-in string equates](#)[Built-in RGB Color Equates](#)**Unions**

Unions

Unions

If you have ever programmed in Pascal or C, you may be familiar with the concept of a Union. A Union is similar in some ways to a [User-Defined Type](#). Both have data fields that can be made up of any of PowerBASIC's data types, including records and other Unions, and except for the UNION keyword, they are defined the same way. The major difference between User-Defined Types and Unions, is that each field within a Union occupies the same memory location as all the others.

While the concept may appear abstract, Unions provide an avenue to freely convert data from one format to another, simply by writing the data into the Union as one data format, and reading the data back as another. Combining the versatility of a UDT with the flexibility of a Union can extend this functionality dramatically, such as splitting data into its component parts.

For example, the following definition would create a Union called *WordFld* and a *WordFld* variable called *MyVar*:

```

TYPE HiLo
  Lo AS BYTE
  Hi AS BYTE
END TYPE

UNION WordFld
  Whole AS WORD
  Part AS HiLo
END UNION

DIM MyVar AS WordFld

MyVar.Whole = &HBC1F      'assign a value to the entire word
a$ = HEX$(MyVar.Part.Hi) 'returns Hi byte of the word
b$ = HEX$(MyVar.Part.Lo) 'returns Lo byte of the word

```

When you access the field *MyVar.Whole*, you are reading the entire contents of the Union as a word. On the other hand, when you refer to *MyVar.Part.Hi*, you are referring to the high byte of *MyVar*.

See Also[User-Defined Types \(UDTs\)](#)[Union Storage requirements and restrictions](#)

Storage requirements and restrictions

Storage requirements and restrictions

A single [Union](#) structure is limited to 16 MB (16,777,216 bytes). [Locally](#) dimensioned Union structures are limited to the amount of free [stack](#) space available, typically less than 1 MB. If larger [UDT](#) structures are required, use a [STATIC](#), [GLOBAL](#), or [INSTANCE](#) declaration instead, since these are not created on the stack. The same rules apply to User-Defined Types (and LOCAL [fixed-length](#) and [nul-terminated](#) strings). An individual [array](#) within a Union may occupy as much as the full 16 MB Union size limit.

See Also

[User-Defined Types \(UDTs\)](#)

[Unions](#)

Pointer Data Types

Pointers (@)

Pointers (@)

A pointer is a variable that holds the 32-bit (4 [byte](#)) address of code or data located elsewhere in memory. It is called a pointer because it literally *points* to that location. The location pointed to is known as the *target* of the pointer.

Pointers represent a powerful addition to the BASIC programmer's arsenal. The address is defined at run-time, so your program can reference any memory location as if it were a standard [variable](#). When a pointer is used to access a memory location, it is called "indirect addressing".

Pointers are declared using the [DIM](#) statement, and the type of the target must be specified. The keywords PTR and POINTER are synonymous.

```
DIM i AS INTEGER PTR 'declares i as a pointer to an Integer
```

or:

```
DIM i AS INTEGER POINTER
```

The above example declares *i* as an [integer](#) pointer. Before it can be used, *i* must be initialized with an actual address of a [variable](#) (easily done with the [VARPTR](#) function; or [STRPTR](#) for

). When you assign a value to a pointer variable, you are giving it an address to use later when you wish to reference the actual target. A pointer's name alone references the pointer variable. A pointer's name with an at sign (@) prefix, references the pointer's target:

```
DIM Ptr1 AS BYTE PTR ' declares Ptr1 as a byte pointer
DIM Ptr2 AS BYTE PTR ' declares Ptr2 as a byte pointer
DIM Byte1 AS BYTE   ' Declares Byte1 as a byte variable
DIM Byte2 AS BYTE   ' Declares Byte2 as a byte variable
Ptr1 = VARPTR(Byte1) ' Ptr1 points to Byte1
@Ptr1 = 36           ' Sets Byte1 to the value 36
Ptr2 = VARPTR(Byte2) ' Ptr2 points to Byte2
@Ptr2 = @Ptr1 + 4    ' Sets Byte2 to 40 (36 + 4)
```

In summary, when you reference a pointer variable *without* an at-sign, you are referencing the 32-bit address contained in it. When you precede the name *with* an at-sign, you are referencing the target data located at the address "pointed to" by the pointer.

By assigning the address of another pointer to a pointer, we can set up another level of indirection. *Pointers to pointers* are useful when setting up linked lists in memory. You can then access the target by adding a second at-sign in front of the pointer's name:

```
DIM y AS STRING POINTER
DIM z AS STRING POINTER
DIM TmpStr AS STRING
y = VARPTR(TmpStr) ' y points to TmpStr
z = VARPTR(y)      ' z points to y
```

```

@y = "A"          ' put an "A" in TmpStr
@@z = "B"         ' overwrite it with a "B"
Display @y       ' display the target value of y

```

PowerBASIC supports up to 200 levels of indirection. For each level, you add another preceding at-sign to the pointer name. You can only use the (@) prefix with pointer variables.

A pointer with a value of zero (0) is considered a null-pointer by PowerBASIC. Windows will generate a General Protection Fault (GPF) if you attempt to access data at an invalid pointer address. See the section on [assembler programming](#) for more information.

The true power of pointers resides in their speed and flexibility. Traditionally, to access memory, a BASIC programmer had to use combinations of [PEEK](#) and [POKE](#). This allowed the programmer to address memory as bytes. If the target data took any other form, conversion was necessary. Pointers allow you to address the target data in any fashion you desire, even as a [user-defined structure](#). Moreover, because the setup of calling PEEK and POKE is no longer necessary, access is much faster.

Let's say that we want to scan all the characters in a buffer, replacing all upper case "A"s with lower case "a"s. The code might look something like this:

```

SUB Lower(zStr AS STRING)
  DIM s AS BYTE PTR, ix AS INTEGER
  s = STRPTR(zStr) ' Access the dynamic string directly
  FOR ix = 1 TO LEN(zStr)
    IF @s = 65 THEN @s = 97 ' "A" -> "a"
    INCR s
  NEXT
END SUB

```

When using a pointer to a structure, the prefix is placed before the structure name when you wish to access an element of the structure. The structure name by itself refers to its address. This distinction is extremely important when treating structures as a whole. The following example shows two ways of doing a simple bubble sort of an [array of User-Defined Types](#). The first uses conventional BASIC methods, the second uses pointers to illustrate their speed and efficiency.

```

'-- Example 1 -----
#COMPILE EXE
#DIM ALL
TYPE NameRec
  Last AS STRING * 20 ' Last name
  First AS STRING * 20 ' First name
END TYPE
FUNCTION PBMAIN () AS LONG
  DIM Rec(1 TO 10) AS NameRec
  DIM RP AS NameRec POINTER
  DIM ix AS LONG, ij AS LONG
  DIM hFile AS DWORD
  '-- Put some data in the records --
  FOR ix = 1 TO 10
    Rec(ix).First = CHOOSE$(ix,"Jacob","Michael","Joshua","Matthew","Ethan", _
      "Emily","Emma","Madison","Abigail","Olivia")
    Rec(ix).Last = CHOOSE$(ix,"SMITH","JOHNSON","WILLIAMS","JONES","BROWN", _
      "DAVIS","MILLER","WILSON","MOORE","TAYLOR")
  NEXT ix
  '-- Sort UDT array in ascending order using a bubble sort
  '-- ARRAY SORT Rec(),FROM 1 TO 20,ASCEND will do this as well
  FOR ix = 9 TO 1 STEP -1
    FOR ij = 1 TO ix
      IF Rec(ij-1).Last > Rec(ij).Last THEN
        SWAP Rec(ij-1), rec(ij)
      END IF
    NEXT ij
  NEXT ix

```

```

NEXT ix
#IF %DEF(%PB_CC32)
  FOR ix = 1 TO 10
    PRINT TRIM$(Rec(ix).Last)+ ", " +TRIM$(Rec(ix).First)
  NEXT ix
  PRINT
  PRINT "Press any key to quit ... "
  WAITKEY$
#ELSE
  DIM msg AS STRING
  FOR ix = 1 TO 10
    msg = msg + TRIM$(Rec(ix).Last)+ ", " +TRIM$(Rec(ix).First) + $CRLF
    MSGBOX msg
  NEXT ix
#ENDIF
END FUNCTION

'-- Example 2 -----
' The difference between example 1 and this example is
' that we're manipulating pointers (4 bytes) instead
' of whole records (40 bytes).
#COMPILE EXE
#DIM ALL
TYPE NameRec
  Last AS STRING * 20 ' Last name
  First AS STRING * 20 ' First name
END TYPE
FUNCTION PBMAIN () AS LONG
  DIM Rec(1 TO 10) AS NameRec
  DIM RP AS NameRec POINTER
  DIM ix AS LONG, ij AS LONG
  DIM hFile AS DWORD

  '-- Put some data in the records --
  FOR ix = 1 TO 10
    Rec(ix).First = CHOOSE$(ix,"Jacob","Michael","Joshua","Matthew","Ethan", _
      "Emily","Emma","Madison","Abigail","Olivia")
    Rec(ix).Last = CHOOSE$(ix,"SMITH","JOHNSON","WILLIAMS","JONES","BROWN",
      "DAVIS","MILLER","WILSON","MOORE","TAYLOR")
  NEXT ix
  '-- Sort UDT array in ascending order using a bubble sort with pointers
  '-- note a bubble sort is not recommended for large collections
  '-- and note ARRAY SORT Rec(),FROM 1 TO 20,ASCEND will do this as well
  '-- so this is only to show pointers to UDT arrays in action!
  RP = VARPTR(Rec(1))
  FOR ix = 9 TO 1 STEP -1
    FOR ij = 1 TO ix
      'note pointers to array elements use zero based subscripts in brackets!
      IF @RP[ij-1].Last > @RP[ij].Last THEN
        SWAP @RP[ij-1], @RP[ij]
      END IF
    NEXT ij
  NEXT ix
#IF %DEF(%PB_CC32)
  FOR ix = 1 TO 10
    PRINT TRIM$(Rec(ix).Last)+ ", " +TRIM$(Rec(ix).First)
  NEXT ix
  PRINT
  PRINT "Press any key to quit ... "

```

```

        WAITKEY$
#ELSE
    DIM msg AS STRING
    FOR ix = 1 TO 10
        msg = msg + TRIM$(Rec(ix).Last) + ", " + TRIM$(Rec(ix).First) + $CRLF
        MSGBOX msg
    NEXT ix
#ENDIF
END FUNCTION

```

If you declare a member of a structure as a pointer, the @ prefix is used with the member name, not the structure name. The previous example could be improved by adding a couple of pointers to the structure to point to the previous and next record, respectively. This lets you allocate memory for a record only when needed, instead of pre-allocating a fixed-size array of records. The modified structure would look something like this:

```

TYPE NameRec
    Last AS STRING * 20    ' Last name
    First AS STRING * 20  ' First name
    Nxt AS NameRec PTR    ' Pointer to next record
    Prv AS NameRec PTR    ' Pointer to previous record
END TYPE
DIM Rec AS NameRec

```

The pointer members are then accessed like this:

```

Rec.@Nxt    ' next record
Rec.@Prv    ' previous record

```

Putting the @ prefix in front of the structure name (i.e., @Rec) would cause a [compile-time error](#), as Rec itself is not a pointer.

When calculating the length of the Type, all pointers are internally stored as Double-word ([DWORD](#)) variables, so NameRec is 48 bytes long (20 + 20 + 4 + 4). If you need to know the length of a Type, it is easier to let PowerBASIC calculate it for you using the [LEN](#) function than doing it yourself:

```
length = LEN(structure)
```

See Also

[Pointers to nul-terminated and fixed-length strings](#)

[Pointers to arrays](#)

[Pointers to arrays with dual indexes](#)

Pointers to Nul-Terminated and fixed-length strings

Pointers to Nul-Terminated and fixed-length strings

A declaration of an [Nul-Terminated](#) or [fixed-length](#) string must explicitly state the maximum length of the string, in order for the compiler to allocate memory accordingly. When declaring [pointers](#) to fixed-length strings, you may also state the maximum length of the string. This will allow [INCR](#) and [DECR](#) to move the pointer to the next or previous string, respectively. If you do not supply the length for a fixed-length string pointer, INCR and DECR will move the pointer by one [byte](#).

However, with an Nul-Terminated string pointer, the length limit may be explicitly stated, or it may be left as an ambiguous value, by skipping the length clause entirely. For example, the following lines are valid:

```

DIM x AS ASCIIZ    PTR * 41
DIM y AS STRINGZ  PTR * 2
DIM z AS WSTRINGZ PTR

```

This rule applies to scalar pointers, [arrays](#) of pointers, pointers as function parameters, and pointers as

members of a [User-Defined Type](#) or [Union](#). If the optional length limit is specified, PowerBASIC will always truncate a string assignment to fit correctly in the memory allocated to the variable.

If the length is ambiguous, it becomes the programmer's responsibility to ensure the target buffer is not overflowed leading to memory corruption or General Protection Faults (GPF). Use caution in this case.

See Also

[Pointers \(@\)](#)

[Pointers to arrays](#)

[Pointers to arrays with dual indexes](#)

Pointers to arrays

Pointers to arrays

In order to work with [arrays](#) created by other languages, such as VB arrays, PowerBASIC supports an extension of the [pointer](#) syntax, called "Pointer Indexing". As noted above, a pointer allows you access a data element at specific address in memory. An index pointer allows you to access data elements beyond the memory address in the base pointer. Consider an array with 6 elements:

```
DIM x%(0 TO 5)
```

The address of the first element, x%(0), is the base with the remaining elements stored in memory, one after the other. To access the array using an index pointer, you simply assign the address of the first element to your base pointer:

```
DIM xPtr AS INTEGER POINTER
xPtr = VARPTR(x%(0))
```

```
@xPtr[0] = 0      ' same as x%(0)
@xPtr[1] = 1      ' same as x%(1)
@xPtr[2] = 2      ' same as x%(2)
@xPtr[3] = 3      ' same as x%(3)
@xPtr[4] = 4      ' same as x%(4)
@xPtr[5] = 5      ' same as x%(5)
```

Note the syntax used to access the elements of the array. It consists of the pointer's name, with the @ prefix, and followed by the array index in square brackets. The number used inside of the brackets is a multiplier. The number inside the brackets is multiplied by the size of the target data (a two byte [Integer](#) in this case) to calculate the target address.

The primary differences between arrays and index pointers are that index pointers do not allocate any memory of their own - they use memory which has already been allocated elsewhere. Their [lower bound](#) is always zero. For example, you can [dimension](#) your six-element array from 1990 to 1995. However, to access the array data using an index pointer, you will still need to use 0 through 5:

```
x%(1990 TO 1995)
DIM xPtr AS INTEGER PTR
xPtr = VARPTR(x%(1990))

@xPtr[0] = 0      ' same as x%(1990)
@xPtr[1] = 1      ' same as x%(1991)
@xPtr[2] = 2      ' same as x%(1992)
@xPtr[3] = 3      ' same as x%(1993)
@xPtr[4] = 4      ' same as x%(1994)
@xPtr[5] = 5      ' same as x%(1995)
```

Consider the following VB code:

```
Sub Sum_Click()
  ReDim PriceData!(1 TO TotalElements%)
  Call FillSumArray(PriceData!())
End Sub
```

```

    Total! = GetSum(PriceData!(1), TotalElements%)
End Sub

```

When the "Sum" button is pressed, a dynamic array is created and filled. *FillSumArray()* is VB code to read the price data from a database file and place it into the array. *GetSum()* is PowerBASIC code to add up all of the prices and return the total, since PowerBASIC handles calculations faster than VB does.

```

FUNCTION GetSum!(Price!, BYVAL TotalElements%) EXPORT
    DIM PriceData AS SINGLE PTR
    DIM Total!
    DIM k%
    PriceData = VARPTR(Price!)
    FOR k% = 0 TO TotalElements% - 1
        Total! = Total! + @PriceData[k%]
    NEXT
    GetSum! = Total!
END FUNCTION

```

In the above example, *GetSum!* takes the Visual Basic array, adds up all the values, and returns the total as a result. Since a pointer is a memory address, we need the memory address of the first element in the array. In VB, you can pass the memory address of a variable by passing it "by reference", or

. This tells Visual Basic not to pass the *value* of a variable to a [Sub](#), [Function](#), [Method](#), or [Property](#), but to pass the *address* in memory where the variable is located. This is handled through the DECLARE statement in Visual Basic.

```

DECLARE FUNCTION GetSum! LIB "SUMS.DLL" (Prices!, BYVAL Elements%)

```

By not using the

keyword before the variable *Prices!*, we've told Visual Basic to pass a memory address to the variable. You'll notice in the DECLARE statement that the variable *Prices!* does not include any parentheses to indicate that it is an array. If we were to change it to *Prices!()*, VB would pass a handle to an array descriptor, not an address to the array data. The PowerBASIC code also needs to know how many elements there are in the array, so that is passed as the second parameter.

Since only the first element of the array is passed to *GetSum!*, we'll need to use a pointer to access the remainder of the elements.

```

DIM PriceData AS SINGLE PTR

```

Remember that all pointers are initialized to null (zero). To access the array, we need to assign the memory address for the element passed. [VARPTR](#) is used to get the address of the passed element.

```

PriceData = VARPTR(Price!)

```

An indexed pointer can then be used to access all of the elements in the array. The VB array was dimensioned from *1 to TotalElements*; however indexed pointers in PowerBASIC all start with a subscript of zero. So to reconcile the difference, we subtract the lower bound (1) from *TotalElements* in our [FOR/NEXT](#) loop. A [DIM](#) statement is not required to access an array using this method.

```

FOR k% = 0 TO Elems% - 1
    Total! = Total! + @PriceData[k%]
NEXT

```

It is also possible to use indexed-pointers with [dynamic string](#) arrays. For example:

```

DIM Arr1(1 TO 3) AS STRING
DIM pArr1 AS STRING POINTER

Arr1(1) = "a1"
Arr1(2) = "a2"
Arr1(3) = "a3"
PArr1 = VARPTR(Arr1(1)) ' The 1st array element
DisplayText @pArr1[2]   ' This references Arr1(3)

```

Indexed pointers make it easy to manipulate arrays created by other languages such as VB, Delphi, C/C++, etc.

See Also

- [Pointers \(@\)](#)
- [Pointers to nul-terminated and fixed-length strings](#)
- [Pointers to arrays with dual indexes](#)

Pointers to arrays with dual indexes

Pointers to arrays with dual indexes

Indexed [pointers](#) with [dual indexes](#) require an "OF *limit*" clause on both indexes. While simple [arrays](#) (arrays with one index) store data sequentially, dual indexes interleave each row of data. The *OF* clause is used by the compiler to calculate the size of each row and column. *limit* is the [upper bound](#) of the index (zero-based):

```
DIM DataPtr AS INTEGER PTR
DIM z%(0 TO 8, 0 TO 3)
DataPtr = VARPTR(z%(0, 0))
FOR y = 0 TO 3
  FOR x = 0 TO 8
    Value% = @DataPtr[x OF 8, y OF 3]
  NEXT x
NEXT y
```

The following example uses a [lower bound](#) other than zero:

```
DIM DataPtr AS INTEGER PTR
DIM z%(1990 TO 1998, -1 TO 3)
DataPtr = VARPTR(z%(1990, -1))
FOR y = 0 TO 4
  FOR x = 0 TO 8
    Value% = @DataPtr[x OF 8, y OF 4]
  NEXT x
NEXT y
```

If you subtract the lower bound from itself and the upper bound (to get a lower bound of zero), you get 8 for the upper bound, which is then used for *limit* after the *OF* keyword.

See Also

- [Pointers \(@\)](#)
- [Pointers to nul-terminated and fixed-length strings](#)
- [Pointers to arrays](#)

Constants

Constants and Literals

Constants and Literals

PowerBASIC programs process two distinct classes of data: *variables* and *constants*. A variable is allowed to change its value as a program runs. A constant's value is fixed at compile-time, and cannot change during program execution (hence, it remains constant). PowerBASIC supports four types of constants: string literals, numeric literals, string equates and numeric equates.

- [String literals](#)
- [Numeric literals](#)
- [Integral constants in binary, octal, and hexadecimal](#)
- [Numeric Equates](#)
- [String Equates](#)

See Also

[Defining Constants](#)

[Array Data Types](#)

[Bit Data Types](#)

[GUID Data Types](#)

[Object Data Types](#)

[Pointers](#)

[User Defined Types](#)

[Unions](#)

[Variant Data Types](#)

Defining Constants

Defining Constants

PB/Win [constants](#) (also known as equates) are defined by prefixing the name of the constant with a "%" character. MSBASIC and VB define constants with the CONST keyword. The MSBASIC/VB compiler then does type conversions at the point of use, if the constant's type was not specified. That overhead does not happen (and is not necessary) with PB/Win. [String equates](#) are specified with a leading "\$" character.

However, the [MACRO](#) facilities in PB/Win offer a way to retain the CONST syntax in your code, while maintaining the low overhead advantage of PowerBASIC. For example:

```
MACRO CONST = MACRO
[statements]
CONST Something = 1&
CONST Something_Else = 2???
CONST AppTitle = "My Application"
[statements]
MSGBOX FORMAT$(Something), ,AppTitle
```

During compilation, the CONST keyword is replaced by the MACRO word, which dynamically creates a new macro that, in turn, defines a constant.

See Also

[Constants and Literals](#)

[Numeric Equates](#)

[Built-in numeric equates](#)

[Built In RGB Color Equates](#)

[String Equates](#)

[Built-in string equates](#)

Numeric Equates

Numeric Equates

PowerBASIC allows you to refer to numeric constants by name. Be aware that equates have [global scope](#); that is, they are visible throughout your program. Unlike [variables](#), you can use an equate on the left side of an assignment statement only once, and only a constant value (or a simple constant/literal expression) may be assigned to it. If an expression is used, all parts of the expression must consist of constants, numeric equates; bitwise operators like [AND](#), [OR](#); and [NOT](#); the [arithmetic operators](#) +, -, *, /, and \, and the [relational operators](#) >, <, >=, <=, <>, =; and the [CVQ](#) function. For example, the following are all legal equate definitions:

```
%X = 1
%Y = 1 + 1
%Z = %X * %Y
%Q = (1& OR 2&) + (NOT 0)
%R = (%Q <> 100&)
%S = CVQ("DemoOnly")
```

A value must be assigned to each equate before it is referenced, even if that value is zero. If you fail to define an equate, an error will be generated during compilation. Numeric equates must be created outside of any [SUB](#), [FUNCTION](#), [METHOD](#), or [PROPERTY](#). All equates are [global](#), and may be referenced anywhere in the module. For readability, we suggest placing equates at the top of your code.

A numeric equate name must always begin with a leading percent sign (%) and a letter (A-Z). This is optionally followed by any combination of letters (A-Z), numbers (0-9), and underscores (_). Equates created within an ENUM structure may also contain one period (.), which is inserted by the compiler as a delimiter. All other characters are illegal.

If you are using a version of PowerBASIC which creates [COM servers](#), you can easily include numeric equates in your [type library](#); just append the words AS COM to the equate definitions:

```
%SCROLL_FLAG = 99 AS COM
```

You can also use equates to reduce the incidence of "magic numbers" in your programs. Magic numbers are mysterious values that mean something to you when you first write a program, but not when you come back to it six months later. Equates are particularly well suited for making programs more readable. For example, consider an array to track chess pieces. If we define:

```
%MAXPIECES = 32
%NPARAM     = 3
%NTYPE      = 1
%RANK       = 2
%FILE       = 3
%KING       = 1
%PAWN       = 2
```

...we can then define an [array](#) of pieces and make statements like the following:

```
DIM piece(1:%MAXPIECES, 1:%NPARAM)
piece(1, %NTYPE) = %KING
piece(1, %RANK)  = 4
piece(1, %FILE)  = 1
```

This sets up a 32 x 3 array for piece information. The first element is the type of unit, the second and third give its current position on the board. Note how much more readable this is than:

```
DIM piece(1:32, 1:3)
piece(1, 1) = 1
piece(1, 2) = 4
piece(1, 3) = 1
```

We could achieve a similar effect by using [comments](#), but there is no way to ensure that when the program changes, the comments will be updated. Using equates reduces the need for comments.

Besides being more readable, equates allow us to easily change a program by changing only the definition of a single equate, rather than changing every occurrence of a particular value. For example: say you run a preschool, and you want to keep track of some data that depends on how many kids you have.

Furthermore, you have to print out reports each week. Rather than type the number in several places, only to have to change it every week, you can assign the number to a constant.

```
%NUMKIDS = 28
```

Then, you can use the constant, `%NUMKIDS`, throughout your program.

```
' Calculate income; the enrollment fee is $85 a week;
' Parents pay whether their kids miss days or not
income% = %NUMKIDS * 85
' Calculate actual attendance
attend% = %NUMKIDS - absent%
' Calculate how much the lunches cost per kid; note the
' use of another constant for cost; it may vary too!
perkid% = %LUNCHCOST / attend%
' Calculate net profit per kid after paying for lunches (you'd
' actually have far more overhead than this, but we'll keep it simple)
net% = (income% - perkid%) / %NUMKIDS
' and so on
```

If your enrollment stays stable, you still have a program that is much easier to follow. Moreover, if your enrollment changes, you only need to change the constant assignment statements to run a revised program. Think of the time you will save - enough to take the kids on an extra field trip.

You might also want to assign the value of an equate conditionally, using the [#IF](#) metastatement. For example:

```
%BIGCLASS = 1
#IF %BIGCLASS
  %NUMKIDS = 40
#ELSE
  %NUMKIDS = 20
#ENDIF
```

Equates make [SELECT](#) statements more readable too:

```
SELECT CASE piece(x, %NTYPE)
  CASE %KING
    ' process king moves
  CASE %PAWN
    ' process pawn moves
  CASE %QUEEN
    ' process queen moves
END SELECT
```

This code will continue to make sense when you return to it after a long absence.

Numeric equates may be assigned a specific

if the literal value has a [type-specifier](#) appended. For example:

```
%MAX_BYTE      = 255?
%MAXIMUM_INT   = 32767%
%MAXIMUM_DWORD = &HFFFFFFF??
%MAXIMUM_LONG  = &H7FFFFFFF&
%MINIMUM_LONG  = &H80000000&
```

Numeric equates which are derived from an equation are pre-calculated by PowerBASIC during the compilation process, to ensure that unnecessary calculations are eliminated from the executable code. If this optimization was not performed, PowerBASIC code would need to perform the same calculation every time the equate was used in the code. Examples of numeric equates derived from expressions follows:

```
%WHATEVER1 = 10
%WHATEVER2 = (%WHATEVER1 * 3) + 1
%DEBUG      = -1&
%RELEASE    = NOT %DEBUG
%DEMO       = %RELEASE AND (NOT %DEBUG)
```

During compilation the actual numeric value of `%WHATEVER2` is pre-calculated as 31, and the values of `%RELEASE` and `%DEMO` are calculated from the value of `%DEBUG`. Note that operators like AND and OR

work as bitwise operators, rather than logical operators, in numeric equate assignments.

Duplicate definitions of both numeric and string equates are permitted by PowerBASIC, provided the actual equate content is identical. If the content is not identical, a compile-time [Error 468](#) ("Duplicate Equate") will occur.

If you need a set of equates which are logically related, you can define them as a group in an [enumeration](#). This provides meaningful names for the enumeration, its members, and therefore the name by which it is referenced.

When an equate is created in an enumeration, its name is composed of a leading percent sign (%), the enumeration name, a period (.), and then the member name. For example:

```
ENUM abc
  count = 7
END ENUM
```

In the above example, the equate is referenced as `%abc.count`, and returns the value seven (7).

Each member of an enumeration may be assigned a specific integral value (in the range of a 64-bit [quad](#) integer) by using the optional `[=value]` syntax. In this case, only a constant value (or a simple constant/literal expression) may be assigned to it. If an expression is used, all of the terms in the expression must be constants; numeric equates; bitwise operators like AND, OR, NOT; arithmetic operators +, -, *, /, \; the relational operators >, <, >=, <=, <>, =; and the CVQ function.

If the `[=value]` option is omitted, each member of the enumeration is assigned an integral value in sequence beginning with the value 0. If one or more equates are assigned an explicit value, equates which follow are assigned the next value in the sequence. For example:

```
ENUM abc
  direction
  count = 8
  scope
END ENUM
```

In the above example, `%abc.direction = 0`, `%abc.count = 8`, and `%abc.scope = 9`.

See Also

- [Constants and Literals](#)
- [Defining Constants](#)
- [Built-in numeric equates](#)
- [String Equates](#)
- [Built-in string equates](#)
- [ENUM/END ENUM statements](#)

Built-in numeric equates

Built-in numeric equates

The compiler provides a convenient set of built-in [numeric equates](#).

The first to consider should be the group which determines the compiler version and the supported feature level. Additional information may be found with the [%DEF](#) equate operator.

Compiler Version:

```
%PB_CC32, %PB_DLL32, %PB_EXE, %PB_REVISION, %PB_REVLETTER, %PB_WIN32
```

Compile-Time information:

```
%PB_COMPILETIME
```

At each compile, this equate is filled with the current date and time of the compilation in PowerTime binary

format. You can use the [PowerTime](#) Class to convert it to a text equivalent for use in your application.

For use with [#RESOURCE FILEFLAGS](#):

```
%VS_FF_DEBUG, %VS_FF_INFOINFERRED, %VS_FF_PATCHED, %VS_FF_PRERELEASE, %
VS_FF_PRIVATEBUILD, %VS_FF_SPECIALBUILD
```

For use with [ARRAYATTR](#):

```
%VARCLASS_BYT, %VARCLASS_WRD, %VARCLASS_DWD, %VARCLASS_INT, %VARCLASS_LNG, %
VARCLASS_QUD, %VARCLASS_SNG, %VARCLASS_DBL, %VARCLASS_EXT, %VARCLASS_CUR, %
VARCLASS_CUX, %VARCLASS_VRNT, %VARCLASS_IFAC, %VARCLASS_TYPE, %VARCLASS_GUID, %
VARCLASS_ASC, %VARCLASS_STRZ %VARCLASS_FIX, %VARCLASS_STR, %VARCLASS_FLD, %
VARCLASS_WSTRZ, %VARCLASS_WFIX, %VARCLASS_WSTR, %VARCLASS_WFLD
```

For use with [BUTTONS](#):

```
%BN_CLICKED, %BN_DBLCLK, %BN_DISABLE, %BN_DOUBLECLICKED, %BN_HILITE, %BN_KILLFOCUS, %
BN_PAINT, %BN_SETFOCUS, %BN_UNHILITE, %IDOK, %IDCANCEL, %IDABORT, %IDRETRY, %IDIGNORE,
%IDYES, %IDNO, %IDCLOSE, %IDHELP, %IDTRYAGAIN, %IDCONTINUE, %BS_TEXT, %BS_PUSHBUTTON,
%BS_DEFPUSHBUTTON, %BS_DEFAULT, %BS_CHECKBOX, %BS_AUTOCHECKBOX, %BS_RADIOBUTTON, %
BS_3STATE, %BS_AUTO3STATE, %BS_GROUPBOX, %BS_USERBUTTON, %BS_AUTORADIOBUTTON, %
BS_OWNERDRAW, %BS_LEFTTEXT, %BS_ICON, %BS_BITMAP, %BS_LEFT, %BS_RIGHT, %BS_CENTER, %
BS_TOP, %BS_BOTTOM, %BS_VCENTER, %BS_PUSHLIKE, %BS_MULTILINE, %BS_NOTIFY, %BS_FLAT, %
BS_RIGHTBUTTON
```

For use with [Callback](#) functions:

```
%NM_OUTOFMEMORY, %NM_CLICK, %NM_DBLCLK, %NM_RETURN, %NM_RCLICK, %NM_RDBLCLK, %
NM_SETFOCUS, %NM_KILLFOCUS, %NM_CUSTOMDRAW, %NM_HOVER, %NM_NCHITTEST, %NM_KEYDOWN, %
NM_RELEASEDCAPTURE, %NM_SETCURSOR, %NM_CHAR, %NM_TOOLTIPS_CREATED, %NM_LDOWN, %
NM_RDOWN, %NM_THEMECHANGED, %SC_SIZE, %SC_MOVE, %SC_MINIMIZE, %SC_MAXIMIZE, %
SC_NEXTWINDOW, %SC_PREVWINDOW, %SC_CLOSE, %SC_VSCROLL, %SC_HSCROLL, %SC_MOUSEMENU, %
SC_KEYMENU, %SC_ARRANGE, %SC_RESTORE, %SC_TASKLIST, %SC_SCREENSAVE, %SC_HOTKEY, %
SC_DEFAULT, %SC_MONITORPOWER, %SC_CONTEXTHELP, %WM_ACTIVATE, %WM_ACTIVATEAPP, %
WM_CANCELMODE, %WM_CAPTURECHANGED, %WM_CHAR, %WM_CLOSE, %WM_COMMAND, %WM_CREATE, %
WM_DESTROY, %WM_DRAWITEM, %WM_HELP, %WM_HSCROLL, %WM_INITDIALOG, %WM_KEYDOWN, %
WM_KEYUP, %WM_KILLFOCUS, %WM_LBUTTONDOWN, %WM_LBUTTONDOWN, %WM_LBUTTONUP, %
WM_MBUTTONDOWN, %WM_MBUTTONDOWN, %WM_MBUTTONUP, %WM_MOUSEACTIVATE, %WM_MOUSEFIRST, %
WM_MOUSEHOVER, %WM_MOUSELAST, %WM_MOUSELEAVE, %WM_MOUSEMOVE, %WM_MOUSEWHEEL, %WM_MOVE,
%WM_NCACTIVATE, %WM_NCCALCSIZE, %WM_NCCREATE, %WM_NCDESTROY, %WM_NCHITTEST, %
WM_NCLBUTTONDOWN, %WM_NCLBUTTONDOWN, %WM_NCLBUTTONUP, %WM_NCMBUTTON, %WM_NCMBUTTON, %
WM_NCMBUTTONDOWN, %WM_NCMBUTTONUP, %WM_NCMOUSEMOVE, %WM_NCPAINT, %WM_NCRBUTTONDOWN, %
%WM_NCRBUTTONDOWN, %WM_NCRBUTTONUP, %WM_NCXBUTTONDOWN, %WM_NCXBUTTONDOWN, %
WM_NCXBUTTONUP, %WM_NOTIFY, %WM_NULL, %WM_PAINT, %WM_QUIT, %WM_RBUTTONDOWN, %
WM_RBUTTONDOWN, %WM_RBUTTONUP, %WM_SETFOCUS, %WM_SIZE, %WM_SYSKEYDOWN, %WM_SYSKEYUP, %
WM_TIMER, %WM_VSCROLL, %WM_USER
```

For use with [CONTROL SHOW STATE](#) and [DIALOG SHOW STATE](#):

```
%SW_HIDE, %SW_SHOWNORMAL, %SW_NORMAL, %SW_SHOWMINIMIZED, %SW_SHOWMAXIMIZED, %
SW_MAXIMIZE, %SW_SHOWNOACTIVATE, %SW_SHOW, %SW_MINIMIZE, %SW_SHOWMINNOACTIVE, %
SW_SHOWNA, %SW_RESTORE, %SW_SHOWDEFAULT, %SW_FORCEMINIMIZE, %SW_MAX
```

For use with [COMBOBOXES](#):

```
%CBS_SIMPLE, %CBS_DROPDOWN, %CBS_DROPDOWNLIST, %CBS_OWNERDRAWFIXED, %
CBS_OWNERDRAWVARIABLE, %CBS_AUTOHSCROLL, %CBS_OEMCONVERT, %CBS_SORT, %CBS_HASSTRINGS,
%CBS_NOINTEGRALHEIGHT, %CBS_DISABLENOSCROLL, %CBS_UPPERCASE, %CBS_LOWERCASE, %
CBN_CLOSEUP, %CBN_DBLCLK, %CBN_DROPDOWN, %CBN_EDITCHANGE, %CBN_EDITUPDATE, %
CBN_ERRSPACE, %CBN_KILLFOCUS, %CBN_SELEND, %CBN_SELEND, %CBN_SELCHANGE, %CBN_SELENDOK, %
CBN_SETFOCUS
```

For use with [DIALOG](#) and/or [CONTROL](#) styles:

```
%DLGC_WANTARROWS, %DLGC_WANTTAB, %DLGC_WANTALLKEYS, %DLGC_WANTMESSAGE, %
DLGC_HASSETSEL, %DLGC_DEFPUSHBUTTON, %DLGC_UNDEFPUSHBUTTON, %DLGC_RADIOBUTTON, %
DLGC_WANTCHARS, %DLGC_STATIC, %DLGC_BUTTON, %DS_ABSALIGN, %DS_SYSMODAL, %DS_3DLOOK, %
DS_FIXEDSYS, %DS_NOFAILCREATE, %DS_LOCALEEDIT, %DS_SETFONT, %DS_MODALFRAME, %
DS_NOIDLEMSG, %DS_SETFOREGROUND, %DS_CONTROL, %DS_CENTER, %DS_CENTERMOUSE, %
```

DS_CONTEXTHELP, %DS_SETFOREGROUND, %WS_OVERLAPPED, %WS_POPUP, %WS_CHILD, %WS_MINIMIZE, %WS_VISIBLE, %WS_DISABLED, %WS_CLIPSIBLINGS, %WS_CLIPCHILDREN, %WS_MAXIMIZE, %WS_CAPTION, %WS_BORDER, %WS_DLGFAME, %WS_VSCROLL, %WS_HSCROLL, %WS_SYSMENU, %WS_THICKFRAME, %WS_GROUP, %WS_TABSTOP, %WS_MINIMIZEBOX, %WS_MAXIMIZEBOX, %WS_TILED, %WS_ICONIC, %WS_SIZEBOX, %WS_OVERLAPPEDWIN, %WS_OVERLAPPEDWINDOW, %WS_TILEDWINDOW, %WS_POPUPWINDOW, %WS_CHILDWINDOW, %WS_EX_DLGMODALFRAME, %WS_EX_NOPARENTNOTIFY, %WS_EX_TOPMOST, %WS_EX_ACCEPTFILES, %WS_EX_TRANSPARENT, %WS_EX_TOOLWINDOW, %WS_EX_SMCAPTION, %WS_EX_WINDOWEDGE, %WS_EX_CLIENTEDGE, %WS_EX_CONTEXTHELP, %WS_EX_RIGHT, %WS_EX_LEFT, %WS_EX_RTLREADING, %WS_EX_LTRREADING, %WS_EX_LEFTSCROLLBAR, %WS_EX_RIGHTSCROLLBAR, %WS_EX_CONTROLPARENT, %WS_EX_STATICEDGE, %WS_EX_APPWINDOW, %WS_EX_OVERLAPPEDWINDOW, %WS_EX_PALETTEWINDOW, %WS_EX_LAYERED, %WS_EX_NOINHERITLAYOUT, %WS_EX_LAYOUTRTL, %WS_EX_COMPOSITED, %WS_EX_NOACTIVATE

For use with the [DIALOG NEW](#) statement:

%HWND_DESKTOP, %DS_SHELLFONT

For use with the [DIR\\$](#) function:

%NORMAL, %HIDDEN, %SYSTEM, %VLABEL, %SUBDIR

For use with the [DISPLAY BROWSE](#) statement:

%BIF_RETURNONLYFSDIRS, %BIF_DONTGOBELOWDOMAIN, %BIF_RETURNFSANCESTORS, %BIF_EDITBOX, %BIF_NEWDIALOGSTYLE, %BIF_USENEWUI, %BIF_BROWSEINCLUDEURLS, %BIF_UAHINT, %BIF_NONNEWFOLDERBUTTON, %BIF_NOTRANSLATETARGETS, %BIF_BROWSEINCLUDEFILES, %BIF_SHAREABLE

For use with the [DISPLAY COLOR](#) statement:

%CC_FULLOPEN, %CC_PREVENTFULLOPEN, %CC_SHOWHELP

For use with the [DISPLAY FONT](#) statement:

%CF_SCREENFONTS, %CF_PRINTERFONTS, %CF_BOTH, %CF_SHOWHELP, %CF_INITTOLOGFONTSTRUCT, %CF_USESTYLE, %CF_EFFECTS, %CF_APPLY, %CF_ANSIONLY, %CF_SCRIPTONLY, %CF_NOVECTORFONTS, %CF_NOSIMULATIONS, %CF_LIMITSIZE, %CF_FIXEDPITCHONLY, %CF_WYSIWYG, %CF_FORCEFONTEXIST, %CF_SCALABLEONLY, %CF_TTONLY, %CF_NOFACESEL, %CF_NOSTYLESEL, %CF_NOSIZESEL, %CF_SELECTSCRIPT, %CF_NOSCRIPTSEL, %CF_NOVERTFONTS

For use with the [DISPLAY OPENFILE](#) and [DISPLAY SAVEFILE](#) statements:

%OFN_ALLOWMULTISELECT, %OFN_CREATEPROMPT, %OFN_DONTADDTORECENT, %OFN_ENABLESIZING, %OFN_EXPLORER, %OFN_EXTENSIONDIFFERENT, %OFN_FILEMUSTEXIST, %OFN_FORCESHOWHIDDEN, %OFN_HIDEREADONLY, %OFN_LONGNAMES, %OFN_NODEREFERENCELINKS, %OFN_NOLONGNAMES, %OFN_NONETWORKBUTTON, %OFN_NOREADONLYRETURN, %OFN_NOTESTFILECREATE, %OFN_NOVALIDATE, %OFN_OVERWRITEPROMPT, %OFN_PATHMUSTEXIST, %OFN_READONLY, %OFN_SHAREAWARE, %OFN_SHOWHELP

For use with [ERR](#) and [ERRCLEAR](#):

%ERR_NOERROR, %ERR_ILLEGALFUNCTIONCALL, %ERR_OVERFLOW (reserved), %ERR_OUTOFMEMORY, %ERR_SUBSCRIPTPOINTEROUTOFRANGE, %ERR_DIVISIONBYZERO (reserved), %ERR_DEVICETIMEOUT, %ERR_INTERNALERROR, %ERR_BADFILENAMEORNUMBER, %ERR_FILENOTFOUND, %ERR_BADFILEMODE, %ERR_FILEISOPEN, %ERR_DEVICEIOERROR, %ERR_FILEALREADYEXISTS, %ERR_DISKFULL, %ERR_INPUTPASTEND, %ERR_BADRECORDNUMBER, %ERR_BADFILENAME, %ERR_TOOMANYFILES, %ERR_DEVICEUNAVAILABLE, %ERR_COMMERROR, %ERR_PERMISSIONDENIED, %ERR_DISKNOTREADY, %ERR_DISKMEDIAERROR, %ERR_RENAMEACROSSDISKS, %ERR_PATHFILEACCESSERROR, %ERR_PATHNOTFOUND, %ERR_OBJECTERROR, %ERR_GLOBALMEMORYCORRUPT (formerly %ERR_FARHEAPCORRUPT), %ERR_STRINGSPACECORRUPT, %ERR_DIVISIONBYZERO, %ERR_FARHEAPCORRUPT, %ERR_GLOBALMEMORYCORRUPT, %ERR_OVERFLOW

For use with [GRAPHIC COPY](#), [GRAPHIC GET MIX](#), [GRAPHIC SET MIX](#), [GRAPHIC STRETCH](#), [XPRINT COPY](#), [XPRINT GET MIX](#), [XPRINT SET MIX](#), and [XPRINT STRETCH](#) (some statements may accept only a subset of these equates):

%MIX_BLACKNESS, %MIX_NOTMERGESRC, %MIX_MASKNOTSRC, %MIX_NOTCOPYSRC, %MIX_MASKSRCNOT, %MIX_NOT, %MIX_XORSRC, %MIX_NOTMASKSRC, %MIX_MASKSRC, %MIX_NOTXORSRC, %MIX_NOP, %MIX_MERGENOTSRC, %MIX_COPYSRC, %MIX_MERGESRCNOT, %MIX_MERGESRC, %MIX_WHITENESS, %BLACKONWHITE, %WHITEONBLACK, %COLORONCOLOR, %HALFTONE

For use with [GRAPHIC IMAGELIST](#) and [XPRINT IMAGELIST](#):

%ILD_NORMAL, %ILD_TRANSPARENT, %ILD_MASK, %ILD_BLEND25, %ILD_BLEND50, %ILD_IMAGE, %

ILD_ROP, %ILD_OVERLAYMASK

For use with [LABELS](#) and [GRAPHIC CONTROLS](#):

%SS_LEFT, %SS_CENTER, %SS_RIGHT, %SS_ICON, %SS_BLACKRECT, %SS_GRAYRECT, %SS_WHITERECT, %SS_BLACKFRAME, %SS_GRAYFRAME, %SS_WHITEFRAME, %SS_USERITEM, %SS_SIMPLE, %SS_LEFTNOWORDWRAP, %SS_NOWORDWRAP, %SS_OWNERDRAW, %SS_BITMAP, %SS_ENHMETAFILE, %SS_ETCHEDHORZ, %SS_ETCHEDVERT, %SS_ETCHEDFRAME, %SS_REALSIZECONTROL, %SS_NOPREFIX, %SS_NOTIFY, %SS_CENTERIMAGE, %SS_RIGHTJUST, %SS_REALSIZEIMAGE, %SS_REALSIZE, %SS_SUNKEN, %SS_ENDELLIPSIS, %SS_PATHELLIPSIS, %SS_WORDELLIPSIS, %SS_ELLIPSISMASK

For use with [HEADERS](#):

%HDM_GETITEMCOUNT, %HDM_INSERTITEM, %HDM_INSERTITEMW, %HDM_DELETEITEM, %HDM_GETITEM, %HDM_GETITEMW, %HDM_SETITEM, %HDM_SETITEMW, %HDM_LAYOUT, %HDM_HITTEST, %HDM_GETITEMRECT, %HDM_SETIMAGELIST, %HDM_GETIMAGELIST, %HDM_ORDERTOINDEX, %HDM_CREATEDRAGIMAGE, %HDM_GETORDERARRAY, %HDM_SETORDERARRAY, %HDM_SETHOTDIVIDER, %HDM_SETBITMAPMARGIN, %HDM_GETBITMAPMARGIN, %HDM_SETUNICODEFORMAT, %HDM_GETUNICODEFORMAT, %HDM_SETFILTERCHANGETIMEOUT, %HDM_EDITFILTER, %HDM_CLEARFILTER, %HDN_FIRST, %HDN_ITEMCHANGING, %HDN_ITEMCHANGINGW, %HDN_ITEMCHANGED, %HDN_ITEMCHANGEDW, %HDN_ITEMCLICK, %HDN_ITEMCLICKW, %HDN_ITEMDBLCLICK, %HDN_ITEMDBLCLICKW, %HDN_DIVIDERDBLCLICK, %HDN_DIVIDERDBLCLICKW, %HDN_BEGINTRACK, %HDN_BEGINTRACKW, %HDN_ENDTRACK, %HDN_ENDTRACKW, %HDN_TRACK, %HDN_TRACKW, %HDN_GETDISPINFO, %HDN_GETDISPINFOW, %HDN_BEGINDRAG, %HDN_ENDDRAG, %HDN_FILTERCHANGE, %HDN_FILTERBTNCLICK, %HHT_NOWHERE, %HHT_ONHEADER, %HHT_ONDIVIDER, %HHT_ONDIVOPEN, %HHT_ONFILTER, %HHT_ONFILTERBUTTON, %HHT_ABOVE, %HHT_BELOW, %HHT_TORIGHT, %HHT_TOLEFT, %HDF_BITMAP, %HDF_BITMAP_ON_RIGHT, %HDF_CENTER, %HDF_IMAGE, %HDF_JUSTIFYMASK, %HDF_LEFT, %HDF_OWNERDRAW, %HDF_RIGHT, %HDF_RTLREADING, %HDF_SORTDOWN, %HDF_SORTUP, %HDF_STRING, %HDFT_HASNOVALUE, %HDFT_ISNUMBER, %HDFT_ISSTRING, %HDI_BITMAP, %HDI_DI_SETITEM, %HDI_FILTER, %HDI_FORMAT, %HDI_HEIGHT, %HDI_IMAGE, %HDI_LPARAM, %HDI_ORDER, %HDI_TEXT, %HDI_WIDTH, %HDS_BUTTONS, %HDS_DRAGDROP, %HDS_FILTERBAR, %HDS_FLAT, %HDS_FULLDRAG, %HDS_HIDDEN, %HDS_HORZ, %HDS_HOTTRACK

For use with [LISTBOXES](#):

%LBN_DBLCLK, %LBN_ERRSPACE, %LBN_KILLFOCUS, %LBN_SELCANCEL, %LBN_SELCHANGE, %LBN_SETFOCUS, %LBS_NOTIFY, %LBS_SORT, %LBS_NOREDRAW, %LBS_MULTIPLESEL, %LBS_OWNERDRAWFIXED, %LBS_OWNERDRAWVARIABLE, %LBS_HASSTRINGS, %LBS_USETABSTOPS, %LBS_NOINTEGRALHEIGHT, %LBS_MULTICOLUMN, %LBS_WANTKEYBOARDINPUT, %LBS_EXTENDEDSEL, %LBS_DISABLENOSCROLL, %LBS_NODATA, %LBS_NOSEL, %LBS_STANDARD

For use with [LISTVIEWS](#):

%LVN_BEGINDRAG, %LVN_BEGINLABELEDIT, %LVN_BEGINRDRAG, %LVN_COLUMNCLICK, %LVN_DELETEALLITEMS, %LVN_DELETEITEM, %LVN_ENDLABELEDIT, %LVN_GETDISPINFO, %LVN_INSERTITEM, %LVN_ITEMCHANGED, %LVN_ITEMCHANGING, %LVN_KEYDOWN, %LVN_SETDISPINFO, %LVS_ALIGNLEFT, %LVS_ALIGNTOP, %LVS_ALIGNMASK, %LVS_AUTOARRANGE, %LVS_EDITLABELS, %LVS_OWNERDRAWFIXED, %LVS_NOCOLUMNHEADER, %LVS NOSORTHEADER, %LVS_ICON, %LVS_REPORT, %LVS_SMALLICON, %LVS_LIST, %LVS_TYPMASK, %LVS_SINGLESEL, %LVS_SORTASCENDING, %LVS_SORTDESCENDING, %LVS_SHAREIMAGELISTS, %LVS_NOLABELWRAP, %LVS_EDITLABELS, %LVS_OWNERDATA, %LVS_NOSCROLL, %LVS_OWNERDRAWFIXED, %LVS_SHOWSELALWAYS, %LVS_EX_GRIDLINES, %LVS_EX_SUBITEMIMAGES, %LVS_EX_CHECKBOXES, %LVS_EX_TRACKSELECT, %LVS_EX_HEADERDRAGDROP, %LVS_EX_FULLROWSELECT, %LVS_EX_ONECLICKACTIVATE, %LVS_EX_TWOCCLICKACTIVATE, %LVS_EX_FLATSB, %LVS_EX_REGIONAL, %LVS_EX_INFOTIP, %LVS_EX_UNDERLINEHOT, %LVS_EX_UNDERLINECOLD, %LVS_EX_MULTIWORKAREAS, %LVS_EX_LABELTIP, %LVS_EX_BORDERSELECT, %LVS_EX_DOUBLEBUFFER, %LVS_EX_HIDELABELS, %LVS_EX_SINGLEROW, %LVS_EX_SNAPTOGRID, %LVS_EX_SIMPLESELECT, %LVNI_ALL, %LVNI_FOCUSED, %LVNI_SELECTED, %LVNI_CUT, %LVNI_DROPHILITED, %LVNI_ABOVE, %LVNI_BELOW, %LVNI_TOLEFT, %LVNI_TORIGHT, %LVM_GETSELECTEDCOLUMN, %LVM_ISGROUPVIEWENABLED, %LVM_GETOUTLINECOLOR, %LVM_SETOUTLINECOLOR, %LVM_CANCELEDITLABEL, %LVM_MAPINDEXTOID, %LVM_MAPIDTOINDEX, %LVM SETTILEVIEWINFO, %LVM_GETTILEVIEWINFO, %LVM SETTILEINFO, %LVM_GETTILEINFO, %LVM SETINSERTMARK, %LVM_GETINSERTMARK, %LVM_INSERTMARKHITTEST, %LVM_GETINSERTMARKRECT, %LVM SETINSERTMARKCOLOR, %LVM_GETINSERTMARKCOLOR, %LVM SETINFOTIP, %LVM GETHOVERTIME, %LVM SETTOOLTIPS, %LVM_GETTOOLTIPS, %LVM_SORTITEMSEX, %LVM SETSELECTEDCOLUMN, %LVM SETTILEWIDTH, %LVM SETVIEW, %LVM_GETVIEW, %LVM GETSUBITEMRECT, %LVM SUBITEMHITTEST, %LVM SETCOLUMNORDERARRAY, %LVM_GETCOLUMNORDERARRAY, %

LVM_SETHOTITEM, %LVM_GETHOTITEM, %LVM_SETHOTCURSOR, %LVM_GETHOTCURSOR, %
 LVM_APPROXIMATEVIEWRECT, %LVM_GETSELECTIONMARK, %LVM_SETSELECTIONMARK. %
 LVM_SETBKIMAGE, %LVM_GETBKIMAGE, %LVM_SETHOVERTIME, %LVM_GETTOPINDEX, %
 LVM_GETCOUNTPERPAGE, %LVM_GETORIGIN, %LVM_UPDATE, %LVM_SETITEMSTATE, %
 LVM_GETITEMSTATE, %LVM_SETITEMTEXT, %LVM_GETITEMTEXT, %LVM_SETITEMCOUNT, %
 LVM_SORTITEMS, %LVM_SETITEMPOSITION32, %LVM_GETSELECTEDCOUNT, %LVM_GETITEMSPACING, %
 LVM_GETISEARCHSTRING, %LVM_SETICONSPACING, %LVM_SETTEXTENDEDLISTVIEWSTYLE, %
 LVM_GETTEXTENDEDLISTVIEWSTYLE, %LVM_ARRANGE, %LVM_EDITLABEL, %LVM_GETEDITCONTROL, %
 LVM_GETCOLUMN, %LVM_SETCOLUMN, %LVM_INSERTCOLUMN, %LVM_DELETECOLUMN, %
 LVM_GETCOLUMNWIDTH, %LVM_SETCOLUMNWIDTH, %LVM_GETHEADER, %LVM_CREATEDRAGIMAGE, %
 LVM_GETVIEWRECT, %LVM_GETTEXTCOLOR, %LVM_SETTEXTCOLOR, %LVM_GETTEXTBKCOLOR, %
 LVM_SETTEXTBKCOLOR, %LVM_GETITEM, %LVM_SETITEM, %LVM_INSERTITEM, %LVM_DELETEITEM, %
 LVM_DELETEALLITEMS, %LVM_GETCALLBACKMASK, %LVM_SETCALLBACKMASK, %LVM_GETNEXTITEM, %
 LVM_FINDITEM, %LVM_GETITEMRECT, %LVM_SETITEMPOSITION, %LVM_GETITEMPOSITION, %
 LVM_GETSTRINGWIDTH, %LVM_HITTEST, %LVM_ENSUREVISIBLE, %LVM_SCROLL, %LVM_REDRAWITEMS, %
 LVM_GETBKCOLOR, %LVM_SETBKCOLOR, %LVM_GETIMAGELIST, %LVM_SETIMAGELIST, %
 LVM_GETITEMCOUNT, %LVSIL_NORMAL, %LVSIL_SMALL, %LVSIL_STATE, %LVM_EDITLABELW, %
 LVM_ENABLEGROUPVIEW, %LVM_FINDITEMW, %LVM_GETBKIMAGEW, %LVM_GETGROUPINFO, %
 LVM_GETGROUPMETRICS, %LVM_GETISEARCHSTRINGW, %LVM_GETITEMTEXTW, %LVM_GETITEMW, %
 LVM_GETNUMBEROFWORKAREAS, %LVM_GETSTRINGWIDTHW, %LVM_GETWORKAREAS, %LVM_HASGROUP, %
 LVM_INSERTGROUP, %LVM_INSERTGROUPSORTED, %LVM_INSERTITEMW, %LVM_MOVEGROUP, %
 LVM_MOVEITEMTOGROUP, %LVM_REMOVEALLGROUPS, %LVM_REMOVEGROUP, %LVM_SETBKIMAGE, %
 LVM_SETBKIMAGEW, %LVM_SETCOLUMNW, %LVM_SETGROUPINFO, %LVM_SETGROUPMETRICS, %
 LVM_SETITEMTEXTW, %LVM_SETITEMW, %LVM_SETSELECTIONMARK, %LVM_SETWORKAREAS, %
 LVM_SORTGROUPS, %LVN_BEGINLABELEDITW, %LVN_ENDLABELEDITW, %LVN_GETDISPINFOW, %
 LVN_SETDISPINFOW

For use with [MENU CONTEXT](#):

%TPM_BOTTOMALIGN, %TPM_CENTERALIGN, %TPM_LEFTALIGN, %TPM_LEFTBUTTON, %TPM_RIGHTALIGN,
 %TPM_RIGHTBUTTON, %TPM_TOPALIGN, %TPM_VCENTERALIGN, %TPM_HORIZONTAL, %TPM_NONOTIFY, %
 TPM_RETURNCMD, %TPM_VERTICAL

For use with [MENU ADD POPUP](#), [MENU ADD STRING](#), [MENU GET STATE](#), and [MENU SET STATE](#):

%MF_CHECKED, %MF_ENABLED, %MF_GRAYED, %MF_DISABLED, %MF_UNHILITE, %MF_HILITE, %
 MF_UNCHECKED, %MFS_CHECKED, %MFS_DEFAULT, %MFS_DISABLED, %MFS_ENABLED, %MFS_GRAYED, %
 MFS_HILITE, %MFS_UNCHECKED, %MFS_UNHILITE

For use with

:

%MB_OK, %MB_OKCANCEL, %MB_ABORTRETRYIGNORE, %MB_YESNOCANCEL, %MB_YESNO, %
 MB_RETRYCANCEL, %MB_CANCELTRYCONTINUE, %MB_ICONHAND, %MB_ICONQUESTION, %
 MB_ICONEXCLAMATION, %MB_ICONASTERISK, %MB_USERICON, %MB_ICONWARNING, %MB_ICONERROR, %
 MB_ICONINFORMATION, %MB_ICONSTOP, %MB_DEFBUTTON1, %MB_DEFBUTTON2, %MB_DEFBUTTON3, %
 MB_DEFBUTTON4, %MB_APPLMODAL, %MB_SYSTEMMODAL, %MB_TASKMODAL, %MB_HELP, %MB_NOFOCUS, %
 MB_SETFOREGROUND, %MB_DEFAULT_DESKTOP_ONLY, %MB_TOPMOST, %MB_RIGHT, %MB_RTLREADING, %
 MB_SERVICE_NOTIFICATION, %MB_SERVICE_NOTIFICATION_NT3X, %MB_TYPMASK, %MB_ICONMASK, %
 MB_DEFMASK, %MB_MODEMASK, %MB_MISCMASK

For use with [OBJRESULT](#) and [IDISPINFO](#):

%S_OK, %S_FALSE, %E_UNEXPECTED, %E_NOTIMPL, %E_NOINTERFACE, %E_POINTER, %E_ABORT, %
 E_FAIL, %E_ACCESSDENIED, %E_HANDLE, %E_OUTOFMEMORY, %E_INVALIDARG, %
 DISP_E_ARRAYISLOCKED, %DISP_E_BADINDEX, %DISP_E_BADPARAMCOUNT, %DISP_E_BADVARTYPE, %
 DISP_E_EXCEPTION, %DISP_E_MEMBERNOTFOUND, %DISP_E_NONAMEDARGS, %DISP_E_OVERFLOW, %
 DISP_E_PARAMNOTFOUND, %DISP_E_TYPERISMATCH, %DISP_E_UNKNOWNINTERFACE, %
 DISP_E_UNKNOWNLCID, %DISP_E_UNKNOWNNAME, %DISP_E_PARAMNOTOPTIONAL

For use with [PowerArray](#):

%VT_I2, %VT_UI4, %VT_I4, %VT_I8, %VT_R4, %VT_INT, %VT_R8, %VT_UINT, %VT_CY, %VT_PTR, %
 VT_DATE, %VT_USERDEFINED, %VT_BSTR, %VT_FILETIME, %VT_DISPATCH, %VT_ASTR, %VT_BOOL, %
 VT_STRINGFIX, %VT_VARIANT, %VT_WSTRINGFIX, %VT_UNKNOWN, %VT_STRINGZ, %VT_DECIMAL, %
 VT_WSTRINGZ, %VT_I1, %VT_TYPE, %VT_UI1, %VT_EXT, %VT_UI2, %VT_CURX

For use with [PROCESS GET PRIORITY](#) and [PROCESS SET PRIORITY](#):

`%HIGH_PRIORITY_CLASS, %IDLE_PRIORITY_CLASS, %NORMAL_PRIORITY_CLASS, %REALTIME_PRIORITY_CLASS`

For use with [PROGRESSBARS](#):

`%PBS_SMOOTH, %PBS_VERTICAL`

For use with [SCROLLBARS](#)::

`%SB_HORZ, %SB_VERT, %SB_CTL, %SB_BOTH, %SB_LINEUP, %SB_LINELEFT, %SB_LINEDOWN, %SB_LINERIGHT, %SB_PAGEUP, %SB_PAGELEFT, %SB_PAGEDOWN, %SB_PAGERIGHT, %SB_THUMBPOSITION, %SB_THUMBTRACK, %SB_TOP, %SB_LEFT, %SB_BOTTOM, %SB_RIGHT, %SB_ENDSCROLL, %SBS_HORZ, %SBS_VERT, %SBS_TOPALIGN, %SBS_LEFTALIGN, %SBS_BOTTOMALIGN, %SBS_RIGHTALIGN, %SBS_SIZEBOXTOPLEFTALIGN, %SBS_SIZEBOXTOTTOMRIGHTALIGN, %SBS_SIZEBOX, %SBS_SIZEGRIP, %SIF_RANGE, %SIF_PAGE, %SIF_POS, %SIF_DISABLENOSCROLL, %SIF_TRACKPOS, %SIF_ALL, %SBARS_SIZEGRIP, %SBARS_TOOLTIPS`

For use with [STATUSBARS](#):

`%SBT_OWNERDRAW, %SBT_NOBORDERS, %SBT_POPOUT, %SBT_RTLREADING, %SBT_TOOLTIPS, %SBT_NOTABPARSING`

For use with [TAB](#) Controls:

`%TCHT_NOWHERE, %TCHT_ONITEMICON, %TCHT_ONITEMLABEL, %TCHT_ONITEM, %TCIF_TEXT, %TCIF_IMAGE, %TCIF_RTLREADING, %TCIF_PARAM, %TCIF_STATE, %TCIS_BUTTONPRESSED, %TCIS_HIGHLIGHTED, %TCN_KEYDOWN, %TCN_SELCHANGE, %TCN_SELCHANGING, %TCN_GETOBJECT, %TCN_FOCUSCHANGE, %TCS_SCROLLPOSITE, %TCS_FLATBUTTONS, %TCS_FORCEICONLEFT, %TCS_FORCELABELLEFT, %TCS_HOTTRACK, %TCS_TABS, %TCS_BUTTONS, %TCS_FIXEDWIDTH, %TCS_RAGGEDRIGHT, %TCS_FOCUSONBUTTONDOWN, %TCS_OWNERDRAWFIXED, %TCS_TOOLTIPS, %TCS_FOCUSNEVER, %TCS_EX_FLATSEPARATORS, %TCS_EX_REGISTERDROP`

For use with [TCP NOTIFY](#):

`%FD_ACCEPT, %FD_CLOSE, %FD_CONNECT, %FD_READ, %FD_WRITE`

For use with [TEXTBOXES](#):

`%EN_CHANGE, %EN_ERRSPACE, %EN_HSCROLL, %EN_KILLFOCUS, %EN_MAXTEXT, %EN_SETFOCUS, %EN_UPDATE, %EN_VSCROLL, %ES_LEFT, %ES_CENTER, %ES_RIGHT, %ES_MULTILINE, %ES_UPPERCASE, %ES_LOWERCASE, %ES_PASSWORD, %ES_AUTOVSCROLL, %ES_AUTOHSCROLL, %ES_NOHIDESEL, %ES_OEMCONVERT, %ES_READONLY, %ES_WANTRETURN, %ES_NUMBER, %EN_ALIGN_LTR_EC, %EN_ALIGN_RTL_EC`

For use with [THREAD GET PRIORITY](#) and [THREAD SET PRIORITY](#):

`%THREAD_PRIORITY_ABOVE_NORMAL, %THREAD_PRIORITY_BELOW_NORMAL, %THREAD_PRIORITY_HIGHEST, %THREAD_PRIORITY_IDLE, %THREAD_PRIORITY_LOWEST, %THREAD_PRIORITY_NORMAL, %THREAD_PRIORITY_TIME_CRITICAL`

For use with [TOOLBARS](#):

`%CCS_ADJUSTABLE, %CCS_BOTTOM, %CCS_LEFT, %CCS_NODIVIDER, %CCS_NOMOVEX, %CCS_NOMOVEY, %CCS_NOPARENTALIGN, %CCS_NORESIZE, %CCS_RIGHT, %CCS_TOP, %CCS_VERT, %BTNS_AUTOSIZE, %BTNS_BUTTON, %BTNS_CHECK, %BTNS_GROUP, %BTNS_CHECKGROUP, %BTNS_DROPDOWN, %BTNS_NOPREFIX, %BTNS_SEP, %BTNS_SHOWTEXT, %BTNS_WHOLEDDROPDOWN, %TBSTYLE_AUTOSIZE, %TBSTYLE_BUTTON, %TBSTYLE_CHECK, %TBSTYLE_GROUP, %TBSTYLE_CHECKGROUP, %TBSTYLE_DROPDOWN, %TBSTYLE_SEP, %TBSTYLE_TOOLTIPS, %TBSTYLE_FLAT, %TBSTYLE_LIST, %TBSTYLE_TRANSPARENT, %TBSTYLE_WRAPABLE, %TBSTATE_CHECKED, %TBSTATE_DISABLED, %TBSTATE_ELLIPSES, %TBSTATE_ENABLED, %TBSTATE_HIDDEN, %TBSTATE_INDETERMINATE, %TBSTATE_MARKED, %TBSTATE_PRESSED, %TBSTATE_WRAP, %TBN_BEGINADJUST, %TBN_BEGINDRAG, %TBN_CUSTHELP, %TBN_ENDADJUST, %TBN_ENDDRAG, %TBN_GETBUTTONINFO, %TBN_QUERYDELETE, %TBN_QUERYINSERT, %TBN_RESET, %TBN_TOOLBARCHANGE, %TB_ADDBITMAP, %TB_ADDBUTTONS, %TB_ADDBUTTONSW, %TB_ADDSTRING, %TB_ADDSTRINGW, %TB_AUTOSIZE, %TB_BUTTONCOUNT, %TB_BUTTONSTRUCTSIZE, %TB_CHANGEBITMAP, %TB_CHECKBUTTON, %TB_COMMANDTOINDEX, %TB_CUSTOMIZE, %TB_DELETEBUTTON, %TB_ENABLEBUTTON, %TB_GETANCHORHIGHLIGHT, %TB_GETBITMAP, %TB_GETBUTTON, %TB_GETBUTTONINFO, %TB_GETBUTTONINFOW, %TB_GETBUTTONSIZE, %TB_GETBUTTONTEXT, %TB_GETBUTTONTEXTW, %TB_GETDISABLEDIMAGELIST, %TB_GETEXTENDEDSTYLE, %TB_GETHOTIMAGELIST, %TB_GETHOTITEM, %TB_GETIMAGELIST, %TB_GETINSERTMARK, %TB_GETINSERTMARKCOLOR, %TB_GETITEMRECT, %TB_GETMAXSIZE, %TB_GETMETRICS, %TB_GETOBJECT, %TB_GETPADDING, %TB_GETRECT, %TB_GETROWS, %TB_GETSTATE, %TB_GETSTRING, %TB_GETSTRINGW, %TB_GETSTYLE, %TB_GETTEXTROWS, %TB_GETTOOLTIPS, %TB_HIDEBUTTON, %TB_HITTEST, %`

TB_INDETERMINATE, %TB_INSERTBUTTON, %TB_INSERTBUTTONW, %TB_INSERTMARKHITTEST, %
 TB_ISBUTTONCHECKED, %TB_ISBUTTONENABLED, %TB_ISBUTTONHIDDEN, %TB_ISBUTTONHIGHLIGHTED,
 %TB_ISBUTTONINDETERMINATE, %TB_ISBUTTONPRESSED, %TB_LOADIMAGES, %TB_MAPACCELERATOR, %
 TB_MAPACCELERATORW, %TB_MARKBUTTON, %TB_MOVEBUTTON, %TB_PRESSBUTTON, %
 TB_REPLACEBITMAP, %TB_SAVERESTORE, %TB_SAVERESTOREW, %TB_SETANCHORHIGHLIGHT, %
 TB_SETBITMAPSIZE, %TB_SETBUTTONINFO, %TB_SETBUTTONINFOW, %TB_SETBUTTONSIZE, %
 TB_SETBUTTONWIDTH, %TB_SETCMDID, %TB_SETDISABLEDIMAGELIST, %TB_SETDRAWTEXTFLAGS, %
 TB_SETEXTENDEDSTYLE, %TB_SETHOTIMAGELIST, %TB_SETHOTITEM, %TB_SETIMAGELIST, %
 TB_SETINDENT, %TB_SETINSERTMARK, %TB_SETINSERTMARKCOLOR, %TB_SETMAXTEXTROWS, %
 TB_SETMETRICS, %TB_SETPADDING, %TB_SETPARENT, %TB_SETROWS, %TB_SETSTATE, %TB_SETSTYLE,
 %TB_SETTOOLTIPS, %TBN_GETBUTTONINFOW, %TBSTYLE_ALTDRAW, %TBSTYLE_CUSTOMERASE, %
 TBSTYLE_EX_DOUBLEBUFFER, %TBSTYLE_EX_DRAWDDARROWS, %TBSTYLE_EX_HIDECLIPPEDBUTTONS, %
 TBSTYLE_EX_MIXEDBUTTONS, %TBSTYLE_NOPREFIX, %TBSTYLE_REGISTERDROP

For use with [TREEVIEWS](#):

%TVS_HASBUTTONS, %TVS_HASLINES, %TVS_LINESATROOT, %TVS_EDITLABELS, %
 TVS_DISABLEDRAHDROP, %TVS_SHOWSELALWAYS, %TVS_RTLREADING, %TVS_NOTOOLTIPS, %
 TVS_CHECKBOXES, %TVS_TRACKSELECT, %TVS_SINGLEEXPAND, %TVS_INFOTIP, %TVS_FULLROWSELECT,
 %TVS_NOSCROLL, %TVS_NONEVENHEIGHT, %TVS_NOHSCROLL, %TVI_ROOT, %TVI_FIRST, %TVI_LAST, %
 TVI_SORT, %TVE_COLLAPSE, %TVE_EXPAND, %TVE_TOGGLE, %TVE_EXPANDPARTIAL, %
 TVE_COLLAPSERESET, %TVN_BEGINDRAG, %TVN_BEGINLBELEDIT, %TVN_BEGINRDRAG, %
 TVN_DELETEITEM, %TVN_ENDLBELEDIT, %TVN_GETDISPINFO, %TVN_ITEMEXPANDED, %
 TVN_ITEMEXPANDING, %TVN_KEYDOWN, %TVN_SELCHANGED, %TVN_SELCHANGING, %TVN_SETDISPINFO,
 %TVN_BEGINDRAGW, %TVN_BEGINLBELEDITW, %TVN_BEGINRDRAGW, %TVN_DELETEITEMW, %
 TVN_ENDLBELEDITW, %TVN_GETDISPINFOW, %TVN_ITEMEXPANDEDW, %TVN_ITEMEXPANDINGW, %
 TVN_SELCHANGEDW, %TVN_SELCHANGINGW, %TVN_SETDISPINFOW

For use with [VARIANTV](#):

%VT_EMPTY, %VT_NULL, %VT_I2, %VT_I4, %VT_R4, %VT_R8, %VT_CY, %VT_DATE, %VT_BSTR, %
 VT_DISPATCH, %VT_ERROR, %VT_BOOL, %VT_VARIANT, %VT_DECIMAL, %VT_UNKNOWN, %VT_I1, %
 VT_UI1, %VT_UI2, %VT_UI4, %VT_I8, %VT_UI8, %VT_INT, %VT_UINT, %VT_VOID, %VT_HRESULT, %
 VT_PTR, %VT_SAFEARRAY, %VT_CARRAY, %VT_USERDEFINED, %VT_LPSTR, %VT_LPWSTR, %VT_RECORD,
 %VT_FILETIME, %VT_BLOB, %VT_STREAM, %VT_STORAGE, %VT_STREAMED_OBJECT, %
 VT_STORED_OBJECT, %VT_BLOB_OBJECT, %VT_CF, %VT_CLSID, %VT_VECTOR, %VT_ARRAY, %VT_BYREF

For use with [XPRINT ATTACH CHOOSE](#):

%PD_ALLPAGES, %PD_SELECTION, %PD_PAGENUMS, %PD_NOSELECTION, %PD_NOPAGENUMS, %
 PD_COLLATE, %PD_PRINTTOFILE, %PD_PRINTSETUP, %PD_NOWARNING, %PD_RETURNDC, %
 PD_RETURNIC, %PD_RETURNDEFAULT, %PD_SHOWHELP, %PD_ENABLEPRINTHOOK, %
 PD_ENABLESETUPHOOK, %PD_ENABLEPRINTTEMPLATE, %PD_ENABLESETUPTEMPLATE, %
 PD_ENABLEPRINTTEMPLATEHANDLE, %PD_ENABLESETUPTEMPLATEHANDLE, %PD_USEDEVMODECOPIES, %
 PD_USEDEVMODECOPIESANDCOLLATE, %PD_DISABLEPRINTTOFILE, %PD_HIDEPRINTTOFILE, %
 PD_NONETWORKBUTTON, %PD_CURRENTPAGE, %PD_NOCURRENTPAGE, %PD_EXCLUSIONFLAGS, %
 PD_USELARGETEMPLATE, %PD_RESULT_CANCEL, %PD_RESULT_PRINT, %PD_RESULT_APPLY, %
 PDERR_PRINTERCODES, %PDERR_SETUPFAILURE, %PDERR_PARSEFAILURE, %PDERR_RETDEFFAULTURE, %
 PDERR_LOADDRVFAILURE, %PDERR_GETDEVMODEFAIL, %PDERR_INITFAILURE, %PDERR_NODEVICES, %
 PDERR_NODEFAULTPRN, %PDERR_DNDMMISMATCH, %PDERR_CREATEICFAILURE, %
 PDERR_PRINTERNOTFOUND, %PDERR_DEFAULTDIFFERENT

For use with the [XPRINT GET COLLATE](#) and [XPRINT SET COLLATE](#) statements:

%DMCOLLATE_FALSE, %DMCOLLATE_TRUE

For use with the [XPRINT GET COLORMODE](#) and [XPRINT SET COLORMODE](#) statements:

%DMCOLOR_MONOCHROME, %DMCOLOR_COLOR

For use with the [XPRINT GET DUPLEX](#) and [XPRINT SET DUPLEX](#) statements:

%DMDUP_SIMPLEX, %DMDUP_VERTICAL, %DMDUP_HORIZONTAL

For use with the [XPRINT GET PAPER](#), [XPRINT GET PAPERS](#), and [XPRINT SET PAPER](#) statements:

%DMPAPER_LETTER, %DMPAPER_TABLOID, %DMPAPER_LEDGER, %DMPAPER_LEGAL, %
 DMPAPER_STATEMENT, %DMPAPER_EXECUTIVE, %DMPAPER_A3, %DMPAPER_A4, %DMPAPER_A5, %
 DMPAPER_B4, %DMPAPER_B5, %DMPAPER_FOLIO, %DMPAPER_QUARTO, %DMPAPER_10X14, %
 DMPAPER_11X17, %DMPAPER_NOTE, %DMPAPER_ENV_9, %DMPAPER_ENV_10

For use with the [XPRINT GET TRAY](#), [XPRINT GET TRAYS](#), and [XPRINT SET TRAY](#) statements:

```
%DMBIN_UPPER, %DMBIN_LOWER, %DMBIN_MIDDLE, %DMBIN_MANUAL, %DMBIN_ENVELOPE, %
DMBIN_ENVMANUAL, %DMBIN_AUTO, %DMBIN_TRACTOR, %DMBIN_SMALLFMT, %DMBIN_LARGEFMT, %
DMBIN_LARGECAPACITY, %DMBIN_CASSETTE, %DMBIN_FORMSOURCE
```

For use with Miscellaneous API routines:

```
%BIF_VALIDATE, %CF_BITMAP, %CF_DIB, %CF_DIBV5, %CF_DIF, %CF_ENHMETAFILE, %CF_HDROP, %
CF_LOCALE, %CF_METAFILEPICT, %CF_OEMTEXT, %CF_PALETTE, %CF_PENDATA, %CF_RIFF, %
CF_SYLK, %CF_TEXT, %CF_TIFF, %CF_UNICODETEXT, %CF_WAVE, %CS_BYTEALIGNCLIENT, %
CS_BYTEALIGNWINDOW, %CS_CLASSDC, %CS_DBLCLKS, %CS_DROPSHADOW, %CS_GLOBALCLASS, %
CS_HREDRAW, %CS_IME, %CS_KEYCVTWINDOW, %CS_NOCLOSE, %CS_NOKEYCVT, %CS_OWIND, %
CS_PARENTDC, %CS_SAVEBITS, %CS_VREDRAW, %MAX_FNAME, %MAX_PATH, %MAXIMUM_WAIT_OBJECTS,
%OFN_NOCHANGEDIR, %SND_ALIAS, %SND_ALIAS_ID, %SND_APPLICATION, %SND_ASYNC, %
SND_FILENAME, %SND_LOOP, %SND_MEMORY, %SND_NODEFAULT, %SND_NOSTOP, %SND_NOWAIT, %
SND_PURGE, %SND_RESOURCE, %SND_VALID, %TCS_BOTTOM, %TCS_MULTILINE, %TCS_MULTISELECT, %
TCS_RIGHT, %TCS_RIGHTJUSTIFY, %TCS_SINGLELINE, %TCS_VERTICAL, %WS_EX_MDICHILD
```

See Also

[Built-in RGB Color Equates](#)

[Constants and Literals](#)

[Numeric Equates](#)

[String Equates](#)

[Built-in string equates](#)

[Built-in Interfaces](#)

[Built-in User Defined Types](#)

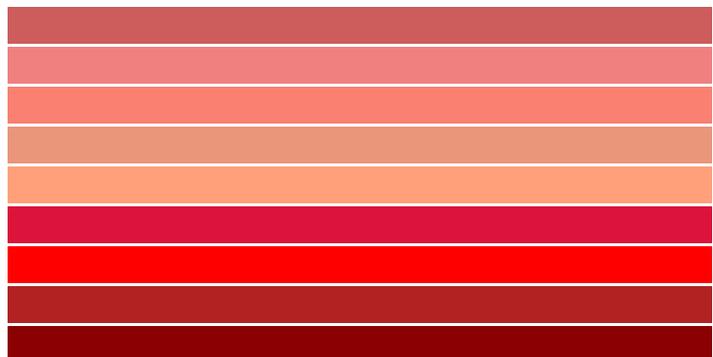
Built In RGB Color Equates

Built-in RGB Color Equates

The following is a list of [RGB](#) color equates built into the compiler, which can be used with routines that accept RGB color values.

Red Colors

```
%RGB_INDIANRED      = &H5C5CCD
%RGB_LIGHTCORAL     = &H8080F0
%RGB_SALMON         = &H7280FA
%RGB_DARKSALMON     = &H7A96E9
%RGB_LIGHTSALMON    = &H7AA0FF
%RGB_CRIMSON        = &H3C14DC
%RGB_RED            = &H0000FF
%RGB_FIREBRICK      = &H2222B2
%RGB_DARKRED        = &H00008B
```



Pink Colors

```
%RGB_PINK           = &HCBC0FF
%RGB_LIGHTPINK      = &HC1B6FF
%RGB_HOTPINK        = &HB469FF
```



```
%RGB_DEEPPINK           = &H9314FF
%RGB_MEDIUMVIOLETRED   = &H8515C7
%RGB_PALEVIOLETRED     = &H9370DB
```

Orange Colors

```
%RGB_LIGHTSALMON       = &H7AA0FF
%RGB_CORAL              = &H507FFF
%RGB_TOMATO             = &H4763FF
%RGB_ORANGERED         = &H0045FF
%RGB_DARKORANGE        = &H008CFF
%RGB_ORANGE             = &H00A5FF
```

Yellow Colors

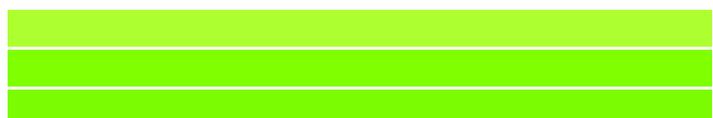
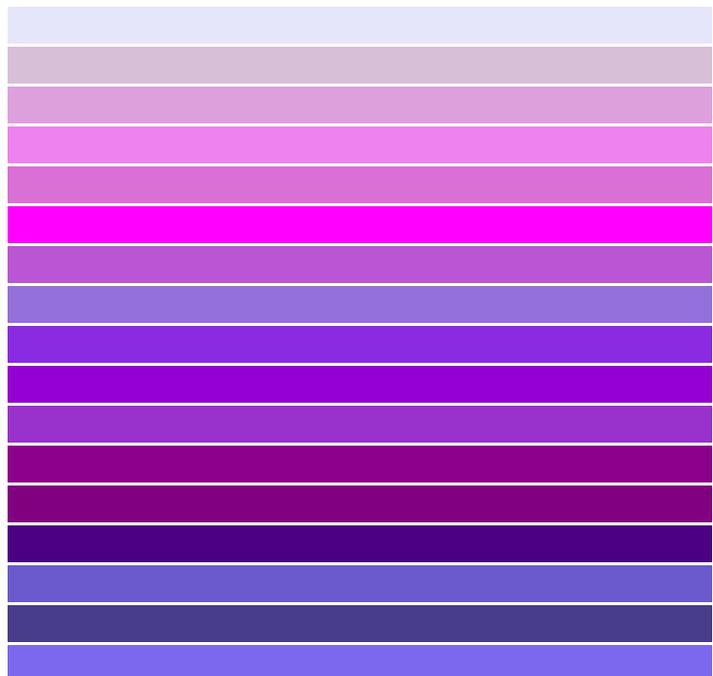
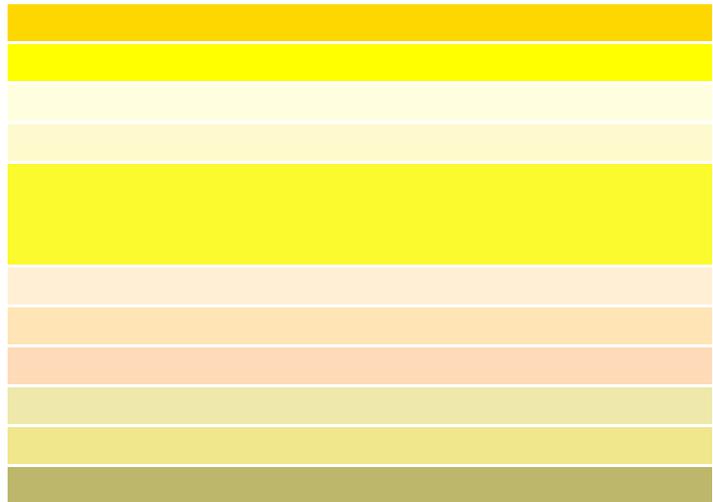
```
%RGB_GOLD               = &H00D7FF
%RGB_YELLOW             = &H00FFFF
%RGB_LIGHTYELLOW       = &HE0FFFF
%RGB_LEMONCHIFFON      = &HCDFAFF
%
RGB_LIGHTGOLDENRODYEL
LOW                     = &HD2FAFA
%RGB_PAPAYAWHIP        = &HD5EFFF
%RGB_MOCCASIN          = &HB5E4FF
%RGB_PEACHPUFF         = &HB9DAFF
%RGB_PALEGOLDENROD    = &HAAE8EE
%RGB_KHAKI             = &H8CE6F0
%RGB_DARKKHAKI        = &H6BB7BD
```

Purple Colors

```
%RGB_LAVENDER          = &HFAE6E6
%RGB_THISTLE           = &HD8BFD8
%RGB_PLUM              = &HDDA0DD
%RGB_VIOLET            = &HEE82EE
%RGB_ORCHID            = &HD670DA
%RGB_MAGENTA           = &HFF00FF
%RGB_MEDIUMORCHID     = &HD355BA
%RGB_MEDIUMPURPLE     = &HDB7093
%RGB_BLUEVIOLET       = &HE22B8A
%RGB_DARKVIOLET       = &HD30094
%RGB_DARKORCHID       = &HCC3299
%RGB_DARKMAGENTA      = &H8B008B
%RGB_PURPLE            = &H800080
%RGB_INDIGO            = &H82004B
%RGB_SLATEBLUE        = &HCD5A6A
%RGB_DARKSLATEBLUE    = &H8B3D48
%RGB_MEDIUMSLATEBLUE  = &HEE687B
```

Green Colors

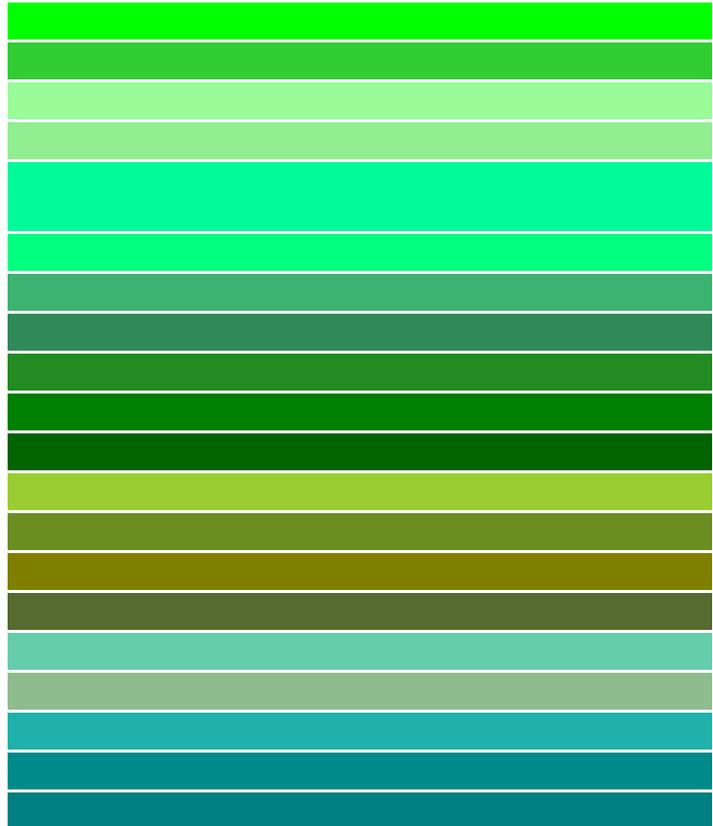
```
%RGB_GREENYELLOW      = &H2FFFAD
%RGB_CHARTREUSE       = &H00FF7F
%RGB_LAWNGREEN        = &H00FC7C
```



```

%RGB_LIME = &H00FF00
%RGB_LIMEGREEN = &H32CD32
%RGB_PALEGREEN = &H98FB98
%RGB_LIGHTGREEN = &H90EE90
%
RGB_MEDIUMSPRINGGREEN
%RGB_SPRINGGREEN = &H7FFF00
%RGB_MEDIUMSEAGREEN = &H71B33C
%RGB_SEAGREEN = &H578B2E
%RGB_FORESTGREEN = &H228B22
%RGB_GREEN = &H008000
%RGB_DARKGREEN = &H006400
%RGB_YELLOWGREEN = &H32CD9A
%RGB_OLIVEDRAB = &H238E6B
%RGB_OLIVE = &H008080
%RGB_DARKOLIVEGREEN = &H2F6B55
%RGB_MEDIUMAQUAMARINE = &HAACD66
%RGB_DARKSEAGREEN = &H8FBC8F
%RGB_LIGHTSEAGREEN = &HAAB220
%RGB_DARKCYAN = &H8B8B00
%RGB_TEAL = &H808000

```

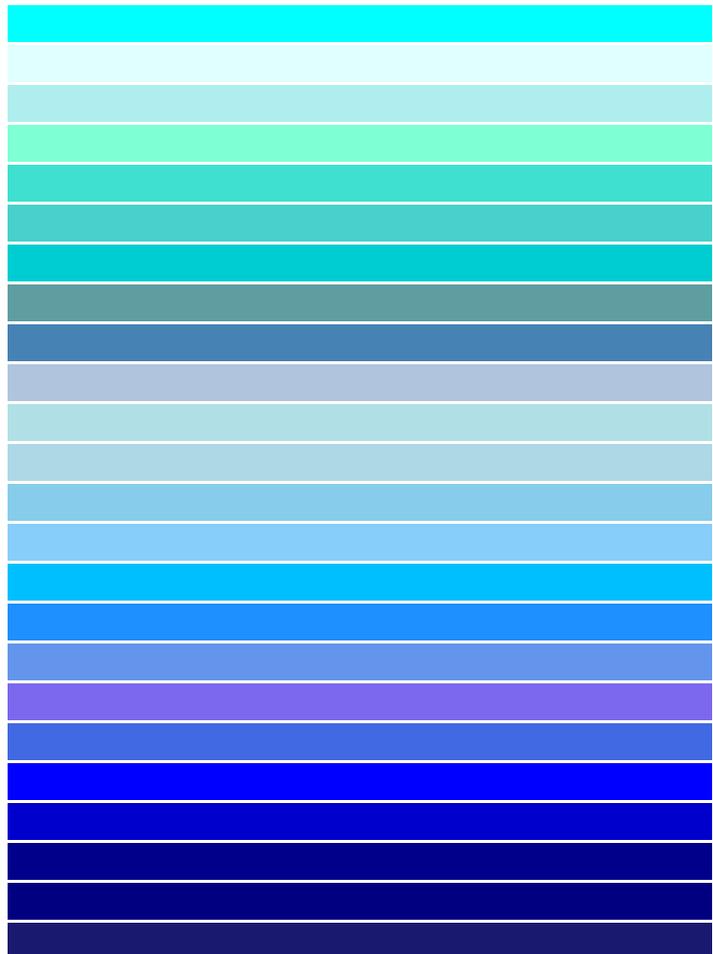


Blue Colors

```

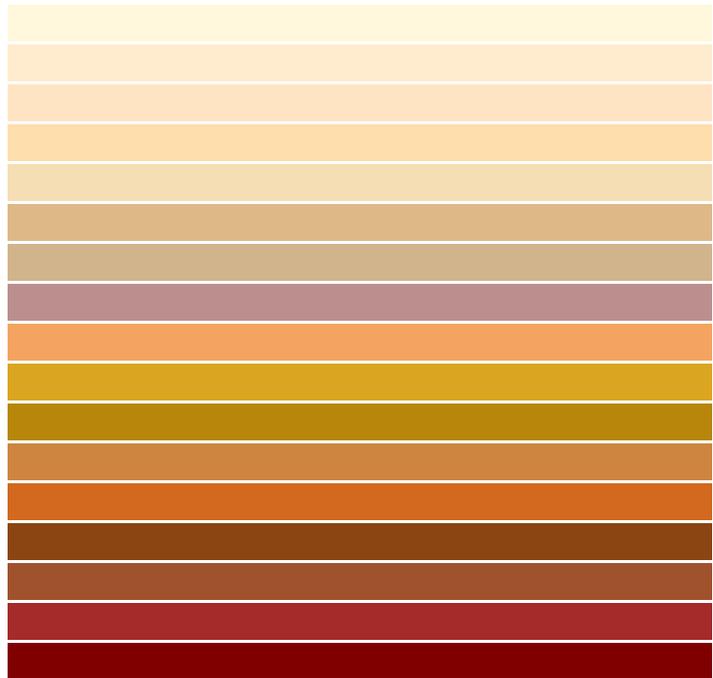
%RGB_CYAN = &HFFFF00
%RGB_LIGHTCYAN = &HFFFFE0
%RGB_PALETURQUOISE = &HEEEEAF
%RGB_AQUAMARINE = &HD4FF7F
%RGB_TURQUOISE = &HD0E040
%RGB_MEDIUMTURQUOISE = &HCCD148
%RGB_DARKTURQUOISE = &HD1CE00
%RGB_CADETBLUE = &HA09E5F
%RGB_STEELBLUE = &HB48246
%RGB_LIGHTSTEELBLUE = &HDEC4B0
%RGB_POWDERBLUE = &HE6E0B0
%RGB_LIGHTBLUE = &HE6D8AD
%RGB_SKYBLUE = &HEBCE87
%RGB_LIGHTSKYBLUE = &HFACE87
%RGB_DEEPSKYBLUE = &HFFBF00
%RGB_DODGERBLUE = &HFF901E
%RGB_CORNFLOWERBLUE = &HED9564
%RGB_MEDIUMSLATEBLUE = &HEE687B
%RGB_ROYALBLUE = &HE16941
%RGB_BLUE = &HFF0000
%RGB_MEDIUMBLUE = &HCD0000
%RGB_DARKBLUE = &H8B0000
%RGB_NAVY = &H800000
%RGB_MIDNIGHTBLUE = &H701919

```



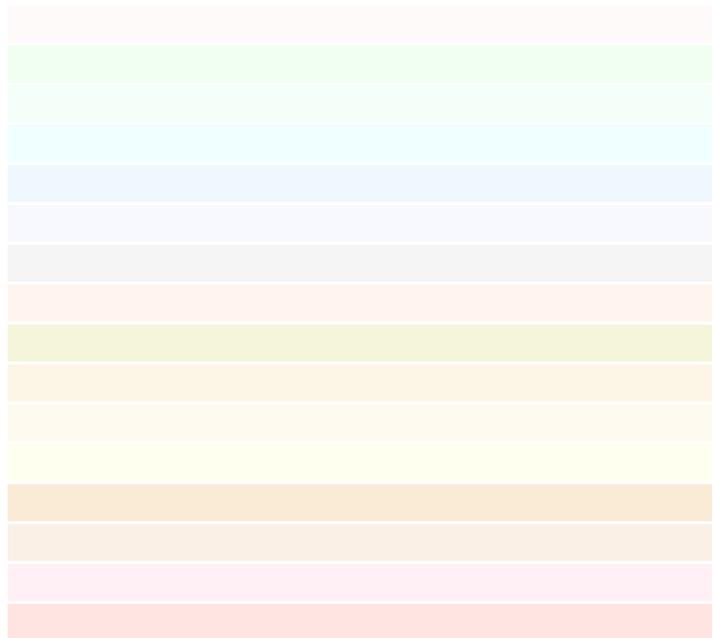
Brown Colors

| | | |
|---------------------|---|----------|
| %RGB_CORNSILK | = | &HDCF8FF |
| %RGB_BLANCHEDALMOND | = | &HCDEBFF |
| %RGB_BISQUE | = | &HC4E4FF |
| %RGB_NAVAJOWHITE | = | &HADDEFF |
| %RGB_WHEAT | = | &HB3DEF5 |
| %RGB_BURLYWOOD | = | &H87B8DE |
| %RGB_TAN | = | &H8CB4D2 |
| %RGB_ROSYBROWN | = | &H8F8FBC |
| %RGB_SANDYBROWN | = | &H60A4F4 |
| %RGB_GOLDENROD | = | &H20A5DA |
| %RGB_DARKGOLDENROD | = | &H0B86B8 |
| %RGB_PERU | = | &H3F85CD |
| %RGB_CHOCOLATE | = | &H1E69D2 |
| %RGB_SADDLEBROWN | = | &H13458B |
| %RGB_SIENNA | = | &H2D52A0 |
| %RGB_BROWN | = | &H2A2AA5 |
| %RGB_MAROON | = | &H000080 |



White Colors

| | | |
|--------------------|---|-----------|
| %RGB_WHITE | = | &HFFFFFF |
| %RGB_SNOW | = | &HF0FAFF |
| %RGB_HONEYDEW | = | &HF0FFF0 |
| %RGB_MINTCREAM | = | &HFAFFF5 |
| %RGB_AZURE | = | &HFFFFFF0 |
| %RGB_ALICEBLUE | = | &HFFF8F0 |
| %RGB_GHOSTWHITE | = | &HFFF8F8 |
| %RGB_WHITESMOKE | = | &HF5F5F5 |
| %RGB_SEASHELL | = | &HEEF5FF |
| %RGB_BEIGE | = | &HDCF5F5 |
| %RGB_OLDLACE | = | &HE6F5FD |
| %RGB_FLORALWHITE | = | &HF0FAFF |
| %RGB_IVORY | = | &HF0FFFF |
| %RGB_ANTIQUWHITE | = | &HD7EBFA |
| %RGB_LINEN | = | &HE6F0FA |
| %RGB_LAVENDERBLUSH | = | &HF5F0FF |
| %RGB_MISTYROSE | = | &HE1E4FF |



Gray Colors

| | | |
|---------------------|---|----------|
| %RGB_GAINSBORO | = | &HDCDCDC |
| %RGB_LIGHTGRAY | = | &HD3D3D3 |
| %RGB_SILVER | = | &HC0C0C0 |
| %RGB_DARKGRAY | = | &HA9A9A9 |
| %RGB_GRAY | = | &H808080 |
| %RGB_DIMGRAY | = | &H696969 |
| %RGB_LIGHTSLATEGRAY | = | &H998877 |
| %RGB_SLATEGRAY | = | &H908070 |
| %RGB_DARKSLATEGRAY | = | &H4F4F2F |
| %RGB_BLACK | = | &H000000 |



See Also

[Built-in numeric equates](#)
[Built-in string equates](#)
[Built-in Interfaces](#)
[Built-in User Defined Types](#)
[Constants and Literals](#)
[Numeric Equates](#)
[String Equates](#)

String Equates

String Equates

You can create a

equate by prefixing \$ (for [ANSI](#)) or \$\$ (for [WIDE](#)) to the equate name. The value on the right side of the equate assignment must be a [string literal](#), or an expression created from string literals. The string literal expression can be constructed from combinations of other string equates or quoted string literals, the [CHR\\$](#) function, [SPACES\\$](#) function, and the [STRING\\$](#) function when used with numeric parameters. [ANSI string](#) equates can also use the [GUID\\$](#) function. For example:

```

$Name      = "John Smith"
$$Fullname = "John"$$ & " Smith"$$
$$UserNam  = $$First & $$Last
$PrintCode = CHR$(27, 34, "E") + SPACES$(10) + CHR$(65 TO 90)
$AppGuid   = GUID$("{01234567-89AB-CDEF-FEDC-BA9876543210}")

```

A string equate can include the double-quote character, simply by doubling the character within the string. For example:

```
$ABC = "This is a ""string"""
```

ANSI string equates are each limited to 255 characters, while WIDE equates are limited to 127 characters. An attempt to create a longer string equate will trigger a compile-time [Error 489](#) ("Invalid string length").

As with numeric equates, PowerBASIC pre-calculates the string equate content during compilation to limit calculations at run-time. Duplicate definitions of both numeric and string equates are permitted by PowerBASIC, provided the actual content is identical. If the content is not identical, a compile-time [Error 468](#) ("Duplicate Equate") will be generated.

A string equate name must always begin with one or two leading dollar signs (\$) and a letter (A-Z). This is optionally followed by any combination of letters (A-Z), numbers (0-9), and underscores (_). All other characters are illegal.

String equates must be created outside of any [SUB](#), [FUNCTION](#), [METHOD](#), or [PROPERTY](#). String equates are global, and may be referenced anywhere in the module. For readability, we suggest placing equates at the top of your code.

See Also

[Constants and Literals](#)
[Defining Constants](#)
[Numeric Equates](#)
[Built-in numeric equates](#)

[Built In RGB Color Equates](#)[Built-in string equates](#)

Built-in string equates

Built-in string equates

The compiler also provides a set of built-in [string equates](#). These offer convenience as well as self-documentation.

The following table shows the [ANSI](#) form, each of which begins with a single dollar-sign (\$). The compiler also includes and offers a wide [Unicode](#) version of each of them, identified by a double dollar-sign (\$\$). For example, \$NUL returns a byte with the character code zero (0), while \$\$NUL returns a [word](#) with the character code zero (0).

| ANSI | Character(s) | Definition |
|--------------|----------------------|-----------------------------------|
| \$NUL | CHR\$(0) | Null |
| \$BEL | CHR\$(7) | Bell |
| \$BS | CHR\$(8) | Back Space |
| \$TAB | CHR\$(9) | Horizontal Tab |
| \$LF | CHR\$(10) | Line Feed |
| \$VT | CHR\$(11) | Vertical Tab |
| \$FF | CHR\$(12) | Form Feed |
| \$CR | CHR\$(13) | Carriage Return |
| \$CRLF | CHR\$(13,10) | CR and LF |
| \$EOF | CHR\$(26) | End-of-File |
| \$ESC | CHR\$(27) | Escape |
| \$SPC | CHR\$(32) | Space |
| \$DQ | CHR\$(34) | Double-Quote |
| \$DQ2 | CHR\$(34,34) | Two Double-Quotes ("") |
| \$SQ | CHR\$(39) | Single-Quote |
| \$SQ2 | CHR\$(39,39) | Two Single-Quotes (") |
| \$QCQ | CHR\$(34, 44, 34) | Double-Quote, Comma, Double-Quote |
| \$WHITESPACE | CHR\$(32, 9, 13, 10) | Space, Tab, CR, LF |

See Also

[Constants and Literals](#)[Numeric Equates](#)[Built-in numeric equates](#)[Built-in string equates](#)[String Equates](#)[Built-in Interfaces](#)[Built-in User Defined Types](#)[Built-in RGB Color Equates](#)

Bit Data Types

Bit Data Types

TYPE and **UNION** structures may contain bit variables, which are named **BIT** (unsigned values) or **SBIT** (signed values). Each bit variable may occupy from 1 to 31 bits. When used in a **TYPE**, bit variables are packed one after another up to a total of 32 bits per bit field. When used in a **UNION**, all bit variables overlay each other, starting at the first bit position.

Bit variables may only be used as **TYPE** or **UNION** members, not as scalar, array, or pointer variables. The size of a bit variable is defined as:

```
var AS BIT * nlit [IN BYTE|WORD|DWORD]
```

where the term "** nlit*" defines the number of bits (1 to 31), and the optional term "IN BYTE|WORD|DWORD", if present, defines the start of a new bit field of 1, 2, or 4 bytes.

```
TYPE abcd
  valu AS BIT * 31 IN DWORD
  sign AS SBIT * 1
  nybl2 AS BIT * 4 IN BYTE
  nybl1 AS BIT * 4
END TYPE
```

The example type above is 5 bytes in size, containing a 4-byte bit field and a 1-byte bit field. In this case, each contain 2 bit variables of varying size. The range of values which may be stored depends upon the number of bits available. For example, "BIT * 4" has a range of 0 to 15, "SBIT * 1" has a range of -1 to 0, and "SBIT * 5" has a range of -16 to +15. BIT and SBIT variables may not be used with SHIFT or ROTATE statements.

```
UNION abcde
  Part1 AS BIT * 8 IN DWORD
  Part2 AS BIT * 16
END UNION
```

The example union above is 2 bytes in size, containing an 8-bit field and an overlapping 16-bit field.

See Also

[TYPE/END TYPE block](#)

[UNION/END UNION statements](#)

GUID data types

GUID Data Types

PowerBASIC introduces another new [variable](#) class: GUID variables. These are a special form of 16-byte string that are used to contain a 128-bit Globally Unique Identifier (GUID), primarily for use with [COM Objects](#).

Generally speaking, a GUID variable is assigned a value with the [GUID\\$](#) function, or with a [string equate](#), and that value usually remains constant throughout the program. The GUID variable is typically used only as a parameter, rather than as a term in an expression.

GUID variables must be explicitly declared with [DIM](#), [LOCAL](#), etc, and are used in much the same way as a 16-byte [fixed-length string](#) or a [user-defined type](#) of that size. A GUID variable is only valid as a parameter when its 16 bytes of data are in an appropriate format. For example:

```
$idNull = STRING$(16,0)
' code here
DIM abc AS LOCAL GUID
DIM def AS LOCAL STRING
DIM xyz AS GLOBAL GUID
```

```

abc = $idNull
abc = GUID$("{00000000-0000-0000-C000-000000000046}")
xyz = abc
def = GUIDTXT$(xyz)
' def contains "{00000000-0000-0000-C000-000000000046}"

```

See Also

- [GUID\\$ function](#)
- [What is an object, anyway?](#)
- [Just what is COM?](#)
- [How are GUID's used with objects?](#)

Object Data Type

Object Data Types

[Object](#) variables are used to access an object. Object variables contain a pointer to the desired object, so they are considered to contain an "[Object Reference](#)". They contain no other value of any kind. Object variables are declared by the name of the [interface](#) they represent. This could be the generic [IDISPATCH](#), [IUNKNOWN](#), and [IAUTOMATION](#) interfaces, or one that is explicitly defined with an INTERFACE structure. For example:

```

' Generic IDispatch Object variable
DIM oWord AS IDISPATCH
LET oWord = NEWCOM "Word.Application"

' Generic IUnknown Object variable
DIM MyObj as IUNKNOWN
DIM oWord as Int_Application
LET MyObj = NEWCOM "Word.Application"
LET oWord = MyObj

' Interface-specific Object variable
DIM oWord AS Int_Application
LET oWord = NEWCOM "Word.Application"

```

An object variable may only be used in specific situations, such as execution of an Object Method. It is never legal to reference Object variables in normal

or [string expressions](#), nor is it possible to even output their value without the use of the special new functions like [OBJPTR](#). [Methods](#) are executed by using an object variable with a Method name. For example, to call the Method ABC in an interface represented by the object variable MyObject, you would

write:

```
CALL MyObject.abc()
```

See Also

- [What is an object, anyway?](#)
- [Just what is COM?](#)
- [How do you create an object?](#)
- [How do you call a Direct Method?](#)
- [How do you call a DISPATCH METHOD?](#)
- [Late Binding](#)

[ID Binding](#)**Variant Data Types****Variant Data Types**

Variant [variables](#) are now supported by PowerBASIC, but their use is limited to that of a parameter assignment for conversion of data, for compatibility with other languages and applications, especially [COM Objects](#).

Although notoriously lacking in efficiency, Variants are commonly used as [COM](#) Object parameters due to their flexibility. You can think of a Variant as a kind of container, which can hold a variable of most any data type,

, , or even an entire [array](#). This simplifies the process of calling procedures in a COM [Object](#) Server, as there is little need to worry about the myriad of possible data types for each parameter.

This flexibility comes at a great price in performance, so PowerBASIC limits their use to data storage and parameters only. You may assign a numeric value, a string value, or even an entire array to a Variant with the [LET](#) statement, or its implied equivalent. In the same way, you may assign one Variant value to another Variant variable, or even assign an array contained in a Variant to a compatible PowerBASIC array, or the reverse.

You may extract a simple scalar value from a Variant with the [VARIANT#](#) function for numeric values (regardless of the internal numeric data type), or with the [VARIANT\\$](#) and [VARIANT\\$\\$](#) functions for string values. You may determine the type of data a Variant variable contains with the [VARIANTVT](#) function. The following table summarizes the predefined (built-in) equates that can be used to examine a Variant:

| Result | Equates | Content Type |
|--------|--------------|---------------------------------|
| 0 | %VT_EMPTY | An Empty Variant |
| 1 | %VT_NULL | Null value |
| 2 | %VT_I2 | Integer |
| 3 | %VT_I4 | Long-Integer |
| 4 | %VT_R4 | Single |
| 5 | %VT_R8 | Double |
| 6 | %VT_CY | Currency |
| 7 | %VT_DATE | Date |
| 8 | %VT_BSTR | Dynamic String |
| 9 | %VT_DISPATCH | IDispatch |
| 10 | %VT_ERROR | Error Code |
| 11 | %VT_BOOL | Boolean |
| 12 | %VT_VARIANT | Variant |
| 13 | %VT_UNKNOWN | IUnknown |
| 14 | %VT_DECIMAL | Decimal |
| 16 | %VT_I1 | Byte (signed) |
| 17 | %VT_UI1 | Byte (unsigned) |
| 18 | %VT_UI2 | Word |
| 19 | %VT_UI4 | DWORD |
| 20 | %VT_I8 | Quad (signed) |
| 21 | %VT_UI8 | Quad (unsigned) |
| 22 | %VT_INT | Long-Integer |

| | | |
|--------|---------------------|---|
| 23 | %VT_UINT | DWord |
| 24 | %VT_VOID | A C-style void type |
| 25 | %VT_HRESULT | COM result code |
| 26 | %VT_PTR | Pointer |
| 27 | %VT_SAFEARRAY | VB Array |
| 28 | %VT_CARRAY | A C-style array |
| 29 | %VT_USERDEFINED | User Defined Type |
| 30 | %VT_LPSTR | ANSI string |
| 31 | %VT_LPWSTR | Unicode string |
| 64 | %VT_FILETIME | A FILETIME value |
| 65 | %VT_BLOB | An arbitrary block of memory |
| 66 | %VT_STREAM | A stream of bytes |
| 67 | %VT_STORAGE | Name of the storage |
| 68 | %VT_STREAMED_OBJECT | A stream that contains an object |
| 69 | %VT_STORED_OBJECT | A storage object |
| 70 | %VT_BLOB_OBJECT | A block of memory that represents an object |
| 71 | %VT_CF | Clipboard format |
| 72 | %VT_CLSID | Class ID |
| &H1000 | %VT_VECTOR | An array with a leading count |
| &H2000 | %VT_ARRAY | Array |
| &H4000 | %VT_BYREF | A reference value |

Variants may not be used in an expression, be directly output ([PRINT#](#), etc), or used as a member of a structure such as a [User-Defined Type](#) (UDT) or [UNION](#), etc. Instead, you must first extract the value with one of the above conversion functions, and use that acquired value for calculations.

Internally, a Variant is always 16-bytes in size, and may be passed as either a [BYVAL](#) or a [BYREF](#) parameter, at the programmer's discretion. However, when a BYREF Variant is required as a parameter, only an explicit Variant variable may be passed by the calling code - a [BYCOPY](#) expression is not allowed.

All dynamic strings contained in a Variant must be [Wide/Unicode](#), and PowerBASIC handles these conversions automatically through the [LET](#) statement and its implied equivalent.

There may be some cases where you wish to manipulate the internal structure of a Variant directly. Though possible, you must exercise caution or a serious memory leak could occur. Since a Variant could be the owner of a string, array, etc., you must always reset a Variant (`[LET] VmntName = EMPTY`) prior to manipulation with [POKE](#), or pointers, etc.

When you use the standard PowerBASIC assignment syntax, for example: `[LET] VmntName = 21`, all this "housekeeping" is completely automatic and handled by PowerBASIC for you.

Every Variant variable must be explicitly declared with an appropriate statement such as:

```
DIM xyz AS VARIANT or LOCAL xyz AS VARIANT
```

See Also

[What is an object, anyway?](#)

[Just what is COM?](#)

[What is a COM component?](#)

Comparative Data Types

C/C++

Comparative Data Types C/C++

When dealing with C, intrinsic types are in lowercase. Defined types are in all caps by convention. C data types are case-sensitive. Integer-class types can take a modifier of "signed" or "unsigned", and are signed by default.

C arrays are defined by the number of elements and are indexed from zero:

"char foo[32]" translates to `DIM foo(0 TO 31) AS BYTE`, or `DIM foo AS STRING * 32`, depending on the context of the code.

C [arrays](#) are stored in row-major order whereas PowerBASIC arrays are stored in column-major order. Bear in mind that when accessing C arrays the following C code:

```
k = arr[i,j]
```

...would translate to PowerBASIC as:

```
k = arr(j,i)
```

C arrays are accessed as follows:

```
(0,0), (0,1), (0,2), ...
(1,0), (1,1), (1,2), ...
```

...whereas PowerBASIC arrays are accessed:

```
(0,0), (1,0), (2,0), ...
(0,1), (1,1), (2,1), ...
```

Commonly, C/C++ code prefixes data types with "LP" which indicates a [pointer](#). Therefore, items with the LP prefix usually correspond to a pointer in PowerBASIC; however, the size of the pointer's target will depend on the data type.

More information on C/C++ syntax can be found on the Internet, such as at <http://www.open-std.org/jtc1/sc22/wg14/www/docs/n1124.pdf> and <http://www.open-std.org/JTC1/SC22/WG21/>

C/C++ Data Types

| Type | Language | Format | PowerBASIC |
|--------|----------|-------------------|---------------------------------|
| bool | C++ | unsigned 8-bit | BYTE (2) |
| char | C/C++ | signed 8-bit | BYTE (2) |
| char* | C/C++ | char pointer | STRINGZ (1) |
| double | C/C++ | 8-byte float | DOUBLE |
| float | C/C++ | 4-byte float | SINGLE |
| int | C/C++ | signed 32-bit | LONG (3) |
| long | C/C++ | signed 32-bit | LONG |
| short | C/C++ | signed 16-bit | INTEGER |
| void | C/C++ | (no return value) | SUB |
| void * | C/C++ | pointer | (ANY) [PTR] (1) |

Defined types (SDK types)

| Type | Format | PowerBASIC |
|--------------|-----------------|-----------------------------------|
| ATOM | unsigned 16-bit | WORD |
| BOOL | signed 32-bit | LONG |
| boolean | 8-bit integer | BYTE |
| Boolean | signed 16-bit | INTEGER |
| BOOLEAN | 8-bit integer | BYTE |
| BSTR | dynamic string | WSTRING {unicode} |
| BYTE | unsigned 8-bit | BYTE |
| COLORREF | unsigned 32-bit | DWORD |
| DWORD | unsigned 32-bit | DWORD |
| HANDLE | unsigned 32-bit | DWORD |
| HWND/HDC/... | unsigned 32-bit | DWORD |

| | | |
|---------------|----------------------|---------------------------------|
| INT32 | signed 32-bit | LONG |
| INT64 | signed 64-bit | QUAD |
| LARGE_INTEGER | signed 64-bit | QUAD |
| LPARAM | signed 32-bit | LONG |
| LP... | pointer | (ANY) [PTR] (4) |
| LPCSTR | STRINGZ pointer | STRINGZ [PTR] |
| LPDWORD | DWORD pointer | DWORD [PTR] |
| LPINT | LONG pointer | LONG [PTR] |
| LPSTR | STRINGZ pointer | STRINGZ [PTR] |
| LPUINT | DWORD pointer | DWORD [PTR] |
| LPVOID | 32-bit pointer | (ANY) [PTR] |
| LPWSTR | WSTRINGZ pointer | WSTRINGZ [PTR] |
| LRESULT | signed 32-bit | LONG |
| NULL | 32-bit | 0 or %NULL |
| PASCAL | {calling convention} | /STDCALL |
| QWORD | unsigned 64-bit | QUAD (2) |
| STDCALL | {calling convention} | SDECL/STDCALL |
| UCHAR | unsigned 8-bit | BYTE |
| UINT | unsigned 32-bit | DWORD (3) |
| UINT16 | unsigned 16-bit | WORD |
| UINT32 | unsigned 32-bit | DWORD |
| UINT64 | unsigned 64-bit | QUAD (2) |
| VOID | SUB | {no return value} |
| VOID * | pointer | (ANY) [PTR] (1) |
| WINAPI | {calling convention} | SDECL/STDCALL |
| WORD | unsigned 16-bit | WORD |
| WPARAM | signed 32-bit | LONG |

Delphi

Comparative Data Types Delphi

Delphi uses integer conventions similar to C, although the names are case-insensitive, as with BASIC. That is, a Delphi INTEGER value may be either a PowerBASIC [INTEGER](#) or [LONG](#), depending on whether the Delphi code is 16-bit or 32-bit.

The elements of multi-dimensional arrays, in Delphi, are not necessarily stored in a straightforward order in memory. Such arrays are not compatible with other languages.

Delphi Data Types

| Type | Format | PowerBASIC |
|------------|------------------------|----------------------------------|
| ansistring | dynamic ANSI string | STRING |
| boolean | unsigned 8-bit | BYTE |
| byte | unsigned 8-bit | BYTE |
| bytebool | unsigned 8-bit | BYTE |
| cardinal | unsigned 16/32-bit | WORD/DWORD (5) |
| comp | signed 64-bit | QUAD |
| currency | 8-byte fixed point | CURRENCY |
| double | 8-byte floating point | DOUBLE |
| extended | 10-byte floating point | EXT |
| int64 | signed 64-bit | QUAD |
| integer | signed 16/32-bit | INTEGER/LONG (5) |
| longbool | signed 32-bit | LONG |
| longint | signed 32-bit | LONG |
| longword | unsigned 32-bit | DWORD |
| pchar | STRINGZ string | STRINGZ |

| | | |
|-------------|------------------------|------------------------------|
| shortint | signed 8-bit | BYTE (2) |
| shortstring | 2 to 256 byte string | STRING * 256 |
| single | 4-byte float | SINGLE |
| smallint | signed 16-bit | INTEGER |
| variant | data-dependent | VARIANT |
| wstring | dynamic Unicode string | WSTRING |
| word | unsigned 16-bit | WORD |
| wordbool | unsigned 16-bit | WORD |

Visual Basic 6

Comparative Data Types Visual Basic 6

Visual Basic Data Types

| Type | Format | PowerBASIC |
|-------------------|---------------------|-----------------------------------|
| Boolean | signed 16-bit | INTEGER |
| Byte | unsigned 8-bit | BYTE |
| Const | numeric constant | {Equate} (2) |
| Currency | 8-byte fixed point | CURRENCY |
| Double | 8-byte float | DOUBLE |
| Integer | signed 16-bit | INTEGER |
| Long | signed 32-bit | LONG |
| Single | 4-byte float | SINGLE |
| String | dynamic string | STRING |
| String * <i>n</i> | fixed-length string | STRING * <i>n</i> |
| Variant | data-dependent | VARIANT |

Variables and Variable Scope

Variables

Variables

Variables represent

or values. Unlike constants, the value of a variable can change during program execution. Like [labels](#), variable names must begin with a letter and can contain up to 255 letters and digits (although in practical terms you really cannot exceed the length of a line). Be generous in naming important variables. In PowerBASIC, long variable names **do not** steal run-time memory.

The [Single-precision](#) variables, *EndOfMonthTotals* and *emt*, both require exactly four bytes of run-time storage. A good rule of thumb is to preserve a balance, keeping variable names short enough so that statements can fit on one line. Many programmers use single-letter variables for

counters (i, j, k, l and x, y, z are favorites). However, you can use names like *count*, *total*, *index*, and so on for greater clarity, especially if you have nested loops.

PowerBASIC has many built-in variable types: [Dynamic string](#); [Fixed-length string](#); [nul-terminated string](#); [Field](#); [Integer](#); [Long integer](#); [Quad integer](#); [Byte](#); [Word](#); [Double word](#); [Single](#); [Double](#); and [Extended floating point](#); [Currency and CurrencyX](#); [Variant](#), [Object](#), [Guid](#), plus [Pointer](#), [arrays](#), and [Bit and Sbit bitfield subtypes](#).

Declaring a variable as a specific type:

Use the [DIM](#) statement to declare a variable and use the AS *type* syntax:

```
DIM iVar AS INTEGER
```

Appending a type-specifier to the variable name:

```
bat# = 1.312 ' bat# is a Double-precision variable
hat% = 3     ' hat% is an Integer variable
DEFINT c    ' Variables beginning with c are now Integer
cats = 16   ' cats is an Integer variable by DEFINT
```

Bear in mind that *cat?*, *cat%*, *cat&*, *cat&&*, *cat!*, *cat#*, *cat###*, *cat@*, *cat@@*, and *cat\$* are ten separate variables. Although using *cat* over and over again to create different variables like this is legal, good programming practice suggests that you use somewhat different names for different variables. It is also much better to use descriptive and more easily understood names for your variables rather than single letters. It's extremely difficult to [debug](#) a program in which *x@* has been entered instead of *x!* or *x#*. Imagine the confusion of trying to distinguish *x&&* and *x&*. If you had used variable names like *count!*, *result#*, *remain###*, and *company\$*, you would have had considerably less trouble keeping your variables (and their types) apart.

See Also

[Default Variable Typing](#)

[Variable Scope](#)

[INSTANCE statement](#)

Default Variable Typing

Default Variable Typing

In most older versions of BASIC (including [PowerBASIC for DOS](#)), all variables without a TypeID (*%*, *!*, *&*, etc.) are automatically considered to be [single precision floating point](#). Other compilers have chosen other defaults (for example, VB defaults to [Variant](#)).

To avoid this ambiguity, PowerBASIC asks you to make this determination instead. You can use the [DEF](#) statement to specify your preferred default variable type to be applied to untyped variable names. For example, to mimic the single precision default of PB/DOS, simply add a DEFSNG statement to the top of your program:

```
DEFSNG A-Z
```

See Also

[Variables](#)

[Variable Scope](#)

Variable scope

Variable Scope

The scope of a [variable](#) is defined as its visibility and its lifetime. Visibility means what parts of your program can access it. Lifetime defines when it is created and when it is destroyed. In PowerBASIC, there are many choices of scope to afford the maximum flexibility. You may choose any scope which best fits the needs of your program. When any variable is created in PowerBASIC, it is automatically initialized.

variables are initialized to zero (0). [Dynamic strings](#), [Field strings](#), and [nul-terminated strings](#) are

initialized to a length of zero (no characters). Fixed-length strings and [UDTs](#) are filled with [CHR\\$\(0\)](#). PowerBASIC automatically destroys every variable at the appropriate time, so you never need worry about this type of memory leak.

| | |
|--------------------------|---|
| LOCAL | Local variables are only accessible within a single SUB , FUNCTION , METHOD , or PROPERTY . They are automatically created and initialized each time you enter the procedure. They are automatically destroyed when you exit the procedure. This is the default variable scope unless you declare otherwise. |
| STATIC | Static variables are only accessible within a single SUB , FUNCTION , METHOD , or PROPERTY . They are initialized when your program starts, but retain their value regardless of how many times the procedure is entered and exited. They are destroyed only when the program ends. |
| INSTANCE | Instance variables are accessible from any method or property in a class. Each object will have its own unique copy of them. They are created and initialized when an object is created. They are destroyed when the object is destroyed. |
| THREADED | Threaded variables are accessible from anywhere in your program, but each thread within your program will have its own unique copy of them. They are created and initialized when a thread is created. They are destroyed when the thread ends. Threaded variables are commonly called Thread Local Storage (TLS). They serve a purpose similar to global variables, but never require synchronization since they can't be accessed across threads. |
| GLOBAL | Global variables are accessible from anywhere in your program. They are initialized when your program starts and are destroyed when the program ends. |

Variable Precedence

In PowerBASIC, variables have a defined precedence based upon their scope. Therefore, if two or more variables are created with the same name, the programmer can know, with certainty, which variable is being accessed when the name is referenced. For example, you might use *abc%*, *abc#*, and *abc\$* in the same function using default typing defined by the Type ID character. You could even create a local variable named "counters" and a global variable also named "counters".

So, when you reference a variable name in your program, which variable is actually used? Depending upon the location of the reference, the compiler chooses the variable with the smallest scope. The precedence of variable scopes is:

1. Local or Static
2. Instance
3. Global or Threaded

By Default, PowerBASIC first tries to find a LOCAL or STATIC. Next, an INSTANCE, and finally a GLOBAL or THREADED. It selects the first one it finds, in that sequence. Of course, you cannot use the same name for a LOCAL and a STATIC, unless you use a Type ID character to differentiate them. You can never use the same name for a GLOBAL and a THREADED, as it would be impossible to tell them apart. While this method offers the most flexibility, it can be confusing, and can lead to the creation of insidious, hard-to-find errors in your program. When you accidentally reference the wrong variable, the results can be disastrous.

If you prefer to avoid name duplication, PowerBASIC offers an optional metastatement to enforce that concept. If [#UNIQUE VAR ON](#) is enabled, PowerBASIC will require that variable names be unique. This can make your job a good deal easier, as it removes the ambiguity found with identifier reuse. There are a few exceptions to the uniqueness rule, which are designed to improve readability in your code:

1. Local, Static, and Parameter names may be reused in other Subs, Functions, and Methods.
2. Instance names may be reused in other Classes.
3. Scalar and array names may co-exist if they are the same data type and scope.

Additional Scope Considerations

LOCAL variables are stored on the [stack](#) frame of the procedure, so the address will change throughout the program. Therefore, it may not be safe to rely upon a pointer to them. Likewise, INSTANCE and

THREADED variables exist only as long as the [object](#) or

is active, though their lifetime is generally somewhat longer. STATIC and GLOBAL variables are stored in main memory, so their address remains constant for the entire program.

The stack has a defined size limit. It defaults to 1 MB, but can be expanded with the [#STACK](#) metastatement. You should use care with very large local data items, like fixed or nul-terminated strings and user defined types, as they could overflow the stack. Local dynamic strings do not pose the same problem, as they require just 4 bytes of stack space each for an identifier handle.

Similarly, each local [array](#) has an associated "array descriptor". This small table is stored on the stack frame, but the actual array data is stored in main memory. Therefore, local arrays also have a small impact on the stack frame.

See Also

[Variables](#)

[Default Variable Typing](#)

Operators

Arithmetic Operators

Arithmetic Operators

Arithmetic operators perform normal mathematical operations. Several of these operators merit a word of explanation. The backslash (\) represents integral division. Integral division rounds its operands to an integral value, to produce a truncated quotient with no remainder. For example, 5 \ 2 evaluates to 2, and 9 \ 10 evaluates to 0. Integral division is also faster than floating-point division when using integral-class variables or expressions.

The remainder of an integral division can be determined with the [MOD](#) (modulo) operator (MOD is valid for all numeric types). MOD is similar to integer division except that it returns the remainder of the division rather than the quotient. For example, 5 MOD 2 returns the value 1, and 9 MOD 10 returns the value 9.

The [ISTRUE](#) operator returns TRUE only if its operand is TRUE (non-zero). ISTRUE is guaranteed to return -1 as its TRUE value, whereas the operators can return any non-zero value.

The [ISFALSE](#) operator returns TRUE only if its operand is FALSE (zero). ISFALSE is guaranteed to return -1 as its TRUE value, where the operators can return any non-zero value.

PowerBASIC arithmetic operators

| Operator | Action | Example |
|--|-----------------------------|---|
| ^ | Exponentiation | 10^4 |
| - | Negation | -16 |
| * | Multiplication | 45 * 19 |
| / | Floating-point division | 45 / 19 |
| \ | Integral division | 45 \ 19 |
| + | Add | 45 + 19 |
| - | Subtract | 45 - 19 |
| MOD | Modulo | 45 MOD 19 |
| ISFALSE | Boolean False | ISFALSE 45 |
| ISTRUE | Boolean True | ISTRUE 19 |
| NOT , AND , OR , XOR , EQV , IMP | Bit manipulation operations | NOT 0, 45 AND 19 45 OR 19, 45 XOR 19 45 EQV 19, 45 IMP 19 |

Note: PowerBASIC does not trap numeric overflow or underflow errors in equation and expression evaluation. Please refer to the topics [Errors](#) and [Error Trapping](#) for more information.

It is recommended that this table be read in conjunction with the Mathematical Order of Operator Precedence table, and the effects that operator precedence has on the evaluation of numeric expressions.

See Also

[Relational Operators](#)

[Operator Precedence](#)

[LET statement](#)

Relational Operators

Relational Operators

Relational operators allow you to compare the values of two expressions, to obtain a Boolean result of [TRUE](#) or [FALSE](#). Although they can be used in any

expression (for example, $a = (b > c) / 13$), the numeric results returned by relational operators are generally used in an `IF` or other decision statements, to make a judgment regarding program flow.

PowerBASIC relational operators

| Operator | Relation | Example |
|----------|--------------------------|---------|
| = | Equality | 5 = 5 |
| <>, >< | Inequality | 5 <> 6 |
| < | Less than | 5 < 6 |
| > | Greater than | 6 > 5 |
| <=, =< | Less than or equal to | 5 <= 6 |
| >=, => | Greater than or equal to | 6 >= 5 |

When [arithmetic](#) and relational operators are combined in an expression, arithmetic operations are always evaluated first. For example, $4 + 5 < 4 * 3$ evaluates to [TRUE](#) (non-zero), because the arithmetic operations (addition and multiplication) are carried out before the relational operation. This then tests the truth of the assertion $9 < 12$.

Strings and relational operators

PowerBASIC lets you compare

data. [String expressions](#) can be tested for equality, as well as for "greater than" and "less than" alphanumeric ordering.

Two string expressions are equal if *and only if* they contain exactly the same characters in exactly the same order. For example:

```
a$ = "CAT"
x1% = (a$ = "CAT") : x2% = (a$ = "CATS") : x3% = (a$ = "cat")
```

String ordering is based on two criteria: first, the ASCII values of the characters they contain, and second, the length of the strings.

For example, the letter *A* is less than the letter *B* because the ASCII code for *A*, 65, is less than the code for *B*, 66. Note, however, that *B* is less than *a* because the [ASCII](#) code for each lowercase letter is *greater* than the corresponding uppercase character (exactly 32 greater). When comparing mixed uppercase and lowercase information, use the [UCASE\\$](#) or [LCASE\\$](#) functions to keep case differences from interfering with the test.

```

city1$ = "Seattle"
city2$ = "Tucson"
IF UCASE$(city1$) > UCASE$(city2$) THEN
    city$ = city1$
ELSE
    city$ = city2$
END IF
city1$ = UCASE$(city1$)
city2$ = UCASE$(city2$)
IF city1$ > city2$ THEN
    city$ = city1$
ELSE
    city$ = city2$
END IF

```

Note the difference between the two sets of statements. In the first case, the string variables *city1\$* and *city2\$* are converted to uppercase for the comparison only, so the first [IF/THEN](#) returns Tucson. In the second case, the conversion is performed on the variables themselves, so the result will be TUCSON.

Length is important only if both strings are identical up to the length of the shorter string, in which case the shorter one evaluates as less than the longer one; for example, *CAT* is less than *CATS*.

The [ARRAY SORT](#) and [ARRAY SCAN](#) statements allow you to specify whether lower case characters are to be treated as uppercase for comparison purposes. You can also specify a string that explicitly determines the sorting order for all 256 ASCII characters.

See Also

[Arithmetic Operators](#)

[Operator Precedence](#)

Operator Precedence

Mathematical order of Operator Precedence

- parentheses ()
- exponentiation (^)
- negation (-)
- multiplication (*),
division (/)
division (\)
- modulo ([MOD](#))
- addition (+), subtraction (-)
- [relational operators](#) (<, <=, =, >=, >, <>)
- [NOT](#), [ISFALSE](#), [ISTRUE](#)
- [AND](#)
- [OR](#), [XOR](#) (exclusive OR)
- [EQV](#) (equivalence)
- [IMP](#) (implication)

For example, the expression $3+6 / 3$ evaluates to 5, not 3. Division has a higher priority than addition, so the division operation ($6 / 3$) is performed first. Even though the compiler will not get confused, people still could, so a better programming style might be to use $3 + (6 / 3)$ or $3 + 6/3$, either using parentheses or spacing to make the intent clear. Otherwise it is easy to misread the statement as $(3 + 6) / 3$.

To handle operations of the same priority, PowerBASIC proceeds from left to right. For example, in the expression $4 - 3 + 6$, the subtraction ($4 - 3$) is performed before the addition ($3 + 6$), producing the intermediate expression $1 + 6$.

Operations inside parentheses are of the highest priority and are always evaluated first. Within parentheses, standard precedence is used. Use parentheses like garlic: generously, but not to excess.

Another example of the effect of Order of Precedence on an expression follows:

```
x = -1^2
```

At first glance, the result of 1 may be the expected result (since $-1 * -1 = 1$); however, the unary negation operator has a lower precedence than exponentiation, so the expression is evaluated as $x = -(1^2)$ which gives a result value of -1. As noted above, the use of parentheses can clarify the intended expression:

```
x = (-1)^2
```

See Also

[Arithmetic Operators](#)

[Relational Operators](#)

Errors and Error Trapping

Error Overview

Error Overview

Unlike the [DOS versions of PowerBASIC](#), Windows versions of PowerBASIC employ a completely different philosophy: to generate the smallest and fastest possible code. Consequently, [error handling](#) is placed firmly in the hands of the programmer. PowerBASIC does not stop your program when a run-time error occurs. It is responsibility of the programmer to check for any conceivable errors that may occur after executing a statement. This is especially true with disk access routines. This section describes the types of errors that may be encountered, and follows on with a discussion on error detection and error handling techniques.

Compile-time errors

Compile-time errors are generated when the compiler cannot resolve a problem in your source code while it is compiling. Examples include: typographical errors; assigning incorrect values to variables (such as "x\$ = 5"); and attempting to use a variable name which has not been dimensioned when [OPTION EXPLICIT](#) (or [#DIM ALL](#)) has been turned on.

When a compile-time error is detected, PowerBASIC will display a message box indicating the error code, plus a brief description, along with the line number in the code where the error occurred. The offending line of code will also be displayed. If you are using the PowerBASIC IDE, the caret will move to the offending line once the error dialog has been dismissed.

Run-time errors

Run-time errors are generated when execution of a particular code statement or function results in an error condition being set. Run-time errors caught by PowerBASIC include Disk access violations (i.e., trying to write data to a full disk), out of bounds array and pointer access, and Memory allocation failures. Array bounds and null-pointer checking is only performed when [#DEBUG ERROR ON](#) is used.

Run-time errors can be trapped; that is, you can cause a designated error-handling subroutine to get control should an error occur. Use the [ON ERROR](#) statement to accomplish this. This routine can "judge" what to do next based on the type of error that occurs. File-system errors (for example, disk full) in particular are prime candidates for run-time error-handling routines. They are the only errors that a thoroughly debugged program should have to deal with.

The [ERROR](#) statement (which simulates run-time errors) can be used to debug your error-handling routines. It allows you to deliberately cause an error condition to be flagged. Avoid using error numbers higher than 240, as they are reserved for use in critical error situations which can never be trapped with ON ERROR.

Run-time error values are restricted to the range 1 through 255, and the compiler reserves codes 0 through 150, and 241 through 255 for predefined errors. Attempting to set an error value (with the ERROR statement) outside of the valid range 1 to 255 will result in a run-time [Error 5](#) ("Illegal function call") instead. In addition to the predefined run-time errors, you may also set your own customized run-time error codes in the range 151 through 240. These error codes may be useful to signal specific types of errors in your own applications, ready to be handled by your error trapping code.

In the situation where an undocumented run-time error occurs, the chief suspect is memory corruption. This can typically be caused by writing beyond an array boundary, improper use of pointers, bad Inline Assembly code, etc.

Disk Errors

Disk and I/O errors are *always* trapped at run-time by PowerBASIC. If a run-time Disk or I/O error is detected, the error code is placed in the [ERR](#) system variable. If ON ERROR is enabled, code execution will branch to the designated local error handler.

All error handling in PowerBASIC is local to each [Sub](#), [Function](#), [Method](#), and [Property](#). You cannot create a global error handler routine as you can in some DOS BASICs.

When an error occurs in PowerBASIC, an error code is placed into the ERR system variable. If [Error Trapping](#) has been enabled, execution branches to the error trap. Otherwise, execution continues. If an error occurs and your code does not take care of it, either by using an error trap or by explicitly testing the ERR or [ERRCLEAR](#) variables, your program may produce unpredictable results. For example, in the following code, several problems can occur which would cause the code to fail, and possibly even trigger a General Protection Fault (GPF) in Windows:

```
SUB ReadFile(Filnam$, buffer$(), Lines%)
  RESET Lines%
  OPEN Filnam$ FOR INPUT AS #1
  WHILE ISFALSE EOF(1)
    INCR Lines%
    LINE INPUT #1, buffer$(Lines%)
  WEND
  CLOSE #1
END SUB
```

Here, the ERR variable is not checked after the [OPEN](#) statement to see if it was successful. If the file does not exist or has been locked by another process, a run-time error can occur. In this case, [EOF\(1\)](#) will never be able to return TRUE (non-zero) since the file was not able to be opened, and therefore the end of the file cannot be determined. Further, checking the EOF of a file that has not been opened will trigger yet another run-time error.

The result is that without adequate error testing, this small loop will begin to run continuously.

While certainly a flaw in the code, no harm will come to the program for period. However, a fatal error in the [LINE INPUT#](#) statement is imminent if the *Lines%* variable value exceeds the [UBOUND](#) of the *buffer\$()* array. A fatal error could also occur if *buffer\$()* was not previously dimensioned, or it wasn't dimensioned with enough elements to store the entire file (that is, assuming the file was opened successfully).

In these cases, a General Protection Fault (GPF) is quite likely to occur, as soon as invalid memory addresses begin to be accessed in an attempt to store the string data. You can prevent the array boundary GPF by turning on error checking using the [#DEBUG ERROR ON](#) metastatement. However, if the [array](#) was not previously dimensioned or does not have enough space, the code will still fail in its overall objective.

A more robust version of this example code follows:

```
#DEBUG ERROR ON
SUB ReadFile(Filnam$, buffer$(), Lines%)
  LOCAL Temp$
  ON ERROR RESUME NEXT

  RESET Lines%
  OPEN Filnam$ FOR INPUT AS #1
  IF ERR THEN 'error opening file
    EXIT SUB
```

```

END IF

WHILE ISFALSE EOF(1)
  INCR Lines%
  LINE INPUT #1, Temp$
  IF ERR then EXIT SUB          'abort if disk error
  buffer$(Lines%) = Temp$
  IF ERR = 9 THEN              'subscript out of range
    REDIM PRESERVE buffer$(Lines%) 'increase array size
    buffer$(Lines%) = Temp$
  END IF
WEND
CLOSE #1
END SUB

```

Numeric Errors

In order to generate tight, fast code, we have eliminated quite a bit of error checking that was done in earlier compilers (such as Division-by-Zero, Numeric Overflow, and most other numeric checking errors). While this results in code that is considerably smaller and faster than any other Windows compiler product, it does put more of an onus on the programmer to write code that is bug-free, or code that does its own [error checking](#) and validation of its data.

For example, an application that performs exponentiation of a negative value to a fractional power ($-5^{1.9}$) will not trigger a run-time error, but the result of the expression will be undefined. Therefore, it makes sense for the application to make some attempt to validate or restrict the numeric range of the arguments of this kind of expression.

See Also

[Error Trapping](#)

Error Trapping

Error Trapping

Error Trapping

Error traps let you intercept and deal with run-time errors, rather than having programs unceremoniously abort or ignore a fatal error, possibly causing loss of data.

There are three steps you must take to trap errors, as described in the following sections:

1. **Set the error trap.** Use the [ON ERROR GOTO](#) statement.
2. **Write the error-handling routine.** The error-handling routine receives control when an error occurs.
3. **Exit the error-handling routine.** You exit the error handler using the [RESUME](#) statement so execution can continue at an appropriate location in the code.

For example, here is a piece of code that fills an array with the filenames from a directory. This section will add complete Error Trapping to prevent [run-time errors](#) when the user chooses a directory that does not have any files or a drive that is not ready.

```

SUB GetFileNames(File() AS STRING)
  DIM CurrentDir AS STRING
  DIM fName AS STRING, Mask AS STRING
  DIM X AS INTEGER

```

```

Mask = "*.*"
CurrentDir = CURDIR$
Path = AskUserForPath$()
fName = DIR$(RTRIM$(Path) + Mask)
IF LEN(fName) = 0 THEN EXIT SUB
X = 1

WHILE LEN(fName)
  Files(X) = fName
  fName = DIR$
  INCR X
WEND
END SUB

```

See Also

- [Error Overview](#)
- [How error traps work](#)
- [Setting an error trap](#)
- [Writing an error handler](#)
- [Exiting an error handler](#)
- [Error Trapping Summary](#)

How error traps work

How error traps work

In PowerBASIC, error codes - returned by the [ERR](#) or [ERRCLEAR](#) functions - and [error traps](#) are local to each [Sub](#), [Function](#), [Method](#), or [Property](#). An error trap will only trap errors that occur within the procedure where it is defined.

PowerBASIC uses the following steps to determine what to do when a [run-time error](#) occurs:

- Does an error trap exist? If so, PowerBASIC uses it.
- If no error trap exists, PowerBASIC places an error code in the ERR and ERRCLEAR system variables and continues execution.

Consider the following:

```

SUB Proc1
  ON ERROR GOTO ErrorTrap
  ' some code goes in here
  CALL Proc2
  ' some more code goes in here

Proc1Resume:
  EXIT SUB

ErrorTrap:
  ' Error-handling code goes in here
  RESUME Proc1Resume
END SUB

```

See Also

- [Error Overview](#)

[Error Trapping](#)[Setting an error trap](#)[Writing an error handler](#)[Exiting an error handler](#)[Error Trapping Summary](#)

Setting an error trap

Setting an error trap

To enable an [error trap](#), use the [ON ERROR GOTO](#) statement where you want trapping enabled within the . The error-handling code must be within that procedure. An error trap is enabled only while the procedure is executing. Use the ON ERROR GOTO 0 statement where you want trapping disabled within the procedure.

See Also

[Error Overview](#)[Error Trapping](#)[How error traps work](#)[Writing an error handler](#)[Exiting an error handler](#)[Error Trapping Summary](#)

Writing an error handler

Writing an error handler

When an error occurs and an [error trap](#) invokes your error-handling routine, the first thing the code should do is to determine which error occurred. PowerBASIC's [ERR](#) and [ERRCLEAR](#) functions return the code of the most recent error. You can use one of PowerBASIC's control structures (like [SELECT CASE](#)) to take appropriate action based on the error code. The [ERROR\\$](#) function can be used to help formulate a suitable error message to log or report to the user.

See Also

[Error Overview](#)[How error traps work](#)[Setting an error trap](#)[Exiting an error handler](#)[Error Trapping Summary](#)

Exiting an error handler

Exiting an error handler

You must exit an error handler with the [RESUME LABEL](#) statement. Execution branches immediately to the specified local [label](#), and the original [error trap](#) operation is restored ready to catch the next [run-time error](#).

In the sample program, you want to use RESUME to a specific line. Put the line label **before** the line that requests user input to give the user another chance to enter a correct path.

Here is the sample program, complete with Error Trapping:

```

SUB GetFileNames(File() AS STRING)
  DIM CurrentDir AS STRING
  DIM fName AS STRING, Mask AS STRING
  DIM X AS INTEGER
  ON ERROR GOTO ErrorTrap
  Mask = "*.*)"
  CurrentDir = CURDIR$

  GetPath:
  Path = AskUserForPath$()
  fName = DIR$(RTRIM$(Path) + Mask)
  IF LEN(fName) = 0 THEN EXIT SUB
  X = 1
  WHILE LEN(fName)
    Files(X) = fName
    fName = DIR$
    INCR X
  WEND
  EXIT SUB

  ErrorTrap:
  SELECT CASE ERRCLEAR
    CASE 53 : ErrorMessage "No files in this directory."
    CASE 71 : ErrorMessage "Drive not ready."
    CASE 76 : ErrorMessage "That path doesn't exist."
    CASE ELSE : ErrorMessage "Unknown error!"
  END SELECT
  RESUME GetPath
END SUB

```

See Also

[Error Overview](#)

[Error Trapping](#)

[How error traps work](#)

[Setting an error trap](#)

[Writing an error handler](#)

[Error Trapping Summary](#)

Error Trapping Summary

Error Trapping Summary

[Error Trapping](#) is a useful and powerful feature of PowerBASIC. Many programmers avoid trapping errors because of the substantial penalties other BASIC dialects impose when Error Trapping is turned on. Fortunately, PowerBASIC's hit is much lower. Still, having Error Trapping turned on may increase the size of your executable. You may wish to investigate other ways to accomplish the same results, whilst ensuring the stability of your code.

Finally, PowerBASIC now includes the following list of predefined (built-in) equates to assist in the creation of more verbose error handling code. They include:

| | |
|--|--|
| <code>%ERR_NOERROR</code> | = 0 |
| <code>%ERR_ILLEGALFUNCTIONCALL</code> | = 5 |
| <code>%ERR_OVERFLOW</code> | = 6 (reserved) |
| <code>%ERR_OUTOFMEMORY</code> | = 7 |
| <code>%ERR_SUBSCRIPTPOINTEROUTOFRANGE</code> | = 9 |
| <code>%ERR_DIVISIONBYZERO</code> | = 11 (reserved) |
| <code>%ERR_DEVICETIMEOUT</code> | = 24 |
| <code>%ERR_INTERNALERROR</code> | = 51 |
| <code>%ERR_BADFILENAMEORNUMBER</code> | = 52 |
| <code>%ERR_FILENOTFOUND</code> | = 53 |
| <code>%ERR_BADFILEMODE</code> | = 54 |
| <code>%ERR_FILEISOPEN</code> | = 55 |
| <code>%ERR_DEVICEIOERROR</code> | = 57 |
| <code>%ERR_FILEALREADYEXISTS</code> | = 58 |
| <code>%ERR_DISKFULL</code> | = 61 |
| <code>%ERR_INPUTPASTEND</code> | = 62 |
| <code>%ERR_BADRECORDNUMBER</code> | = 63 |
| <code>%ERR_BADFILENAME</code> | = 64 |
| <code>%ERR_TOOMANYFILES</code> | = 67 |
| <code>%ERR_DEVICEUNAVAILABLE</code> | = 68 |
| <code>%ERR_COMMERROR</code> | = 69 |
| <code>%ERR_PERMISSIONDENIED</code> | = 70 |
| <code>%ERR_DISKNOTREADY</code> | = 71 |
| <code>%ERR_DISKMEDIAERROR</code> | = 72 |
| <code>%ERR_RENAMEACROSSDISKS</code> | = 74 |
| <code>%ERR_PATHFILEACCESSERROR</code> | = 75 |
| <code>%ERR_PATHNOTFOUND</code> | = 76 |
| <code>%ERR_OBJECTERROR</code> | = 99 |
| <code>%ERR_GLOBALEMEMORYCORRUPT</code> | = 241 (Previously <code>%ERR_FARHEAPCORRUPT</code>) |
| <code>%ERR_STRINGSPACECORRUPT</code> | = 242 |

See Also

[Error Overview](#)

[Error Trapping](#)

[How error traps work](#)

[Setting an error trap](#)

[Writing an error handler](#)

[Exiting an error handler](#)

Compile Time Errors

Error 401 Expression too long/complex

Error 401 - Expression too long/complex

Expression too long/complex - The expression contained too many

; break it down into two or more simplified expressions.

Error 402 - Statement too long/complex

Error 402 - Statement too long/complex

Statement too long/complex - The statement complexity caused an overflow of the internal compiler buffers; break the statement down into two or more simplified statements. This error can also occur if a [SELECT CASE](#) structure using the AS CONST optimization causes the internal jump table to exceed the maximum size (approximately 3200 entries or 12 Kb).

Error 403 - #IF nesting overflow

Error 403 - #IF nesting overflow

#IF nesting overflow - Conditional compilation blocks ([#IF/#ELSE/#ENDIF](#)) can only be nested up to 16 levels deep.

Error 404 - #INCLUDE file/Macro nesting overflow

Error 404 - #INCLUDE file/Macro nesting overflow

#INCLUDE file/Macro nesting overflow - Include files and macros may be nested up to twelve levels deep. The most common cause of this error stems from excessive nesting and/or circular references. For example, a nested [#INCLUDE](#) file that includes itself or an ancestor file that in turn includes the file again, etc. Likewise, a macro that references itself either directly or indirectly can cause a circular reference. See the [MACRO](#) statement for more information on the limits of macro expansions.

Error 405 - Block nesting overflow

Error 405 - Block nesting overflow

Block nesting overflow - Your program has too many statement block structures nested within each other. In PowerBASIC block structures may be nested 64 levels deep.

Error 406 - Compiler out of memory

Error 406 - Compiler out of memory

Compiler out of memory - Available compiler memory for symbol space, buffers, and so on, has been exhausted.

If no more memory is available, separate your program into a small main program which uses the [#INCLUDE](#) metastatement to include the rest of your program. You can also try the following steps:

- Remove unnecessary [line numbers and labels](#).
- Shorten your [variable](#) and [procedure names](#).
- If your code includes [WIN32API.INC](#): Try adding the "code exclusion" [equates](#) such as %NOGDI = 1 to your code to cause the compiler to ignore large sections of the API file. Please review the first few pages of notes in WIN32API.INC for more information.

Alternatively, create a customized version of WIN32API.INC that contains just the definitions and declarations actually used by your code. The latter solution, whilst more work initially, will have the added benefit of much faster compilation times, and make your code more resistant to changes in subsequent releases of WIN32API.INC.

Error 407 - Source line too long

Error 407 - Source line too long

Source line too long - The line of code is too long for the compiler to process. This can also occur if the file contains lines of source code that are not CR/LF delimited. Try breaking the line of code up into smaller logical lines with the use of [line continuation](#) characters, and ensure that the file is using the Win32 standard of CR/LF line delimiting. If you are using a 3rd-party editor, try opening the source code file in the [PowerBASIC IDE](#) and examine the lines where the error occurred -- merged lines here will be a good indication of invalid line delimiting.

Error 408 - Wrong compiler for this program

Error 408 - Wrong compiler for this program

Wrong compiler for this program - The compiler you are using is not compatible with the compiler version specified by the [#COMPILER](#) metastatement. Use the compiler specified by the [#COMPILER](#) metastatement. Another approach would be to change the [#COMPILER](#) settings to match your compiler but, this should be done with caution, since the program may no longer work the same way (or at all) with a different compiler.

Error 409 - Sub/Function is too large

Error 409 - Sub/Function/Method/Property is too large

Sub/Function/Method/Property is too large - There is a reasonable limit for the physical size of a single [Sub](#), [Function](#), [Method](#), or [Property](#). The limit is imposed for practical reasons (such as the size of internal compiler buffers), but also for logical suitability. A huge block of code is very difficult to maintain. In the current version of PowerBASIC, this absolute limit is set at approximately 12,000 lines of source code per procedure. PowerBASIC recommends that each procedure perform one logical function, with a general goal of no more than perhaps 100 lines of source code. If you encounter this error, just break up your code into two or more procedures.

Error 411 - "," expected

Error 411 - "," expected

"," expected - The statement's syntax requires a comma (,).

Error 412 - ";" expected

Error 412 - ";" expected

;" expected - The statement's syntax requires a semicolon (;).

Error 413 - "(" expected

Error 413 - "(" expected

"(" **expected** - The statement's syntax requires a left parenthesis ().

Error 414 - ")" expected

Error 414 - ")" expected

")" **expected** - The statement's syntax requires a right parenthesis ()). The compiler encountered text or symbols where a right parenthesis was expected, or a parenthesis is missing. This error can also occur when attempting to pass more than 32 parameters to a [Sub](#), [Function](#), [Method](#), or [Property](#).

Error 415 - "=" expected

Error 415 - "=" expected

"=" **expected** - The statement's syntax requires an equal sign (=).

Error 416 - "-" expected

Error 416 - "-" expected

"-" **expected** - The statement's syntax requires a hyphen (-).

Error 417 - "*" expected

Error 417 - "*" expected

"*" **expected** - The statement's syntax requires an asterisk (*).

Error 418 - Statement expected

Error 418 - Statement expected

Statement expected - A PowerBASIC statement was expected. Some character could not be identified as a statement, [metastatement](#), or [variable](#).

Error 419 - Label/line number expected

Error 419 - Label/line number expected

Label/line number expected - A valid [label or line-number](#) reference was expected in an [GOTO](#), [GOSUB](#), or statement.

Error 420 - Relational operator expected

Error 420 - Relational operator expected

Relational operator expected - The compiler has found a

operand in a position where a operand should be, or a type mismatch has been detected.

For example, the statement `X& = Y$` triggers an error because a string cannot be assigned or compared to numeric [variable](#), hence the compiler expected to find an additional operator that would return a numeric result. For example, `X& = Y$ > Z$`.

Error 421 - String operand expected

Error 421 - String operand expected

String operand expected - The compiler expected a [string expression](#) and found something else; for example, `X$ = A$ + 3`.

Error 422 - Scalar variable expected

Error 422 - Scalar variable expected

Scalar variable expected - The compiler expected a scalar [variable](#) as a formal parameter to a user-defined [function](#). Scalar variables are non-[array](#) variables.

Error 423 - Array variable expected

Error 423 - Array variable expected

Array variable expected - An [array variable](#) was expected in a [DIM](#) statement.

Error 424 - Numeric variable expected

Error 424 - Numeric variable expected

Numeric variable expected - A [variable](#) was expected, such as in an [INCR](#) or [DECR](#).

Error 425 - String variable expected

Error 425 - String variable expected

String variable expected - A [variable](#) was expected, such as in a [PUT\\$](#) or a [GET\\$](#) statement.

Error 426 - Variable expected

Error 426 - Variable expected

Variable expected - A [variable](#) was expected, but not found. A common cause for this error is the use of a reserved keyword as a variable.

Error 427 - Integer constant expected

Error 427 - Integer constant expected

Integer constant expected - An

[constant](#), [numeric literal](#), or [numeric equate](#) was expected, such as in a named constant assignment.

This error can occur when attempting to use a numeric [variable](#) to dictate the size of the target of a fixed-length or [Nul-Terminated](#) string pointer. For example:

```
DIM X AS STRING PTR * Y&
```

...is not permitted as this statement could only be evaluated at run-time. However:

```
DIM X AS STRING PTR * 1024
```

...is acceptable as the target size is known at compile-time.

Another cause of this error is specifying a non-integral CASE argument in a [SELECT CASE AS CONST](#) block.

Error 428 - Positive integer constant expected

Error 428 - Positive integer constant expected

Positive integer constant expected - A positive

[constant](#) was expected, but not found.

Error 429 - String constant expected

Error 429 - String constant expected

String constant expected - A string constant was expected, but not found. For example, this error can occur when in a [SELECT CASE AS CONST\\$](#) block when a non-string CASE argument is specified.

Error 430 - Integer variable expected

Error 430 - Integer variable expected

Integer variable expected - An

[variable](#) was expected, but not found

Error 431 - Numeric scalar variable expected

Error 431 - Numeric scalar variable expected

Numeric scalar variable expected - The counter [variable](#) in a [FOR/NEXT](#) counter variable is a parameter passed to the [Sub/Function/Method/Property](#), a target, a [THREADED](#) variable, an [array](#) variable (non-scalar), or the counter variable is not a data type. Scalar variables are non-array variables.

Error 432 - Long-integer variable expected

Error 432 - Long-integer variable expected

Long-integer variable expected - A [Long-integer variable](#) is expected.

Error 433 - Matrix array expected (integer/float)

Error 433 - Matrix array expected (integer/float)

Matrix array expected (integer/float) - Matrix [arrays](#) may only be of or types.

See Also

[MAT Statement](#)

Error 434 - End of line expected

Error 434 - End of line expected

End of line expected - No characters are allowed on a line (except for a [comment](#)) following a [metastatement](#), [END SUB](#), or a [label](#).

Error 435 - #IF expected

Error 435 - #IF expected

#IF expected - An [#ENDIF](#) conditional compilation metastatement is missing its accompanying #IF. Look for all #ENDIF [metastatements](#) and figure out where to put the associated #IF.

Error 436 - #ENDIF expected

Error 436 - #ENDIF expected

#ENDIF expected - An [#IF](#) conditional compilation [metastatement](#) is missing its accompanying #ENDIF. Examine all #IF metastatements to determine where to put the associated #ENDIF.

Error 437 - AS expected

Error 437 - AS expected

AS expected - The AS reserved word is missing, such as in a [variable](#) declaration.

Error 438 - Member name expected

Error 438 - Member name expected

Member name expected - The compiler encountered a statement or other text where a structure member name was expected.

Error 439 - GOSUB expected

Error 439 - GOSUB expected

GOSUB expected - An [ON statement](#) is missing its accompanying GOSUB part.

Error 440 - GOTO expected

Error 440 - GOTO expected

GOTO expected - An [ON statement](#) is missing its accompanying GOTO part.

Error 441 - IN expected

Error 441 - IN expected

IN expected - The IN reserved word is missing in a [REGEXPR](#), [REGREPL](#), or [REPLACE](#) statement. Check the syntax of the relevant statement in the reference directory section.

Error 442 - THEN expected

Error 442 - THEN expected

THEN expected - An
is missing its accompanying THEN part.

Error 443 - TO expected

Error 443 - TO expected

TO expected - Missing TO in a [FOR statement](#). This can also be reported for a missing TO in the [CALL FuncName TO](#) syntax.

Error 444 - PREFIX clause expected

Error 444 - PREFIX clause expected

WITH clause expected - A PREFIX clause is expected in this statement.

Error 445 - OF expected

Error 445 - OF expected

OF expected - Indexed
with dual indexes require an "OF Limit" clause on both indexes. For example:
`x = @w[i& OF m&, j& OF n&]`

Error 446 - FUNCTION expected

Error 446 - FUNCTION expected

FUNCTION expected - The compiler found an END FUNCTION or [EXIT FUNCTION](#) statement without a [FUNCTION](#) defined. When defining a FUNCTION, it must begin with a FUNCTION statement.

Error 447 - IF expected

Error 447 - IF expected

IF expected - The compiler found an END IF or an [EXIT IF](#) statement without a beginning [IF statement](#) defined.

Error 448 - DO loop expected

Error 448 - DO loop expected

DO loop expected - The compiler found a LOOP or [EXIT LOOP](#) statement without a beginning [DO statement](#) defined.

Error 449 - SELECT expected

Error 449 - SELECT expected

SELECT expected - When defining a [SELECT CASE](#) statement, you either forgot to include the reserved word SELECT or the compiler ran into an END SELECT or [EXIT SELECT](#) without a beginning SELECT CASE statement. This error can also occur if you try to use the reserved word CASE as a [variable](#) name in your program.

Error 450 - CASE expected

Error 450 - CASE expected

CASE expected - When defining a [SELECT CASE](#) statement, you forgot to include the reserved word CASE. This error can also occur if you try to use the reserved word SELECT as a [variable](#) name in your program.

Error 451 - FOR loop expected

Error 451 - FOR loop expected

FOR loop expected - A [NEXT](#), [EXIT FOR](#), or [ITERATE FOR](#) was encountered here without the associated [FOR](#) statement to begin the FOR/NEXT loop.

Error 452 - SUB expected

Error 452 - SUB expected

SUB expected - An [END SUB](#) was encountered here without the associated [SUB](#) statement to begin the procedure.

Error 453 - Equate (%xyz) expected

Error 453 - Equate (%xyz) expected

Equate (%xyz) expected - The [%DEF\(\)](#) function requires a [numeric](#) or [string equate](#) name as the parameter. It returns [true](#) (non-zero) or [false](#) (zero) to advise whether this equate has been defined in the program.

Error 454 - END FUNCTION expected

Error 454 - END FUNCTION expected

END FUNCTION expected - A [FUNCTION](#) block was not terminated with an associated [END FUNCTION](#) statement. It's likely you tried to start a new procedure block, without first terminating the current FUNCTION.

Error 455 - END IF expected

Error 455 - END IF expected

END IF expected - An [IF](#) block was not terminated with a corresponding END IF statement.

Error 456 - LOOP/WEND expected

Error 456 - LOOP/WEND expected

LOOP/WEND expected - A [DO](#) or [WHILE](#) loop was not terminated with a corresponding LOOP or WEND statement.

Error 457 - END SELECT expected

Error 457 - END SELECT expected

END SELECT expected - A [SELECT CASE](#) statement was not properly terminated with an END SELECT statement.

Error 458 - END SUB expected

Error 458 - END SUB expected

END SUB expected - A [SUB](#) block was not terminated with an associated [END SUB](#) statement. It's likely you tried to start a new procedure block, without first terminating the current SUB.

Error 459 - NEXT expected

Error 459 - NEXT expected

NEXT expected - A [FOR](#) loop was not properly terminated with a NEXT statement.

Error 460 - Undefined equate

Error 460 - Undefined equate

Undefined equate - A named constant ([numeric equate](#) or [string equate](#)) was referenced in your program, but it has not yet been defined.

Error 461 - INSTANCE arrays must be declared

Error 461 - INSTANCE arrays must be declared

[INSTANCE arrays](#) must be declared before any [CLASS](#) code.

Error 462 - Undefined SUB/FUNCTION reference

Error 462 - Undefined Procedure reference

Undefined Procedure reference - You attempted to execute or reference a [SUB](#) or [FUNCTION](#), but it has not been declared or defined anywhere in the program. Check for the possibility of spelling errors.

Error 463 - Undefined label/line reference

Error 463 - Undefined label/line reference

Undefined label/line reference - You used a [label](#) or [line number](#), but it does not exist. Check for the possibility of spelling errors. Note that labels and line numbers are local to the where they are defined.

Error 464 - Undefined class reference

Error 464 - Undefined class reference

Undefined class reference - You used a [CLASS](#) name which does not exist. You must define a CLASS before it can be used. Check for the possibility of spelling errors.

Error 465 - May be defined only once

Error 465 - May be defined only once

May be defined only once - A program element which should only appear once was duplicated in your program. For example, two [#STACK](#) metastatements could cause this error to be generated. A common source of this problem is multiple [#INCLUDE](#) files which define the same term.

Error 466 - This name is already in use

Error 466 - This name is already in use

This name is already in use - This name (identifier) is used for more than one purpose, causing a fatal conflict. For example, you might have used the name ABC as both a [variable](#) and a [label](#). You must rename one or both uses of this particular name. PowerBASIC generates this error when it sees the second use of the name.

Error 467 - Duplicate line number

Error 467 - Duplicate line number

Duplicate line number - A [line number](#) was used more than once.

Error 468 - This equate may not be redefined

Error 468 - This equate may not be redefined

This equate may not be redefined - A [numeric](#) or [string equate](#) is defined a second time with a different value. Equate definitions may appear more than once, but the value must remain constant.

Error 469 - Quad integer variable expected

Error 469 - Quad integer variable expected

Quad integer variable expected - A [Quad integer](#) variable is required as a parameter in this statement.

Error 471 - Invalid line number

Error 471 - Invalid line number

Invalid line number - [Line numbers](#) must be in the range 1 through 65535.

Error 472 - Invalid label

Error 472 - Invalid label

Invalid label - A [label](#) in your code contains invalid characters, such as the period character or the label conflicts with another function, sub, variable, etc. name.

Error 473 - Invalid numeric format

Error 473 - Invalid numeric format

Invalid numeric format - Your program declared a

with more than 18 digits or a number with an E component without the exponent value. This error can also occur if the "&" concatenation operator is used without leading whitespace. For example: a\$ = a\$&b\$ should be written a\$ = a\$ & b\$

Error 474 - Invalid name

Error 474 - Invalid name

Invalid name - A [function](#), [sub](#), [method](#), [property](#), [macro](#), or [label](#) has an invalid name. In the case of a Sub, Function, Method, or Property, the name must begin with a letter and can be followed by other letters, digits, and underscores, but may not include a [type-specifier](#) or period. In the case of a macro you may have a duplicate macro name defined.

Error 475 - Metastatements not allowed here

Error 475 - Metastatements not allowed here

Metastatements not allowed here - A [metastatement](#) must be the first statement on a line.

Error 476 - Block/scanned statements not allowed here

Error 476 - Block/scanned statements not allowed here

Block/scanned statements not allowed here - Block statements (like [WHILE/WEND](#), [DO/LOOP](#), and [SELECT CASE](#)) are not allowed in single line [IF](#) statements. In addition, you may not have a [Sub](#), [Function](#), [Method](#), or [Property](#) definition nested within the body of another definition. A missing END SUB, END FUNCTION, END METHOD, or END PROPERTY can also cause this error.

Error 477 - Syntax error

Error 477 - Syntax error

Syntax error - Something is incorrect on the line; however, the compiler could not determine a proper error message or decode the line further. A common cause is mixing two statement keywords together, using a reserved keyword for a [variable](#) name, or attempting to use an undefined [interface](#) member (in an [OBJECT](#) statement) when using [ID Binding](#), etc.

Error 478 - Resource file error

Error 478 - Resource file error

Resource file error - The [resource file](#) referenced has not been found or is not identifiable as a valid resource file. A common cause of this problem is attempting to use [#RESOURCE](#) with a non-PBR file, or if the PBR file was not able to be opened by the compiler (for example, because the file is locked by another process or application).

Error 479 - Array bounds error

Error 479 - Array bounds error

Array bounds error - You [dimensioned](#) an [array](#) within a [User-Defined Type](#) that contains invalid array boundaries. For example:

```
TYPE MyType
  ArrayWithinUDT(5 TO 1)
END TYPE
```

Error 480 - Parameter mismatches definition

Error 480 - Parameter mismatches definition

Parameter mismatches definition - You attempted to reference a using a parameter which does not match (or cannot be converted to) the data type found in the original declaration/definition. This might also be caused by passing too few or too many parameters, misspellings, etc.

Error 481 - Mismatch with prior definition

Error 481 - Mismatch with prior definition

Mismatch with prior definition - This program element ([TYPE](#), [UNION](#), [SUB](#), [FUNCTION](#), etc.) does not match a declaration or definition found previously in the program. It could be a SUB or FUNCTION which mismatches a declaration, a duplicate TYPE or which is not identical, or another similar condition.

Error 482 - Data type mismatch

Error 482 - Data type mismatch

Data type mismatch - Many PowerBASIC statements and functions require parameters which evaluate to a variable or expression of a particular data type. This error is generated if there is a mismatch with the expected data type. Consult the documentation for the specific statement or function to determine the exact parameter requirements.

Error 483 - Requires Object Procedure (Method/Property)

Error 483 - Requires Object Procedure (Method/Property)

Requires Object Procedure (Method/Property) - The statement or function found here is only allowed within a [METHOD](#) or [PROPERTY](#). Elsewhere, it has no valid meaning and must be removed.

Error 484 - Requires procedure (Sub/Function)

Error 484 - Requires procedure (Function/Method...)

Requires procedure (Sub/Function/Method/Property) - The statement or function found here is only allowed within a procedure ([SUB](#), [FUNCTION](#), [METHOD](#) or [PROPERTY](#)). Elsewhere, it has no valid meaning and must be removed.

Error 485 - Dynamic/Field strings not allowed

Error 485 - Dynamic/Field strings not allowed

Dynamic/Field strings not allowed - A [TYPE](#) or [UNION](#) may not include a [dynamic string](#) or a [field string](#) as a member, because the total size of the structure must be known at compile-time. [Fixed-length strings](#) and [Nul-Terminated Strings](#) should be used instead.

Error 486 - BYVAL option not allowed

Error 486 - BYVAL option not allowed

BYVAL option not allowed - Use of the

option in this context is not allowed. This error is most frequently generated by an attempt to pass an array as a BYVAL parameter. Generally speaking, you should change this to `BYVAL` instead.

Error 487 - Multiple NEXT not allowed

Error 487 - Multiple NEXT not allowed

Multiple NEXT not allowed - Prior versions of PowerBASIC allowed multiple NEXT statements implied by, or separated by commas. This is no longer supported.

Error 488 - Numeric processor overflow

Error 488 - Numeric processor overflow

Numeric processor overflow - Execution of this line of source code is complex, and requires more registers than are currently available in the FPU. One solution might be to add the metastatement [#REGISTER NONE](#) to the current `REGISTER`, if [register](#) variables are being allocated. Another solution would be to break up the source code into multiple simpler statements.

Error 489 - Invalid string length

Error 489 - Invalid string length

Invalid string length - You attempted to [DIM](#) a [fixed-length string](#) with a length of zero, or you attempted to create a [string equate](#) whose length exceeds 255 characters. Fixed-length strings must be at least 1 byte long, and individual string equates may not exceed 255 bytes in length

Error 490 - Static array too large

Error 490 - Static array too large

Static array too large - You attempted to [dimension](#) a [static array](#) larger than 16 MB in a [User-Defined Type](#).

Error 491 - Invalid register variable

Error 491 - Invalid register variable

Invalid register variable - You specified a [register](#) variable which is not allowed in this context. Register variables must be [LOCAL](#), and must be one of: [Integer](#), [Long](#), [Word](#), [DWord](#), or [Extended float](#). It's also possible this variable was used with a function such as [VARPTR\(\)](#), which requires a memory variable for correct execution.

Error 492 - Invalid SORT function

Error 492 - Invalid SORT function

Invalid SORT function - [ARRAY_SORT](#) of a custom [array](#) requires a custom user [FUNCTION](#) with a specific signature (2

parameters, calling conventions, etc.). The function you supplied did not meet these requirements.

Error 493 - Compiler file not found/accessible

Error 493 - Compiler file not found/accessible

Compiler file not found/accessible - A source file could not be found in the specified directory path, or the current directory, or in the search path specified in the compiler /I [command-line](#) option. Alternatively, the file may be locked by another process. Check the directory paths or make sure that the specified file exists, and that another process or application has not locked the file.

Error 494 - ASM not allowed here

Error 494 - ASM not allowed here

ASM not allowed here - You tried to use multiple statements on a line containing an [ASM](#) statement. An ASM statement must be the only statement on a line (plus an optional comment or [REM](#) statement).

Error 495 - Compiler file read error

Error 495 - Compiler file read error

Compiler file read error - During the compilation process, the compiler tried to open an [#INCLUDE](#) or [#RESOURCE](#) file, but a disk error was encountered. Verify that the file is present, not locked by another process, and that the disk itself is free from errors.

Error 496 - Destination file write error

Error 496 - Destination file write error

Destination file write error - During compilation the compiler received a disk write error. This can occur if the destination EXE is, for example, still running in memory when you attempt to compile, the target file is write locked by another process or compile session, or the target file is write-protected (read-only).

Error 497 - Assembler syntax error

Error 497 - Assembler syntax error

Assembler syntax error - An [ASM](#) statement contains an invalid [assembly-language](#) construction.

Error 498 - Assembler variables must be declared

Error 498 - Assembler variables must be declared

Assembler variables must be declared - An attempt was made to reference an [assembler variable](#) before it was defined.

Error 499 - Statement must be first on line

Error 499 - Statement must be first on line

Statement must be first on line - Certain PowerBASIC statements, and all metastatements, must be the first statement on a line. This includes block structures like PREFIX and MACRO, as well as constructs like SELECT CASE elements. If this error is generated, split compound statements apart so that each statement is on a separate line.

Error 500 - Variable name must be unique

Error 500 - Variable name must be unique

Variable name must be unique - All Global, Threaded, and Instance variable names must be unique to guarantee access to a specific variable. If [#UNIQUE VAR ON](#) is specified, then all variable names must be unique.

Error 501 - Parameters too large (exceed 64 Kb)

Error 502 - COM interface name expected

Error 502 - COM interface name expected

COM interface name expected - This form of the [LET](#) (assignment) statement is used to create a [COM object](#), one which is created externally using the [COM](#) services provided by Windows. The associated [interface](#) name is not valid.

Error 503 - Invalid MAIN Function(s)

Error 503 - Invalid MAIN Function(s)

Invalid MAIN Function(s) - Main/LibMain Function(s) do not match the target file type.

Error 504 - Executable requires PBMAIN / WINMAIN function

Error 504 - Executable requires PBMAIN/WINMAIN function

Executable requires PBMAIN/WINMAIN function - No [WINMAIN](#) or [PBMAIN](#) function was located in an executable program. Without one of these functions, it is not possible for Windows to execute the program.

Error 505 - Debugging requires EXE file, not DLL

Error 505 - Debugging requires EXE file, not DLL

Debugging requires EXE file, not DLL - An attempt was made to launch the [debugger](#) on a DLL rather than an EXE file (PB/Win only). Be sure to use an explicit [#COMPILE EXE](#) metastatement to ensure the compiler generates the correct type of compiled code.

Error 506 - Declaration must precede statements

Error 506 - Declaration must precede statements

Declaration must precede statements - You attempted to use a declaration, such as a [#DIM ALL](#) metastatement after executable code. Move the declaration to a position before any statements that generate executable code.

Error 507 - OLE variable expected

Error 507 - OLE variable expected

OLE variable expected - The [OBJECT](#) statement requires that all parameters, return values, and assignment values be in the form of COM-compatible variables. [Literals](#) and expressions are not allowed. COM-compatible variables include [BYTE](#), [WORD](#), [DWORD](#), [INTEGER](#), [LONG](#), [QUAD](#), [SINGLE](#), [DOUBLE](#), [CURRENCY](#), [STRING](#), [WSTRING](#), and [VARIANT](#).

Error 508 - INSTANCE not allowed here

Error 508 - INSTANCE not allowed here

INSTANCE not allowed here - [INSTANCE](#) statements may only be placed at the beginning of a [CLASS/END CLASS](#) block, preceding all [INTERFACE](#) blocks and [METHODS](#).

Error 509 - Interface mismatches class

Error 509 - Interface mismatches class

Interface mismatches class - This form of the [LET](#) (assignment) statement is used to create an internal [object](#), but the associated [class](#) and [interface](#) are not defined in the program.

Error 510 - Interface name expected

Error 510 - Interface name expected

Interface name expected - The compiler encountered a statement or other text where an name was expected.

Error 511 - Numeric operand expected

Error 511 - Numeric operand expected

Numeric operand expected - The compiler encountered a statement or other text where a operand was expected.

Error 512 - Brackets not supported (use OPTIONAL)

Error 512 - Brackets not supported (use OPTIONAL)

Brackets not supported (use OPTIONAL) - Brackets are no longer supported for optional parameters.

Error 513 - "]" expected

Error 513 - "]" expected

"]" expected - The statement's syntax requires a closing bracket (]).

Error 514 - Enclosing <...> angle brackets expected

Error 514 - Enclosing <...> angle brackets expected

Enclosing <...> angle brackets expected - An definition block member item requires a parameter enclosed with angle brackets to identify the member ID.

Error 515 - Fixup overflow

Error 515 - Fixup overflow

Fixup overflow - You have a jump short instruction that exceeds its maximum length.

Error 516 - DEFtype, Type ID or type-specifier required

Error 516 - DEFtype, Type ID or type-specifier

required

DEFtype, Type ID or type-specifier (?%&!#\$), or AS ... required - A [variable](#) with no [type declaration](#) was found and no [DEFtype](#) statement (such as [DEFINT](#)) was found. The compiler was unable to identify the type of variable indicated. The misspelling of variable names commonly causes this error. The DEFtype statement may not be supported in future editions of PowerBASIC. Use explicit declarations wherever possible to maintain future compatibility.

Error 517 - OPTIONAL requires CDECL or SDECL

Error 517 - OPTIONAL requires CDECL or SDECL

OPTIONAL requires CDECL or SDECL - The

(or OPT) clause in a [DECLARE](#), [SUB](#), [FUNCTION](#), [METHOD](#), or [PROPERTY](#) statement requires the [CDECL](#) or [SDECL](#) calling convention. You may not use OPTIONAL or OPT parameters with [CDECL](#) or [SDECL](#) calling convention.

Error 519 - Missing declaration

Error 519 - Missing declaration

Missing declaration - You specified that all [variables](#) must be declared before use, but this one was not declared. Use [DIM](#), [GLOBAL](#), [INSTANCE](#), [LOCAL](#), [STATIC](#), or [THREADED](#) to declare the data type and dimensions, if an [array](#). To declare [Register](#) Variables use the [REGISTER](#) statement.

Error 520 - TYPE expected

Error 520 - TYPE expected

TYPE expected - An [END TYPE](#) was encountered here without the associated [TYPE](#) statement to initiate the data block.

Error 521 - UNION expected

Error 521 - UNION expected

UNION expected - An [END UNION](#) was encountered here without the associated [UNION](#) statement to initiate the data block.

Error 522 - END TYPE expected

Error 522 - END TYPE expected

END TYPE expected - The compiler found a [TYPE](#) statement without a terminating END TYPE statement.

Error 523 - END UNION expected

Error 523 - END UNION expected

END UNION expected - The compiler found a [UNION](#) statement without a terminating END UNION statement.

Error 524 - Undefined type

Error 524 - Undefined type

Undefined type - You referenced a [TYPE](#) or [UNION](#) which was not defined. Check for the possibility of spelling errors.

Error 525 - Type ID or specifier (?%&!#\$) not allowed

Error 525 - Type ID or specifier (?%&!#\$) not allowed

Type ID or specifier (?%&!#\$) not allowed - Members in a [User-Defined Type \(UDT\)](#) or [UNION](#) variable must not include type ID or [type-specifier](#) characters. Change the definition to use the AS type syntax instead.

Error 526 - Period not allowed

Error 526 - Period not allowed

Period not allowed - Periods are not allowed within any identifier names. They may only be used as a separator for member names. A good alternative is to use an underscore (_) character to decorate variable names.

Error 527 - End of statement expected

Error 527 - End of statement expected

End of statement expected - There were one or more extra characters at the end of this statement.

Error 528 - Type too large

Error 528 - Type too large

Type too large - This [TYPE](#) or [UNION](#) exceeded the 16 Megabyte structure size limit.

Error 529 - Pointer variable error

Error 529 - Pointer variable error

Pointer variable error - You used [pointer](#) variable syntax incorrectly, such as placing a leading "@" on a variable which is not declared as a pointer.

Error 530 - Invalid member name/definition

Error 530 - Invalid member name/definition

Invalid member name/definition - This usage of a member name or definition is not allowed in a [TYPE](#), [UNION](#), or

. The name could be invalid, or the data type could be disallowed. See the specific statement definition for more information.

Error 531 - Object variable expected

Error 531 - Object variable expected

Object variable expected - The syntax of this statement or function requires an [object variable](#) here. Substitution with another data type is not possible. See the specific statement definition for more information.

Error 532 - Variant variable expected

Error 532 - Variant variable expected

Variant variable expected - The syntax of this statement or function requires a [VARIANT](#) variable here. Substitution with another data type is not possible. See the specific statement definition for more information.

Error 533 - Dispatch object variable expected

Error 533 - IDispatch object variable expected

IDispatch object variable expected - The [OBJECT](#) statement requires an [object variable](#) which has either been declared as [IDISPATCH](#) (for [late binding](#)), or by a specific dispatch interface (for [ID binding](#)).

Error 534 - Bit field error

Error 534 - Bit field error

Bit field error - An error was made in defining a bit field of [BIT/SBIT](#) variables. For example, it could be that the first variable in the bit field did not define the total size (using [IN BYTE|WORD|DWORD](#)), or the total number of bits may have exceeded the maximum of 32.

Error 535 - Dynamic string variable expected

Error 535 - Dynamic string variable expected

Dynamic string variable expected - The syntax of this statement or function requires a [dynamic string](#) variable here. Substitution with another data type is not possible. See the specific statement definition for more information.

Error 536 - Too many imports

Error 536 - Too many imports

Too many imports - The program has exceeded the maximum number of allowed imports.

Error 537 - Pointer expected

Error 537 - Pointer expected

Pointer expected - This operation expects a [pointer](#). For example:

```
... @PtrName[n]
```

Error 538 - Invalid FOR/NEXT limits

Error 538 - Invalid FOR/NEXT limits

Invalid FOR/NEXT limits - The specified start, stop and/or increment value(s) for a [FOR/NEXT](#) loop are not within the allowable range for the class of counter [variable](#) used. For example, you attempted to specify an increment value of -1 (a signed value) when the loop counter uses an unsigned variable. This error is also generated if the compiler is able to determine, at compile time, that the start and stop values chosen will prevent the FOR/NEXT from ever executing, e.g., FOR x = 10 TO 1.

Error 539 - Invalid thread function

Error 539 - Invalid thread function

Invalid thread function - A valid thread [Function](#) may only take one 32-bit [LONG](#) or [DWORD](#) parameter, which must be received by value (

).

This error can occur if the thread Function does not match the following syntax:

```
FUNCTION ThreadFuncName (BYVAL param AS {LONG | DWORD}) AS {LONG | DWORD}
```

An error 539 can also occur if the target thread Function is declared to use a DWORD parameter but is passed a Long-integer, or vice-versa. You must pass the correct (matching)

for the thread Function parameter. For example:

```
THREAD CREATE MyThread(y&) TO hThread???  
[statements]  
FUNCTION MyThread(BYVAL x AS LONG) AS LONG
```

Or

```
THREAD CREATE MyThread(y???) TO hThread???  
[statements]  
FUNCTION MyThread(BYVAL x AS DWORD) AS LONG
```

See Also

[THREAD CREATE statement](#)

Error 540 - Invalid operation with a register variable

Error 540 - Invalid operation with a register

variable

Invalid operation with a register variable - This assembler opcode or operands are invalid using a register variable.

Error 541 - Register size conflict

Error 541 - Register size conflict

Register size conflict - An inline assembler statement ([ASM](#)) used [registers](#) or a memory [operand](#) which conflicted in size. For example, an attempt might have been made to move a value such as:

```
ASM MOV  AX, EBX
ASM SUB  EBX, DL
```

Error 542 - May not be altered

Error 542 - May not be altered

May not be altered - An attempt was made to change the value of a read-only parameter. For example, [COMM SET](#) cannot be used with RING, RLSD, RXQUE or TXQUE.

Error 543 - Must be outside Sub/Function/Class...

Error 543 - Must be outside Sub/Function/Class...

Must be outside Sub/Function/Class... - This statement/function is only allowed outside of any [Sub](#), [Function](#), [Method](#), or [Property](#) block. It should be moved to the correct location.

Error 544 - Field variable expected

Error 544 - Field variable expected

Field variable expected - The syntax of this statement or function requires a [field](#) variable here. Substitution with another data type is not possible. See the specific statement definition for more information.

Error 545 - AT expected

Error 545 - AT expected

AT expected - The syntax of this statement or function requires the word AT here. See the specific statement definition for more information.

Error 546 - Use only as a Callback

Error 546 - Use only as a Callback

Use only as a Callback - You tried to explicitly call a DDT [Callback](#) function. Callback functions may only be invoked by the [DDT](#) engine or Windows. To reference it indirectly, send an appropriate window message using [CONTROL SEND](#) or [DIALOG SEND](#). To send custom messages, be sure to use message values

higher than %WM_USER+500 to avoid conflicts with other notification messages.

Error 547 - Callback function required

Error 547 - Callback function required

Callback function required - A [Callback](#) Function was named but the target function was not defined as a CALLBACK, or the nominated function was not a Callback Function. (PB/Win only)

Error 548 - No parameters with Callback

Error 548 - No parameters with Callback

No parameters with Callback - A [Callback](#) Function definition cannot specify parameters. (PB/Win only)

Omit the parameters from the function definition. For example:

```
CALLBACK FUNCTIONDlg1Callback()  
[statements]  
END FUNCTION
```

Error 549 - BYVAL required with pointers

Error 549 - BYVAL required with pointers

BYVAL required with pointers - [Pointers](#) may only be passed

. Add an explicit BYVAL to the [Sub/Function/Method/Property](#) declaration and prototype. Previous versions of PowerBASIC used an implied BYVAL.

Error 550 - Too many data statements

Error 550 - Too many data statements

Too many data statements - Data is limited to 64 Kb per [Sub](#), [Function](#), [Method](#), or [Property](#), and 16384 individual data items. Either reduce the number of [DATA](#) statements, or split the data into separate procedures.

Error 551 - Not supported in this version

Error 551 - Not supported in this version

Not supported in this version - An attempt was made to use a feature that is not supported by this version of the compiler. This error may also occur if a reserved word is used as a [variable](#), [label](#), [Sub](#), [Function](#), [Method](#), or [Property](#) name. For example, using INP or OUT.

Error 552 - TRY statement expected

Error 552 - TRY statement expected

TRY statement expected - PowerBASIC expected to find a [TRY](#) statement at or before the indicated position in the code. Check the syntax of the surrounding code for other syntax errors, such as the

misplacement of a CATCH or END TRY statement, conditional compilation excluding required portions of the code, etc.

Error 553 - CATCH statement expected

Error 553 - CATCH statement expected

CATCH statement expected - A [TRY/END TRY](#) block did not include a CATCH statement. Recheck the syntax of the block.

Error 554 - END TRY statement expected

Error 554 - END TRY statement expected

END TRY statement expected - A [TRY/END TRY](#) block appears to be missing its END TRY clause. This can typically occur if an [END SUB](#), [END FUNCTION](#), [END METHOD](#), [END PROPERTY](#) statement was encountered within the TRY/END TRY block.

Error 555 - ON ERROR/RESUME not allowed here

Error 555 - ON ERROR/RESUME not allowed here

ON ERROR/RESUME not allowed here - An attempt was made to include an [ON ERROR](#) or a [RESUME](#) statement inside a [TRY/END TRY](#) block. Remove the ON ERROR or RESUME statement or move it out of the TRY/END TRY block. [Error handling](#) is automatic within a TRY/END TRY block.

Error 556 - Function restricted to threads

Error 556 - Function restricted to threads

Function restricted to threads - [Functions](#) that are called with [THREAD CREATE](#) may not be called in the conventional manner. This restriction is necessary because thread Functions require additional initialization steps that are not included in standard function code.

One situation that can arise is where a Function may need to be invoked both directly and used as a thread Function. The easiest solution is to create a small wrapper function for the function, then use THREAD CREATE with the wrapper function, or call the original function directly. For example:

```
FUNCTION WorkerFunc(BYVAL x AS LONG) AS LONG
    ' code here
END FUNCTION

FUNCTION WorkerThread(BYVAL x AS LONG) AS LONG
    FUNCTION = WorkerFunc(x)
END FUNCTION

' more code here

' Execute the worker function directly, thus:
lResult& = WorkerFunc(var&)

' Execute the worker thread as a thread, using
```

```
' the wrapper function:  
THREAD CREATE WorkerThread(var&) TO hThread???
```

Error 557 - Macro too long/complex

Error 557 - Macro too long/complex

Macro too long/complex - An attempt was made to create a [MACRO](#) that is too long or complex. An individual macro can contain replacement text of up to approximately 4000 characters, and can specify up to 240 parameters occupy up to approximately 2000 bytes expanded space per macro. Macro substitutions are limited to an expanded total of approximately 16000 characters per line of original source code.

Error 558 - MACRO expected

Error 558 - MACRO expected

MACRO expected - An END MACRO statement was found without a matching [MACRO](#) statement. Please recheck the syntax of the macro block.

Error 559 - END MACRO expected

Error 559 - END MACRO expected

END MACRO expected - A [MACRO](#) block appears to be missing a terminating END MACRO statement. Please recheck the syntax of the macro block.

Error 560 - FASTPROC expected

Error 560 - FASTPROC expected

FASTPROC expected - A [FASTPROC](#) statement must precede other related statements like [EXIT FASTPROC](#) and END FASTPROC.

Error 561 - END FASTPROC expected

Error 561 - END FASTPROC expected

END FASTPROC expected - A [FASTPROC](#) statement must be matched with an associated END FASTPROC.

Error 562 - INTERFACE expected

Error 562 - INTERFACE expected

INTERFACE expected - An END INTERFACE statement was found to be without a matching statement. Please recheck the syntax of the interface definition block.

Error 563 - END INTERFACE expected

Error 563 - END INTERFACE expected

END INTERFACE expected - An

statement was found without a matching END INTERFACE statement. Please recheck the syntax of the interface definition block.

Error 564 - MACROTEMP not allowed here

Error 564 - MACROTEMP not allowed here

MACROTEMP not allowed here - PowerBASIC encountered a [MACROTEMP](#) statement outside the scope of a [MACRO](#) block.

Error 565 - Macro mismatch with code position

Error 565 - Macro mismatch with code position

Macro mismatch with code position - The compiler encountered a multi-line [MACRO](#) statement in a non-statement position.

Error 566 - CLASS expected

Error 566 - CLASS expected

CLASS expected - An [END CLASS](#) statement was encountered here without the associated [CLASS](#) statement to initiate the block.

Error 567 - END CLASS expected

Error 567 - END CLASS expected

END CLASS expected - A [CLASS](#) block was not terminated with an associated [END CLASS](#) statement.

Error 568 - METHOD expected

Error 568 - METHOD expected

METHOD expected - An [END METHOD](#) statement was encountered here without the associated [METHOD](#) statement to initiate the block.

Error 569 - END METHOD expected

Error 569 - END METHOD expected

END METHOD expected - A [METHOD](#) block was not terminated with an associated [END METHOD](#) statement. It's likely you tried to start a new procedure block, without first terminating the current METHOD.

Error 570 - PROPERTY expected

Error 570 - PROPERTY expected

Property expected - An [END PROPERTY](#) statement was encountered here without the associated [PROPERTY](#) statement to initiate the block.

Error 571 - END PROPERTY expected

Error 571 - END PROPERTY expected

END METHOD expected - A [PROPERTY](#) block was not terminated with an associated [END PROPERTY](#) statement. It's likely you tried to start a new procedure block, without first terminating the current [PROPERTY](#).

Error 572 - PROPERTY GET expected

Error 572 - PROPERTY GET expected

PROPERTY GET expected - A [PROPERTY = nnn](#) statement (for assigning the return value) was found, but it was not located within a [PROPERTY GET](#) block. It is not allowed at any other location in your program.

Error 573 - Valid only in a CALLBACK FUNCTION

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Error 573 - Valid only in a CALLBACK FUNCTION

Error 573 - Valid only in a CALLBACK FUNCTION - [FUNCTION = x,y](#) with two parameters is only valid in a [CALLBACK FUNCTION](#).

Error 574 - Not allowed in an Event Class

Error 574 - Not allowed in an Event Class

Not allowed in an Event Class - The statement or function found here is not allowed within an [EVENT CLASS](#). It has no valid meaning and must be removed. See the specific statement definition for more information.

Error 575 - EVENT SOURCE is not declared

Error 575 - EVENT SOURCE is not declared

EVENT SOURCE is not declared - You included code which generates events with the [RAISEEVENT](#) statement, but did not declare an event source with the [EVENT SOURCE](#) statement.

Error 576 - Too many Interfaces

Error 576 - Too many Interfaces

Too many Interfaces - PowerBASIC allows up to 32 [interfaces](#) per [CLASS](#), but you have exceeded that limit. You should try to combine two or more of those interfaces.

Error 577 - EVENT INTERFACE expected

Error 577 - EVENT INTERFACE expected

EVENT INTERFACE expected - The [EVENT INTERFACE](#) you specified could not be found.

Error 578 - INHERIT of Base Class expected

Error 578 - INHERIT of Base Class expected

INHERIT of Base Class expected - Every [INTERFACE](#) must INHERIT from a [base class](#), which may be nested any level. Ultimately, every interface inherits from [IUnknown](#). The INHERIT statement must be the first statement in every INTERFACE block.

Error 579 - BYREF variable or BYVAL/BYREF variant expected

Error 579 - BYREF variable or BYVAL/BYREF variant expected

BYREF variable or BYVAL/BYREF variant expected - The [ISMISSING\(\)](#) function can only detect a missing parameter for a BYREF variable, or a BYVAL/BYREF [variant](#).

Error 580 - Duplicate GUID usage

Error 580 - Duplicate GUID usage

Duplicate GUID usage - You have used a single [GUID](#) to identify two or more elements of your program. Change at least one of the GUIDs to a new value.

Error 581 - Type Library creation error

Error 581 - Type Library creation error

Type Library creation error - A system error occurred while creating the COM [Type Library](#). The common cause of this error is using a data type not supported by Type Libraries. Type Libraries only support the following data types: [BYTE](#), [WORD](#), [DWORD](#), [INTEGER](#), [LONG](#), [QUAD](#), [SINGLE](#), [DOUBLE](#), [CURRENCY](#),

[OBJECT](#), [STRING](#), and [VARIANT](#). Either suppress the creation of a Type Library by using the [#COM_TLIB OFF](#) metastatement or by changing the [Methods](#) and [Properties](#) to only use supported data types.

Error 582 - Duplicate Dispatch interface

Error 582 - Duplicate Dispatch interface

Too many DISPATCH interfaces - Only one [Dispatch](#) (DUAL) interface is allowed per [CLASS](#).

Error 583 - Unpaired PROPERTY definition

Error 583 - Unpaired PROPERTY definition

Unpaired PROPERTY definition - If you create both a [PROPERTY GET](#) and a [PROPERTY SET](#), they must be paired. The parameters and the property value must be identical in both forms, and the PROPERTY SET must immediately follow the PROPERTY GET.

Error 584 - Mismatched PROPERTY pair

Error 584 - Mismatched PROPERTY pair

Mismatched PROPERTY pair - If you create both a [PROPERTY GET](#) and a [PROPERTY SET](#), they must be paired. The parameters and the property value must be identical in both forms, and the PROPERTY SET must immediately follow the PROPERTY GET.

Error 585 - PROPERTY requires BYVAL parameters

Error 585 - PROPERTY requires BYVAL parameters

PROPERTY requires BYVAL parameters - [PROPERTY](#) methods created in PowerBASIC must have BYVAL parameters.

Error 586 - User Defined Type or AS expected

Error 586 - User Defined Type or AS expected

User Defined Type or AS expected - The name of a [User-Defined TYPE](#), or an "AS <type>" clause is required here.

Error 587 - Invalid Constructor/Destructor

Error 587 - Invalid Constructor/Destructor

Invalid Constructor/Destructor - [Constructor](#) and [Destructor](#) Methods must be [CLASS METHODS](#). They must take no parameters and return no result.

Error 588 - Indirect operand must be bracketed: [12]

Error 588 - Indirect operand must be bracketed: [12]

Indirect operand must be bracketed: [12] - An inline assembler ([ASM](#)) opcode which includes indirect addressing must enclose that operand in square brackets.

Error 589 - Dual/IDispatch interface is required

Error 589 - Dual/IDispatch interface is required

Dual/IDispatch interface is required - This statement or construct may only be used in a [DUAL interface](#).

Error 590 - PROPERTY SET requires at least one parameter

Error 590 - PROPERTY SET requires at least one parameter

PROPERTY SET requires at least one parameter - [PROPERTY SET](#) is used to assign a value to an [INSTANCE](#) variable. At least one parameter is mandatory to hold that value.

Error 591 - BYVAL with OUT is not allowed

Error 591 - BYVAL with OUT is not allowed

BYVAL with OUT is not allowed - OUT parameter may not be BYVAL, because those are destroyed before the OUT value could be retrieved.

Error 592 - Return value required

Error 592 - Return value required

Return value required - [GETPROPERTY](#) requires a return value to hold the retrieved value.

Error 593 - Dual or Automation interface is required

Error 593 - Dual or Automation interface is required

Dual or Automation interface is required - [OBJRESULT](#) is only valid in a [DUAL](#) or [IAUTOMATION](#) interface.

Error 594 - Macro ends with continuation ' _ '

Error 594 - Macro ends with continuation '_'

Macro ends with continuation '_' - [MACRO](#) body text may not end with an underscore continuation character.

Error 595 - Object return type required

Error 595 - Object return type required

Object return type required - [Component methods](#) in a [Compound Object Reference](#) must each return an [object variable](#) to be used by the next method.

Error 596 - Inherited interface expected

Error 596 - Inherited interface expected

Inherited interface expected - [MYBASE](#) may only be used on an [interface](#) which is derived from an [inherited](#) user-created interface.

Error 597 - Invalid name or sequence in the interface

Error 597 - Invalid name or sequence in the interface

Invalid name or sequence in the interface - To [OVERRIDE](#) an [inherited METHOD](#), the replacement must have the same name and signature, and appear in the same sequence.

Error 598 - CLASS METHOD name expected

Error 598 - CLASS METHOD name expected

METHOD or PROPERTY name expected - A valid [METHOD](#) or [PROPERTY](#) name must appear in this context.

Error 599 - Requires CLASS but outside of Interfaces

Error 599 - Requires CLASS but outside of Interfaces

Requires CLASS but outside of Interfaces - This item must be enclosed within a [CLASS](#), but outside of Interfaces.

Error 600 - Macro phase error, referenced before define

Error 600 - Macro phase error, referenced before define

Macro phase error, referenced before define - A macro was referenced before it was defined.

Error 601 - One INHERIT per interface

Error 601 - One INHERIT per interface

One INHERIT per interface - PowerBASIC offers single [inheritance](#), so just one [INHERIT](#) is allowed per [interface](#). However, the inherited interface may itself inherit from another interface, to virtually any level of nesting.

Error 602 - Hidden interface referenced by COM

Error 602 - Hidden interface referenced by COM

Hidden interface referenced by COM - The compiler was not able to create a [Type Library](#). The most likely cause is the use of a Hidden [interface](#) as a parameter or return value in a [METHOD](#) or [PROPERTY](#) published [AS.COM](#).

Error 603 - Incompatible with a Dual/IDispatch interface

Error 603 - Incompatible with a Dual/IDispatch interface

Incompatible with a Dual/IDispatch interface - This data type cannot be passed as a [variant](#).

Error 604 - Incompatible with #COM TLIB generation

Error 604 - Incompatible with #COM TLIB generation

Incompatible with #COM TLIB generation - This data type cannot be described in a [Type Library](#).

Error 605 - Macro parameter mismatch

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Error 605 - Macro parameter mismatch

Macro parameter mismatch - A Macro parameter does not match the original definition.

Error 606 - PowerCollection / LinkListCollection required

Keyword Template

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Example

Error 606 - PowerCollection / LinkListCollection requiredrequired

PowerCollection / LinkListCollection required - [FOR EACH](#) loops require an object of a specific class.

Error 607 - New syntax requires GETCOM/NEWCOM/ANYCOM

Error 607 - New syntax requires GETCOM/NEWCOM/ANYCOM

New syntax requires GETCOM/NEWCOM/ANYCOM - The LET statement syntax for COM OBJECT creation has been changed. Previous syntax is no longer recognized. Refer to [LET](#).

Error 609 - Too many macro expansions

Error 609 - Too many macro expansions

Too many macro expansions - You have used more than 65,535 macros in this program.

Error 610 - Invalid within a FastProc

Error 610 - Invalid within a FastProc

Invalid within a FastProc - You have used a feature which is not supported within a [FastProc](#).

Error 611 - FASTPROC params must be ByVal Long Integer

Error 611 - FASTPROC params must be ByVal Long Integer

FASTPROC params must be ByVal Long Integer - [FASTPROC](#) parameters must be ByVal Long Integer.

Error 612 - FASTPROC return may only be Long Integer

Error 612 - FASTPROC return may only be Long Integer

FASTPROC return may only be Long Integer - [FASTPROC](#) return value must be Long Integer or nothing.

Error 613 - Cannot compile - the program is now running

Error 613 - Cannot compile - the program is now running

Cannot compile - the program is now running - The program you are trying to compile is currently executing. You may have to use Task Manager to force the program to end.

Error 614 - Mismatched CHR Mode (Ansi/Wide)

Error 614 - Mismatched CHR Mode (Ansi/Wide)

Mismatched CHR Mode (Ansi/Wide) - The operand does not match the required [Ansi](#) or [Wide](#) mode.

Error 615 - PREFIX expected

Error 615 - PREFIX expected

WITH expected - A [PREFIX](#) statement must precede each END WITH statement.

Error 616 - END PREFIX expected

Error 616 - END PREFIX expected

END WITH expected - A [PREFIX](#) statement must be matched with an associated END WITH.

Error 617 - ASMDATA expected

Error 617 - ASMDATA expected

ASMDATA expected - An [ASMDATA](#) statement must precede each END ASMDATA statement.

Error 618 - END ASMDATA expected

Error 618 - END ASMDATA expected

END ASMDATA expected - An [ASMDATA](#) statement must be matched with an associated END ASMDATA.

Error 619 - ENUM expected

Error 619 - ENUM expected

ENUM expected - An [ENUM](#) statement must precede each END ENUM statement.

Error 620 - END ENUM expected

Error 620 - END ENUM expected

END ENUM expected - An [ENUM](#) statement must be matched with an associated END ENUM.

Error 621 - Interface cannot inherit from itself

Error 621 - Interface cannot inherit from itself

Interface cannot inherit from itself - An interface cannot inherit from itself.

Error 622 - AS STRING required for variant conversion

Error 622 - AS STRING required for variant conversion

AS STRING required for variant conversion - If you assign a user defined [TYPE](#) to a [variant](#) variable, it is now necessary to add the words [AS STRING](#) to confirm the type conversion.

Error 623 - THREADPARAM Instance variable required

Error 623 - THREADPARAM Instance variable required

THREADPARAM Instance variable required - [THREAD Class](#) must declare a THREADPARAM Instance variable.

Error 624 - Invalid THREADPARAM variable type

Error 624 - Invalid THREADPARAM variable type

Invalid THREADPARAM variable type - [THREADPARAM](#) must be a [LONG](#), [DWORD](#), or [UDT PTR INSTANCE](#) variable.

Error 625 - THREAD Method required

Error 625 - THREAD Method required

THREAD Method required - [THREAD Class](#) must include a THREAD Method.

Error 626 - Duplicate THREAD Method

Error 626 - Duplicate THREAD Method

Duplicate THREAD Method - [THREAD Class](#) must have exactly one THREAD Method.

Error 627 - INHERIT IPowerThread expected

Error 627 - INHERIT IPowerThread expected

INHERIT IPowerThread expected - [THREAD METHOD](#) is only allowed with a threaded interface.

Error 628 - Not valid in a Static-Lin-Lib (SLL)

Error 628 - Not valid in a Static-Link-Lib (SLL)

Not valid in a Static-Link-Lib (SLL) - This language element is invalid in a [Static-Link-Library](#).

Error 629 - ALIAS disallows Private/Thread/Callback

Error 629 - ALIAS disallows Private/Thread/Callback

ALIAS disallows Private/Thread/Callback - ALIAS clause is not valid with Private, Thread, or Callback.

Error 630 - Link File Error

Error 630 - Link File Error

Link File Error - The [SLL](#) Link File is not valid for this compiler.

Error 631 - Nested Link Files

Error 631 - Nested Link Files

Nested Link Files - You cannot link an [SLL](#) file into an SLL file.

Error 632 - COMMON name is a duplicate

Error 632 - COMMON name is a duplicate

COMMON name is a duplicate - COMMON procedure name was previously defined.

Error 633 - COMMON signature is mismatched

Error 633 - COMMON signature is mismatched

COMMON signature is mismatched - COMMON procedure signature (params, return type...) is mismatched.

Error 634 - Undefined COMMON reference

Error 634 - Undefined COMMON reference

Undefined COMMON reference - COMMON item was referenced but not defined.

Error 635 - USING clause is required

Error 635 - USING clause is required

USING clause is required - USING <ProcName> is required to describe the function signature.

Error 636 - Invalid VersionInfo Resource

Error 636 - Invalid VersionInfo Resource

Invalid VersionInfo Resource - Invalid [VersionInfo](#), may be out of sequence.

Error 637 - SLL mismatch with this compiler

Error 637 - SLL mismatch with this compiler

SLL mismatch with this compiler - This [SLL](#) requires [CONSOLE \(PB/CC only\)](#) or [DDT](#) support which is not available.

Error 638 - Please change AS STRING to AS WSTRING

Error 638 - Please change AS STRING to AS WSTRING

Please change AS STRING to AS WSTRING - Strings stored in a variant must be in wide Unicode format.

Error 639 - TYPE variable expected

Error 639 - TYPE variable expected

TYPE variable expected - A user-defined type variable is expected here.

Error 801 to 815 - Internal error

Error 801 to 815 - Internal error

Internal error - If one of these errors occurs, please report it to the PowerBASIC [Technical Support](#) group.

Error 640 - Invalid use of BYCOPY

Error 640 - Invalid use of BYCOPY

Invalid use of BYCOPY - The BYCOPY override may not be used with certain parameters (for example, entire arrays).

Run Time Errors

Error 0 - No error

Error 0 - No error

No error (%ERR_NOERROR)

Error 5 - Illegal function call

Error 5 - Illegal function call

Illegal function call - (%ERR_ILLEGALFUNCTIONCALL) - This is a catch-all error related to passing an inappropriate argument to some statement or [function](#).

There are many things that can cause an Error 5, for example:

- A record number is too large (or negative) in a [GET](#) or [PUT](#).
- Attempting to use the WIDTH# statement on a
.
- The run-time execution of a [LET](#), [LET \(with Objects\)](#), [LET \(with Types\)](#), [LET \(with Variants\)](#), or [OBJECT](#) statement failed (see [OBJRESULT](#) and [OBJRESULTS\\$](#) to obtain an extended error code).

Error 6 - Overflow

Error 6 - Overflow

Overflow (%ERR_OVERFLOW) - This error is not currently supported.

Error 7 - Out of memory

Error 7 - Out of memory

Out of memory - (%ERR_OUTOFMEMORY) - Many different situations can cause this message, including [dimensioning](#) too large an [array](#), or running out of virtual memory due to insufficient free disk space for the Windows swap file.

Error 9 - Subscript / Pointer out of range

Error 9 - Subscript / Pointer out of range

Subscript / Pointer out of range - (%ERR_SUBSCRIPTPOINTEROUTOFRANGE) - You attempted to use a [subscript](#) smaller than the minimum or larger than the maximum value established when the [array](#) was [dimensioned](#). Attempting to use a null or invalid [pointer](#) may also cause this error. Error 9 will only be

generated if you have specified [#DEBUG ERROR ON](#).

Error 11 - Division by zero

Error 11 - Division by zero

Division by zero (%ERR_DIVISIONBYZERO) - This error is not currently supported.

Error 24 - Device time-out

Error 24 - Device time-out

Device time-out - (%ERR_DEVICETIMEOUT) - The specified time-out value for a [UDP](#) or [TCP](#) communications operation has expired.

Error 51 - Internal error

Error 51 - Internal error

Internal error - (%ERR_INTERNALERROR) - A malfunction occurred within the PowerBASIC run-time system, or the operating system reported an error that PowerBASIC was not expecting (or was unable to decipher). For example, attempting to [KILL](#) (delete) an open file can cause this kind of problem.

If you are unable to identify the cause of the problem, contact the PowerBASIC [Technical Support](#) group with information about your program.

Error 52 - Bad file name or number

Error 52 - Bad file name or number

Bad file name or number - (%ERR_BADFILENAMEORNUMBER) - The file number you gave in a file statement does not match the file number given in an [OPEN](#) statement, or the file number may be out of the range of valid file numbers.

Error 53 - File not found

Error 53 - File not found

File not found - (%ERR_FILENOTFOUND) - The file name specified could not be found on the indicated drive.

Error 54 - Bad file mode

Error 54 - Bad file mode

Bad file mode - (%ERR_BADFILEMODE) - You attempted a [PUT](#) or a [GET](#) (or [PUT\\$](#) or [GET\\$](#)) on a file opened in [sequential](#) mode.

Error 55 - File is already open

Error 55 - File is already open

File is already open - (%ERR_FILEISOPEN) - You attempted to [OPEN](#) a [file](#) that was already open, or you attempted to [delete](#) an open file.

Error 57 - Device I/O error

Error 57 - Device I/O error

Device I/O error - (%ERR_DEVICEIOERROR) - A hardware problem occurred when trying to carry out some device-orientated command.

For example, a [COMM](#) connection was lost during a session, or a [TCP/UDP](#) statement failed to be connected, etc. Alternatively, a TCP/UDP port may have been closed unexpectedly or the network refused the connection requested.

If an ERROR 57 occurs with a [TCP OPEN](#) statement under Windows 98 when using a dotted [IP](#) address string (i.e., "202.123.456.1"), then check to ensure that "Client for Microsoft Networks" is installed in the Network applet in Control Panel. Alternatively, manually add a DNS entry in the HOSTS file in the \WINDOWS folder.

For example, add the following line into the HOSTS file, and change the TCP OPEN statement to use the (dummy) domain name instead of the dotted IP address:

```
202.123.456.1 dummyname.com
```

Error 58 - File already exists

Error 58 - File already exists

File already exists - (%ERR_FILEALREADYEXISTS) - The new name argument specified in your [NAME](#) statement already exists.

Error 61 - Disk full

Error 61 - Disk full

Disk full - (%ERR_DISKFULL) - There is not enough free space on the indicated or default disk to carry out a file operation. Create more free disk space and retry your program.

Error 62 - Input past end

Error 62 - Input past end

Input past end - (%ERR_INPUTPASTEND) - You tried to read more data from a file than it had to read. Use the [EOF](#) (end of file) function to avoid this problem. Trying to read from a [sequential file](#) opened for output or append can also cause this kind of error.

Error 63 - Bad record number

Error 63 - Bad record number

Bad record number - (%ERR_BADRECORDNUMBER) - A number less than the BASE option specified in

the [OPEN](#) statement or a number larger than 2⁶³-1 was specified as the record argument to a random file [PUT](#) or a [GET](#) statement.

Error 64 - Bad file name

Error 64 - Bad file name

Bad file name - (%ERR_BADFILENAME) - The file name specified in a [KILL](#) or [NAME](#) statement contains invalid characters.

Error 67 - Too many files

Error 67 - Too many files

Too many files - (%ERR_TOOMANYFILES) - This error can be caused either by trying to create too many files in a drive's root directory, or by an invalid file name that affects the performance of the Create File system call.

Error 68 - Device unavailable

Error 68 - Device unavailable

Device unavailable - (%ERR_DEVICEUNAVAILABLE) - You tried to
a device or to a device or graphic without that device present or installed.
For example, opening COM1 on a system without a serial adapter or modem, or attempting to use [TCP/IP](#) or [UDP/IP](#) on a machine without [Winsock](#) 2.0 (or better) installed. Also, trying to attach to a [graphic](#) or [printer](#) that is not available will cause this error.

Error 69 - COMM error

Error 69 - COMM error

COMM error - (%ERR_COMMERROR) - A [communications](#) error occurred. For example, a framing error may have occurred.

Error 70 - Permission denied

Error 70 - Permission denied

Permission denied - (%ERR_PERMISSIONDENIED) - You tried to write to a write-protected disk. This error can also be generated as a result of network permission errors, such as accessing a locked file, or a locked record. It can also occur when attempting to open a subdirectory as a file.

Error 71 - Disk not ready

Error 71 - Disk not ready

Disk not ready - (%ERR_DISKNOTREADY) - The door of a floppy disk drive is open, or there is no disk in the indicated drive.

Error 72 - Disk media error

Error 72 - Disk media error

Disk media error - (%ERR_DISKMEDIAERROR) - The controller board of a floppy or hard disk indicates a hard media error in one or more sectors.

Error 74 - Rename across disks

Error 74 - Rename across disks

Rename across disks - (%ERR_RENAMEACROSSDISKS) - You cannot [rename](#) a directory across disk drives or partitions.

Error 75 - Path/file access error

Error 75 - Path/file access error

Path/file access error - (%ERR_PATHFILEACCESSERROR) - During a command capable of specifying a path name ([OPEN](#), [NAME](#), or [MKDIR](#), for example), a path was used inappropriately. For example, attempting to [delete a directory](#) that is in-use.

Error 76 - Path not found

Error 76 - Path not found

Path not found - (%ERR_PATHNOTFOUND) - The path you specified during a [CHDIR](#), [MKDIR](#), [OPEN](#), etc, cannot be found.

Error 98 - XPrint Preview error

Error 98 - XPrint Preview error

XPrint Preview error - [XPrint Preview](#) failed because it was not executed immediately after the [XPrint Attach](#) statement.

Error 99 - Object error

Error 99 - Object error

Object error - (%ERR_OBJECTERROR) - A run-time error occurred involving an [object](#).

Error 241 - Global memory corrupt

Error 241 - Global memory corrupt

Global memory corrupt - (%ERR_GLOBALEMORYCORRUPT) - PowerBASIC detected a global

memory corruption.

Typical causes include misuse of

, accessing an [array](#) beyond its boundary, or bad [Inline Assembly](#) code. The cause of the problem may actually be in a seemingly unrelated portion of the program, and/or in a DLL or module used by the program.

Error 241 was formerly deemed "Far heap corrupt" (%ERR_FARHEAPCORRUPT). While this [equate](#) remains supported for a short period, source code should be updated to maintain compatibility with future versions of PowerBASIC.

Error 242 - String space corrupt

Error 242 - String space corrupt

String space corrupt - (%ERR_STRINGSPACECORRUPT) - PowerBASIC detected a memory or space corruption. Typical causes include misuse of , accessing an [array](#) beyond its boundary, or bad [Inline Assembly](#) code. The cause of the problem may actually be located in a seemingly unrelated portion of the program, and/or in a DLL or module used by the program.

Dynamic Dialog Tools (DDT)

Dynamic Dialog Tools (DDT)

Dynamic Dialog Tools (DDT)

Welcome to PowerBASIC's powerful and improved Dynamic Dialog Tools™. DDT allows a BASIC programmer to easily create a Graphical User Interface (GUI) for an application using simple BASIC statements. With DDT, there's no need to stress over learning how to effectively use GUI design software that contains icons you don't understand and also hundreds of cryptic "property" settings. With DDT, your PowerBASIC application or [DLL](#) can create user interface dialogs "on the fly".

For programmers who are familiar with DDT, you will find that PowerBASIC has expanded the DDT implementation even further in this version of PowerBASIC, with advanced features such as User Data storage and accelerator tables.

This chapter describes PowerBASIC's Dynamic Dialog Tools and how to easily create full-featured Graphical User Interfaces in your code.

See Also

[Creating a Dialog](#)

[Adding Controls to the Dialog](#)

[Modal vs. Modeless](#)

[Controls](#)

[Control Styles](#)

[Callbacks](#)

[Dialog Styles](#)

[Menus](#)

[Menu Walkthrough](#)

[More on the Menu](#)[Menu State](#)[Menu Example](#)

Creating a Dialog

Creating a Dialog

In this example, we will create a simple [dialog](#) that asks the user to enter his/her name, providing a [text box](#) for input, plus both "OK" and "Cancel" buttons. To create the dialog, first we use the [DIALOG NEW](#) statement:

```
LOCAL hParent AS DWORD
LOCAL hDlg AS DWORD
[statements]
DIALOG NEW hParent, Caption$,,, 160, 50, Style&, exStyle& TO hDlg
```

hParent refers to the parent window [handle](#). If this value is 0 (or %HWND_DESKTOP), the dialog has no [parent](#) window, and may be referred to as a "top-level" window. However, if the dialog has a parent window and the dialog is a [MODAL](#) dialog, Windows will automatically disable the parent window while the DDT dialog is displayed.

Caption\$ is the text displayed in the [caption](#) of the dialog. This may be the name of your program, or it can be used to convey other information to the user.

The next two parameters for the location on the screen are omitted (this causes the dialog to be centered on the screen), and the size is set to 160 [dialog units](#) wide by 50 dialog units tall. *Style&* specifies how the dialog is drawn on the screen (with a caption, without a caption, etc). *exStyle&* specifies an extended style attributes for drawing the dialog. For information on the range of possible dialog styles, please see the [DIALOG NEW](#) statement.

Once the dialog has been created, the handle for it is placed in the hDlg variable. hDlg may be a Long-integer or Double-word variable (i.e., *hDlg&* or *hDlg???*), but a **Double-word variable is recommended**. This handle is used by Windows (and your program) code to identify the dialog. Windows gives each dialog a unique handle value at run-time; no two windows, dialogs, or controls can have the same handle value. This means that the actual handle value will be different every time the dialog is created.

Note that the height and width values determine the client size of the dialog, if the dialog style explicitly includes the %WS_CAPTION style. Otherwise, they are interpreted as the outer dimensions of the complete dialog.

Note: The location and size of a dialog are specified in Dialog Units or, optionally, Pixels.

See Also

[Dynamic Dialog Tools \(DDT\)](#)[Adding Controls to the Dialog](#)[Modal vs. Modeless](#)[Controls](#)[Control Styles](#)[Callbacks](#)[Dialog Styles](#)[Menus](#)

Adding Controls to the Dialog

Adding Controls to the Dialog

Once the dialog has been created, we can add [controls](#) to it. For our example, we will add a [text box](#) to let the user type in their name, and also add two BUTTON controls ("OK" and "Cancel"):

```
CONTROL ADD TEXTBOX, hDlg, IdText&, "", 14, 21, 134, 12, Style&, exStyle&
CONTROL ADD BUTTON, hDlg, 1, "&OK", 44, 38, 40, 14, %BS_DEFAULT or %WS_TABSTOP CALL Ok
CONTROL ADD BUTTON, hDlg, 2, "&Cancel", 90, 38, 40, 14 CALL Cancel
```

hDlg refers to the [handle](#) of the dialog you're adding the control to, as returned by the [DIALOG NEW](#) statement.

The next parameter *IdText&, 1*, and *2* in the example lines above) is the unique numeric identifier (ID) for the control. Whereas dialog handles are determined by Windows at run-time, controls use ID values that are specified by the programmer. By knowing the dialog handle and a [control ID](#), we can identify and interact programmatically with any control on a DDT dialog using any of the control-related DDT statements.

In general, ID values should be kept within in the range 100 to 65535. It should also be noted that some values below 100 are reserved by Windows for special purposes. For example, the special ID value 1 (%IDOK) is usually assigned to a Button control that is to be activated when the ENTER key is pressed (this would typically be the "OK" button on a dialog). Similarly, the special ID value of 2 (%IDCANCEL) is usually assigned to a Button control that is to be activated when the ESCAPE key is pressed (typically this would be the "Cancel" button).

In general, two controls on a given dialog should not use the same ID value, as it prevents them from being identified uniquely. However, it is common to assign the special value -1& to plain [Label](#) (static) controls that will not have their content, style, or color changed at run-time.

It is always a good idea to plan the values of control identifiers carefully. For example, a set of related [Option](#) (radio) controls should use ID values that are ordered sequentially, as this makes it very easy to manipulate them as a group with the [CONTROL SET OPTION](#) statement, etc. Another common scheme is keep all the ID numbers for the controls in a specific range. For example, the first dialog in a program might use controls whose ID values are in the range 100 to 199, the second dialog might use the range 200 to 299, etc.

The identifier parameter is followed by the caption text for the control. The ampersand symbols "&" within the caption text fields is surprisingly helpful - the letter that follows the symbol specifies a command accelerator (hot-key). At run-time, the accelerator character is drawn underscored: OK and Cancel. In this case, the underscored character informs the user that pressing the ALT+O keys has the same effect as using the mouse to click the "OK" button. Similarly, the ALT+C combination will trigger the "Cancel" button.

Coordinates used in the

statement are specified in the same terms ([dialog units](#) or [pixels](#)) as the [parent](#) dialog. The final *Style&* (primary style) and *exStyle&* (extended style) parameters tell Windows how to draw the control, and how the control should behave. These parameters are optional, and if omitted, receive default styles according to the type of control.

Each type of control has its own unique set of style options. Most of the equates have been predefined in the DDT.INC and WIN32APL.INC files supplied with PowerBASIC. It should be noted that explicit (custom) style values replace the default values for the control. That is, custom styles are not additional to the default style values - your code must specify all necessary style parameters. This also applies to the extended styles parameter - if your code specifies a custom primary style, the default extended style will no longer be in effect either. In this case, an explicit extended style may also need to be added to the CONTROL ADD statement if an explicit primary style is specified.

The CONTROL ADD statement for the "OK" button includes the keyword [CALL](#). This tells Windows to call the "OK" function each time the "OK" button is pressed. The "OK" function is simply a [Callback](#) Function that contains the code you want to execute when the button is pressed (or when some other control-related event occurs).

In this example, we want to assign the text from the text box control to a [global string](#), and then close the dialog box. However, we first must check that our code is executed only in response to a "click" event - we would not want our dialog to end if some other notification message was sent to the callback! We do this by testing the values of the message parameters held in the [CB.HNDL](#), [CB.MSG](#), and [CB.CTLMSG](#) system variables:

```
CALLBACK FUNCTION Ok() AS LONG
  IF CB.MSG = %WM_COMMAND AND CB.CTLMSG = %BN_CLICKED THEN
    CONTROL GET TEXT CB.HNDL, %IDTEXT TO gsUserName
    DIALOG END CB.HNDL, 1 ' Return 1
    FUNCTION = 1
  END IF
END FUNCTION
```

Similarly, we provide a Callback Function for the "Cancel" button, which will close the dialog box, ignoring any text entered into the text box:

```
CALLBACK FUNCTION Cancel() AS LONG
  IF CB.MSG = %WM_COMMAND AND CB.CTLMSG = %BN_CLICKED THEN
    DIALOG END CB.HNDL, 0 ' Return 0
    FUNCTION = 1
  END IF
END FUNCTION
```

Once the dialog has been created and the controls added, we are ready to display the dialog on the screen. In this example, we will create it as a [Modal](#) dialog. That means that when the [DIALOG SHOW MODAL](#) statement is executed, the execution of this portion of our program will block (halt) until the dialog is closed: (see [Modal vs. Modeless](#) below for more information on modal and modeless dialogs)

```
LOCAL lResult AS LONG
...
DIALOG SHOW MODAL hDlg TO lResult
```

During the time that the "main" part of our code is blocked by the modal dialog, DDT may call the code in the Callback Functions in response to user interaction, etc. If no events occur, our code is not executed at all, and therefore uses no CPU time. In this example, the dialog only closes when the user eventually clicks the OK or the Cancel button (or presses the ENTER or ESCAPE keys).

Once the dialog is closed, the *lResult* variable will contain the value set using the [DIALOG END](#) statement, and execution of the statements following the DIALOG SHOW statement will resume. In our example, we use a return value of one (1) to indicate that the user clicked the OK button, and a return value of 0 to indicate the user clicked the Cancel button.

The complete example code can be found in the HELLODDT.BAS file in the \PB\SAMPLES\DDT\HELLODDT folder:

```
#COMPILE EXE
#include "DDT.INC"

%IDOK = 1
%IDCANCEL = 2
%IDTEXT = 100
%BS_DEFAULT = 1

' Global variable to receive the user name
GLOBAL gsUserName AS STRING

CALLBACK FUNCTION OkButton()
  IF CB.MSG = %WM_COMMAND AND CB.CTLMSG = %BN_CLICKED THEN
    CONTROL GET TEXT CB.HNDL, %IDTEXT TO gsUserName
    DIALOG END CB.HNDL, 1
    FUNCTION = 1
  END IF
END FUNCTION

CALLBACK FUNCTION CancelButton()
```

```

IF CB.MSG = %WM_COMMAND AND CB.CTLMSG = %BN_CLICKED THEN
    DIALOG END CB.HNDL, 0
    FUNCTION = 1
END IF
END FUNCTION

FUNCTION PBMAIN() AS LONG

LOCAL hDlg AS DWORD
LOCAL lResult AS LONG

' ** Create a new dialog template
DIALOG NEW 0, "What is your name?", ,, 160, 50, 0, 0 TO hDlg

' ** Add controls to it
CONTROL ADD TEXTBOX, hDlg, %IDTEXT, "", 14, 12, 134, 12
CONTROL ADD BUTTON, hDlg, %IDOK, "OK", 34, 32, 40, 14, %BS_DEFAULT OR %WS_TABSTOP CALL
OkButton
CONTROL ADD BUTTON, hDlg, %IDCANCEL, "Cancel", 84, 32, 40, 14 CALL CancelButton

' ** Display the dialog
DIALOG SHOW MODAL hDlg TO lResult

' ** Check the dialog return result
IF lResult THEN
    MSGBOX "Hello " & gsUserName, &H00002000& ' = %MB_TASKMODAL
END IF

END FUNCTION

```

See Also

- [Dynamic Dialog Tools \(DDT\)](#)
- [Creating a Dialog](#)
- [Modal vs. Modeless](#)
- [Controls](#)
- [Control Styles](#)
- [Callbacks](#)
- [Dialog Styles](#)
- [Menus](#)

Modal vs. Modeless

Modal vs. Modeless

To support the different ways that applications use dialog boxes, PowerBASIC provides two types of dialog box: [modal](#) and [modeless](#).

A modal dialog box requires the user to supply information, or cancel the dialog box, before allowing the application to continue. Applications use modal dialog boxes in conjunction with commands that require additional information before they can proceed.

A modeless dialog box allows the user to supply information and return to the previous task without closing the dialog box. Modal dialog boxes are simpler to manage than modeless dialogs because they are displayed, perform their task, and are destroyed by calling a single [DIALOG SHOW MODAL](#) statement.

In the above example, we display the dialog as modal. The `DIALOG SHOW MODAL` statement displays the dialog and waits until your code calls `DIALOG END` (or if there is a Close box in the caption, the dialog will end when the Close box is clicked). When Windows displays a modal dialog box, it disables the parent window to keep the user focused on the dialog. When the dialog box is closed, the parent window is automatically re-enabled.

By comparison, a modeless dialog box does not cause your code to stop and wait while the dialog is displayed. An example of a modeless dialog box is the "Cancel" dialog displayed by many programs that print long documents on the printer. The application code sits in a loop sending data to the printer. The "Cancel" dialog allows the user to cancel printing at any time. The following is a simplistic example of this process:

```
DIALOG SHOW MODELESS hDlg TO lResult&
DO
  DIALOG DOEVENTS
  Done& = PrintNextLineFunction()
LOOP UNTIL lResult& = %IDCANCEL OR Done& = %TRUE
```

The `DIALOG DOEVENTS` statement is necessary so that Windows can process [messages](#) for your modeless dialog. Without it, events such as clicking on the "Cancel" button or redrawing the dialog would not be processed. This loop is known as a Message Pump.

A modeless dialog must always have a message pump running while the dialog is running. Without a message pump, a modeless dialog will not be able to receive messages to redraw itself, etc.

Because of this consideration, applications should be written in such a way as to ensure that the message pump is able to run. The following example is of a modeless dialog message pump that relies on the fact that when the dialog is destroyed, `DIALOG GET SIZE` will return 0.

```
DIALOG SHOW MODELESS hDlg TO lResult&
DO
  DIALOG DOEVENTS
  DIALOG GET SIZE hDlg TO x&, y&
LOOP UNTIL ISFALSE (x& * y&)
```

This works fine for applications that have a single modeless dialog showing at any given moment, but this is not always practical. For example, consider an application that uses a tabbed dialog. Typically, this is constructed around a single dialog containing a "Tab Control", plus an additional set of modeless dialogs, each of which would form a "page" of the tabbed dialog.

In this case, we need to reconstruct our message pump so that it terminates only when all of the modeless dialogs have been destroyed. If the main dialog is modal, the application design would become quite complex - the modeless dialogs and the message pump would need to be launched from within the main dialog's [Callback](#) Function. Such an approach is technically feasible, but unnecessary. By changing the main dialog from modal to modeless, the whole design can be simplified to use a single message pump.

```
DIALOG SHOW MODELESS hMainDlg TO lResult&
DIALOG SHOW MODELESS hPage1
DIALOG SHOW MODELESS hPage2
' more code here
DO
  DIALOG DOEVENTS TO Count&
LOOP UNTIL ISFALSE Count&
```

See Also

[Dynamic Dialog Tools \(DDT\)](#)

[Creating a Dialog](#)

[Adding Controls to the Dialog](#)

[Controls](#)

[Control Styles](#)

[Callbacks](#)[Dialog Styles](#)[Menus](#)

Controls

Controls

A

is a special Window that provides a method for interacting with the user. [Buttons](#), [Combo boxes](#), [List boxes](#), and [Text boxes](#) are all examples of controls. Whenever the user interacts with a control (clicks a button or types into a text box), an event occurs causing Windows to send a [message](#) to your application. Your application processes these messages in special functions called [Callback](#) Functions.

When you add a control to a [dialog](#), it is important that each control has a unique numeric identifier. This identifier helps your application to know which control is sending an event. For example, if your program has two buttons in it, the [control ID](#) allows you distinguish between them.

As each control is created, Windows assigns a unique window [handle](#) to identify the control. Because your program does not assign these handle values, your code cannot directly use them to identify individual controls. Further, each time a control is destroyed and recreated, a new unique handle value is assigned, further complicating the task. The control ID overcomes these problems, as the programmer determines the ID for each control.

Controls are added to your dialog with the CONTROL ADD statement. Make sure that each control you create has a unique numeric identifier, so that you (and Windows) can tell it apart from other controls on the dialog.

Given the ID of a control, DDT provides the [CONTROL HANDLE](#) statement to retrieve the window handle value of the control. If a given ID is duplicated in a dialog, CONTROL HANDLE is only able to identify the first control that matches the ID, and the remaining controls will essentially be ignored. Control ID's can often be duplicated for [Label](#) (static) text controls, provided these controls (and their contents, [color](#), or [styles](#)) are not going to be modified at run-time. If such a Label control is to be modified, its control ID must be unique.

PowerBASIC provides a comprehensive set of statements and functions for dealing with controls. The following is a small sample of these statements and functions with a brief description of the purpose of each:

Function Description

| | |
|----------------------------|---|
| #MESSAGES | Specify which messages should be sent to a Control Callback Function |
| CB.CTL | Return the ID of the control sending a message to your Callback Function. (Only valid inside a Callback Function). |
| CB.CTLMSG | Return the notification ID of the control sending a message to your Callback Function. (Only valid inside a Callback Function). |
| CB.HNDL | Returns the dialog handle sending a message to your Callback Function. (Only valid inside a Callback Function). |
| CB.LPARAM | Returns the lParam& value sent to your Callback Function. (Only valid inside a Callback Function). |
| CB.MSG | Returns the wParam& value sent to your Callback Function. (Only valid inside a Callback Function). |
| CB.NMCODE | Returns the specific notification message describing the event which occurred. (Only valid inside a Callback Function). |
| CB.NMHDR | Returns the address (a pointer) to the NMHDR UDT for a notification message sent to your Callback Function. (Only valid inside a Callback Function). |
| CB.NMHDR\$ | Returns the contents of the NMHDR UDT as a dynamic string. (Only valid inside a Callback Function). |

| | |
|-----------------------------------|--|
| CB.NMHWND | Returns the handle of the control which sent this message to your Callback Function. (Only valid inside a Callback Function). |
| CB.NMID | Returns the ID number assigned to this control which sent this message to your Callback Function. (Only valid inside a Callback Function). |
| CB.WPARAM | Returns the wParam& value sent to your Callback Function. (Only valid inside a Callback Function). |
| CONTROL_DISABLE | Create a control in a dialog. Disable a control so that it can no longer send messages to a callback. If the control is a button, it is grayed. If it is a text box, it becomes grayed out and you can no longer edit the text contained within it. |
| CONTROL_ENABLE | Enable a control that was previously disabled. A control must be enabled in order for it to send notifications to a Callback Function. |
| CONTROL_GET_SIZE | Get the size of a control. |
| CONTROL_GET_LOC | Get the location of a control inside of its parent dialog. |
| CONTROL_GET_TEXT | Retrieve the text from a control, such as a Text box or Label, etc. |
| CONTROL_HANDLE | Return a window handle for a given control. |
| CONTROL_KILL | Remove a control from a dialog. |
| CONTROL_SEND | Send a message to a control. |
| CONTROL_SET_FOCUS | Set the keyboard focus to a given control. If the control is a button, it receives keyboard focus. If the control is a text box, the caret is placed in the text box to allow the user to edit the text. |
| CONTROL_SET_FONT | Select a font to be used for a particular control. |
| CONTROL_SET_IMAGE | Change the image on an image button or image control. Also see CONTROL_SET_IMAGEX . |
| CONTROL_SET_SIZE | Change the size of a control. |
| CONTROL_SET_LOC | Change the location of a control within its parent dialog. |
| CONTROL_SET_TEXT | Place new text into a control. Any existing text in the control is replaced. |
| WINDOW_GET_ID | Returns the Control ID for a given control. |
| WINDOW_GET_PARENT | Returns the handle of a controls parent. |

For a more comprehensive list of DDT statements and functions, See the [Command Summary for DDT](#).

See Also

[Dynamic Dialog Tools \(DDT\)](#)
[Creating a Dialog](#)
[Adding Controls to the Dialog](#)
[Modal vs. Modeless](#)
[Control Styles](#)
[Callbacks](#)
[Dialog Styles](#)
[Menus](#)

Control Styles

Control Styles

When creating child controls for your dialogs, you are free to use almost any control style permitted by Windows. These styles mostly start with the %WS_ prefix (Window Style), and are included in the

[WIN32API.INC](#) file included in your WINAPI directory.

If the style parameter in your CONTROL ADD statements is set to 0, DDT will set default styles automatically for you. The default styles will depend on the type of control you are adding to your dialog. For example, a button will be given the %WS_TABSTOP style.

Note that DDT always gives your controls certain styles, such as %WS_CHILD and %WS_VISIBLE, regardless of the styles you specify. When setting your style parameter, you can safely ignore these two styles and concentrate on the more important styles that are required. This has the advantage of reducing the clutter of your code. The exception is custom controls - in this case you must explicitly specify all required styles.

The "tab-order" of controls (also known as the "z-order") is determined by the order that DDT controls are created at run-time. That is, the first control added to a dialog is the first control in the z-order, the second control added is second, and so forth. When a dialog is initially displayed, keyboard focus is automatically given to the first control in the z-order that has the %WS_TABSTOP style. Each time the TAB key is subsequently pressed, the keyboard focus moves to the next control in the tab-order. To ensure all controls in a dialog can be selected using the TAB key, each control in the dialog should include the %WS_TABSTOP style. The z-order also determines the order that controls are drawn on a dialog, to help ensure that control that overlap one another can be drawn in a predictable manner.

Controls that are disabled (because either they have the %WS_DISABLED style or they have been dynamically disabled with [CONTROL_DISABLE](#)) are skipped over.

Most DDT controls are created with the %WS_TABSTOP style by default. However, you should explicitly include the %WS_TABSTOP style in the control style parameter, if your DDT code creates controls with custom (non-default) styles. If you do not include this style, these control(s) may not be able to receive keyboard focus.

The following table lists the default DDT styles for many of the standard controls:

| Control type | Default DDT Styles * | Hex Value |
|-----------------------------|--|----------------------|
| BUTTON | %WS_TABSTOP | 50010000 |
| CHECK3STATE | %WS_TABSTOP, {%BS_AUTO3STATE} | 50010006 |
| CHECKBOX | %WS_TABSTOP, {%BS_AUTOCHECKBOX} | 50010003 |
| COMBOBOX | %WS_TABSTOP, %CBS_SORT, %CBS_DROPDOWN, {%CBS_HASSTRINGS} | 50010302 |
| FRAME | %BS_LEFT, {%BS_TOP, %BS_GROUPBOX} | 50000507 |
| GRAPHIC | %WS_CHILD, %WS_VISIBLE, %SS_OWNERDRAW | 5001000D |
| IMAGE | either {%SS_ICON} or {%SS_BITMAP} | 50000003 5000000E |
| IMAGEX | either {%SS_ICON} or {%SS_BITMAP} | 50000003 5000000E |
| IMGBUTTON | either %WS_TABSTOP, {%BS_ICON} or %WS_TABSTOP, {%BS_BITMAP} | 50010040 50010080 |
| IMGBUTTONX | either %WS_TABSTOP, {%BS_ICON} or %WS_TABSTOP, {%BS_BITMAP} | 50010040 50010080 |
| LABEL | %SS_LEFT | 50000000 |
| LINE | %SS_ETCHEDFRAME | 50000012 |
| LISTBOX | %WS_TABSTOP, %LBS_SORT, %LBS_NOTIFY, %WS_VSCROLL | 50210003 |
| LISTVIEW | %WS_TABSTOP, %LVS_REPORT, %LVS_SHOWSELALWAYS | 50000009 |
| OPTION | %WS_TABSTOP, {%BS_AUTORADIOBUTTON} | 50010009 |
| PROGRESSBAR | %WS_BORDER | 50800000 |
| SCROLLBAR | either {%SBS_HORZ} or {%SBS_VERT} | 50000000 50000001 |
| STATUSBAR | %CCS_BOTTOM | 50000003 |

| | | |
|----------------------------------|---|----------|
| TAB | %WS_CHILD, %WS_TABSTOP | 54010000 |
| TEXTBOX | %WS_TABSTOP, %WS_BORDER, %ES_AUTOHSCROLL, %ES_LEFT | 50810080 |
| TOOLBAR | %WS_CHILD, %WS_VISIBLE, %WS_BORDER, %CCS_TOP, and %TBSTYLE_FLAT | 50808801 |
| TREEVIEW | %WS_TABSTOP, %TVS_HASBUTTONS, %TVS_LINESATROOT, %TVS_HASLINES, and %TVS_SHOWSELALWAYS | 50010027 |
| "custom control" | No default style (%WS_CHILD and %WS_VISIBLE not used)** | 0 |

See Also

[Dynamic Dialog Tools \(DDT\)](#)
[Creating a Dialog](#)
[Adding Controls to the Dialog](#)
[Modal vs. Modeless](#)
[Controls](#)
[Callbacks](#)
[Dialog Styles](#)
[Menus](#)

Callbacks**Callbacks**

A callback is a Function called by Windows when an event occurs. In the previous [modal dialog example](#), when the OK button is clicked by the user, Windows calls the *OkButton()* function. PowerBASIC's [Dynamic Dialog Tools](#) allows you to create a single callback to handle all events for the [dialog](#), or you can create individual Callback Functions for each

in your dialog. You can even use a combination of the two methods.

Control Callback

If you've used Visual Basic, you'll be familiar with the concept of a Control Callback even though it's not called by that name. A Control Callback is a [function](#) that is called when a %WM_COMMAND or %WM_NOTIFY event is generated for a particular control. In the [earlier example](#), we arranged it so the *OkButton()* function was called when the OK button was clicked. Further, when the Cancel button was clicked, the *CancelButton()* function was called. A Control Callback function is enabled when you execute a statement using the *CALL CtlProc* option at the end.

```
CONTROL ADD BUTTON, hDlg, %IDOK, "OK", 34, 32, 40, 14, %BS_DEFAULT OR %WS_TABSTOP CALL OkButton
```

```
CONTROL ADD BUTTON, hDlg, %IDCANCEL, "Cancel", 84, 32, 40, 14 CALL CancelButton
```

Some controls, like [text boxes](#), [list boxes](#), and [combo boxes](#), can generate more than one type of event. In VB, each separate event on each control is handled by a new function. For example, if your VB form includes a list box, it may include a Callback Function such as *List1_Change()* that is called whenever the current selected item changes. In PowerBASIC, only a single Callback Function is needed for each control.

When an event occurs, the Callback Function just chooses which events to handle, and which events to ignore. If your PowerBASIC callback wanted to process the Change event for a list box, your code would look like this:

```
CALLBACK FUNCTION List1() AS LONG
  IF CB.MSG = %WM_COMMAND THEN
```

```

IF CB.CTLMSG = %LBN_SELCHANGE THEN
    [your code here]
    FUNCTION = 1
END IF
END IF

```

```
END FUNCTION
```

You can use a combination of the [CB.MSG](#) and [CB.CTLMSG](#) functions to decide exactly which event has occurred. Generally speaking, in a Control Callback, CB.MSG will contain either %WM_COMMAND or %WM_NOTIFY. The CB.CTLMSG will return the specific [message](#) is either of those two categories. In this example situation, the control notification [%LBN_SELCHANGE](#) is sent to the callback for the list box whenever the item in the list box changes (the user clicks on the new item or uses the keyboard to select a new item).

All of the control and dialog message equates are located in the DDT.INC file. This file is simply a subset of the much larger WIN32API.INC file and is provided only for convenience. Therefore, the use of these two files is mutually exclusive.

If your code processes a message, it should return [TRUE](#) (any non-zero value) by setting FUNCTION = *number* within the Control Callback. This advises that there is no need to process that message further. If you return the value [FALSE](#) (zero), the message is passed on to your Dialog Callback, if you have one. If the message is still unhandled by your Dialog Callback, the [DDT](#) dialog engine itself will handle the message on your behalf.

If your code processes a %WM_NOTIFY message, the return value is generally ignored. Because of the nature of %WM_NOTIFY messages, they are always directed to both Control callbacks and Dialog callbacks to use as needed.

Prior to version 9.0 of PowerBASIC for Windows, Control Callback Functions received only %WM_COMMAND messages. Beginning with PB 9.0, %WM_NOTIFY messages are sent as well. There are many situations where these added messages will prove to be very important. If your existing callback functions are written with complete error checking (ensuring that CB.MSG = %WM_COMMAND), this minor addition will cause no problems. It just presents additional information which can be acted upon, or just ignored. However, if callbacks were written without complete error checking, some ambiguity is possible. In this case, you should either update your Control Callback code, or suppress %WM_NOTIFY messages with a [#MESSAGES COMMAND](#) metastatement.

When a Control Callback receives a click notification for a control, the callback will receive a %WM_COMMAND message in the CB.MSG variable. A common mistake made by programmers is to fail to test both CB.MSG and CB.CTLMSG parameters before responding to the message. If the message is truly generated from a click event, CB.CTLMSG will contain %BN_CLICKED. This simple test ensures that your code responds correctly to notification messages.

```

CALLBACK FUNCTION OkButton() AS LONG
    IF CB.MSG = %WM_COMMAND AND CB.CTLMSG = %BN_CLICKED THEN
        '...Process the click event here
        FUNCTION = 1
    END IF
END FUNCTION

```

It pays to be sure you are responding to the correct message in your callback. Subtle bugs can occur if you aren't very careful to notice and recognize unanticipated messages.

It should also be noted that there are ranges of notification messages that individual controls can send to the Control Callback or Dialog Callback. However, many of these messages are suppressed unless the controls have been initially assigned a "notify" style. For controls that are members of the Button class ([CHECKBOX](#), [OPTION](#), [FRAME](#), etc.), this is the %BS_NOTIFY style. Please refer to the statements for additional information on notification styles for other control types.

Dialog callback

If you review the example code in most Windows programming books (particularly the Windows 32-bit SDK), you will see that most of the examples create a single callback for the entire dialog. Each time the user presses a button, a message is sent to this Callback Function. Within this Callback Function, there is often a large [SELECT CASE](#) or [IF/ELSEIF/THEN](#) structure, designed to pick out the incoming event messages and then process the selected messages.

C programmers are usually quite familiar with this concept, and often resort to using "Message Cracker" functions to separate their event handling code into a set of independent functions. On the other hand, PowerBASIC's DDT takes much of this drudgery away. By permitting separate callbacks for each CONTROL ADD statement, you become free to enclose your event handling code in separate functions, just like a C programmer may do, but without the confusing macros C programmers are often forced to use.

DDT gives the programmer the choice of either using a single callback to handle all dialog and control events, or writing a callback for each (or any) specific control. If you intentionally omit a callback for a particular control, the programmer has the choice of handling messages for that control within the dialog Callback Function, or ignoring them altogether.

In addition to handling control messages within the dialog callback, this Callback Function also provides a way to handle events that concern the actual dialog box itself. For example, handling a %WM_PAINT message, or notification that the dialog was minimized, etc.

A Dialog Callback function is enabled when you execute a statement using the *CALL DlgProc* option.

```
DIALOG SHOW MODELESS hDlg CALL DlgProc TO lResult&
```

OR:

```
DIALOG SHOW MODAL hDlg CALL DlgProc TO lResult&
```

These two lines of code specify that dialog related event messages should be directed to the Callback Function *DlgProc()*. If we rewrote the earlier DDT example to use a single Dialog Callback instead of individual Control Callback Functions, the function might look something like this:

```
CALLBACK FUNCTION DlgProc()
  SELECT CASE CB.MSG
    CASE %WM_COMMAND
      IF CB.CTLMSG = %BN_CLICKED THEN
        IF CB.CTL = %IDOK THEN
          DIALOG END CB.HNDL, 1
          FUNCTION = 1
        ELSEIF CB.CTL = %IDCANCEL THEN
          DIALOG END CB.HNDL, 0
          FUNCTION = 1
        END IF
      END IF
    END SELECT
  END FUNCTION
```

To complete this stage of modifications, you would also remove the "CALL OkButton" and "CALL CancelButton" parameters from the CONTROL ADD lines. Once changed, this modified code produces the identical behavior of the original example with only a single Callback Function.

This simple example only scrapes the surface of what can be achieved in a Dialog Callback Function. For example, by intercepting a %WM_ERASEBKGD message, you could draw onto the dialog client area, producing colorful dialogs with ease.

Callback Return Values

Callback functions always return a long integer result. The primary purpose of this return value is to tell the PowerBASIC DDT engine and the Windows operating system whether your Callback Function has processed this particular message. If you return the value TRUE (any non-zero value), you are asserting that the message was processed and no further handling is needed. If you return the value FALSE (zero), the PowerBASIC DDT engine will manage the message for you, using the default message procedures in Windows. If you do not specify a return value in the function, PowerBASIC chooses the value FALSE (zero)

for you.

The term "process a message" may have many meanings. If it's a simple notification of a change in focus or style, which has no impact on your program, you may decide to consider it processed, yet do nothing. In other cases, your reaction could be quite complex and involved. As the programmer, that's your decision to make. But, regardless of your reaction, you should consider a message "processed" (returning a true value) whenever no further handling of the message (by DDT or Windows) is needed.

In some cases, especially when dealing with Common Controls and custom controls, you may be required to return a second result value through a special Windows data area named `DWL_MSGRESULT`. When you complete a Callback Function, PowerBASIC automatically copies any non-zero return value to `DWL_MSGRESULT`, if you haven't done so already. Therefore, it's generally safe to ignore this requirement in your code.

In most cases, when you process a message, you'll return a generic value for TRUE, such as: `FUNCTION = 1`. However, some messages require that you return a special value for TRUE, such as a graphical brush handle. As long as the value is non-zero, you can return it in the normal manner (with `FUNCTION=n`), since any non-zero value automatically implies that the message was processed.

That said, there are a few unique messages which may require special handling. Luckily, they're rare, but some just "break all the rules" listed above. For example, you might find one which requires a zero result, even when you have processed the message. You may find another which requires the return value be different from `DWL_MSGRESULT`. For these very special cases, you can simply specify two return values:

```
FUNCTION = 1, BrushHandle&
```

In this form, the first numeric expression specifies the value to be returned from the Callback Function. The second numeric expression tells the value to be assigned to `DWL_MSGRESULT`. When you use this double parameter assignment, the results are absolute. PowerBASIC assumes you have processed the message, regardless of the values given. PowerBASIC makes no other assumptions of any kind about these values. A double parameter function assignment is only allowed in a Callback Function.

Previous versions of PowerBASIC did not offer a double parameter form of function return. This caused some difficulty with a few Windows messages which required a special return value of zero. If you return a value of zero (0) with the single parameter form, it implies the message was not processed at all by the Callback. This issue is totally circumvented by the double parameter form.

See Also

- [Dynamic Dialog Tools \(DDT\)](#)
- [Creating a Dialog](#)
- [Adding Controls to the Dialog](#)
- [Modal vs. Modeless](#)
- [Controls](#)
- [Control Styles](#)
- [Dialog Styles](#)
- [Menus](#)

Dialog Styles

Dialog Styles

Like [control styles](#), DDT provides a default style for a dialog window, if the [DIALOG NEW](#) statement does not specify a specific style parameters.

The default style comprises the combination of `%WS_POPUP`, `%WS_CAPTION`, `%DS_SETFONT`, `%DS_NOFAILCREATE`, `%DS_MODALFRAME`, and `%DS_3DLOOK`. These equates are equivalent to a style

of &H080C00D4. The extended style default is zero.

If you explicitly specify %WS_CAPTION in your DIALOG NEW statement, DDT will interpret the width and height values as client dimensions, rather than as overall dialog dimensions. This can be very useful for the times when you need to build a dialog with particular client dimensions.

You can create dialogs using combinations of the following styles:

| Style Equate | Description |
|------------------|---|
| %WS_BORDER | Dialog has a thin-line border. |
| %WS_CAPTION | Dialog has a title bar (includes the %WS_BORDER style). |
| %WS_HSCROLL | Dialog contains a horizontal scroll bar. |
| %WS_MAXIMIZE | Dialog is initially maximized. |
| %WS_MAXIMIZEBOX | Dialog has a Maximize button, but must be used in conjunction with the %WS_SYSMENU style. You cannot combine this style with the %WS_EX_CONTEXTHELP extended style. |
| %WS_MINIMIZE | Dialog is initially minimized. |
| %WS_MINIMIZEBOX | Dialog has a Minimize button, but must be used in conjunction with the %WS_SYSMENU style. You cannot combine this style with the %WS_EX_CONTEXTHELP extended style. |
| %WS_SIZEBOX | Dialog has a resizable border. Equivalent to the %WS_THICKFRAME style. |
| %WS_SYSMENU | Dialog contains a system-menu on its title bar. Must be used in conjunction with the %WS_CAPTION style. |
| %WS_THICKFRAME | See %WS_SIZEBOX |
| %WS_VSCROLL | Dialog contains a vertical scroll bar. |
| %DS_3DLOOK | Dialog uses a non-bold font and uses three-dimensional borders around child controls. Not required with applications marked for #OPTION VERSION4 or #OPTION VERSION5 , as Windows provides this style automatically. |
| %DS_CENTER | Centers the dialog box in the region of the screen that is not obscured by the taskbar and tray (i.e., the work area). |
| %DS_CENTERMOUSE | Centers the mouse cursor in the dialog. |
| %DS_CONTEXTHELP | Places a "question mark" button in the title bar of the dialog. If this button is clicked, the cursor changes to a pointer with a question mark. If the next click is on a control in the dialog, the control's Callback Function will receive a %WM_HELP message. When a dialog containing this style is created, Windows automatically adds the %WS_EX_CONTEXTHELP extended style. %DS_CONTEXTHELP is mutually exclusive with the %WS_MAXIMIZEBOX and %WS_MINIMIZEBOX styles. |
| %DS_CONTROL | Dialog operates as a child of another dialog. For example, a modeless dialog is able to operate as a child window of a tab control (although the parent must be the tab control's owner, not the tab control itself). This style permits the TAB key to move from control to control in both the parent and the modeless dialog seamlessly, provided the parent includes the extended style %WS_EX_CONTROLPARENT. |
| %DS_FIXEDSYS | Dialog uses the %SYSTEM_FIXED_FONT instead of the %SYSTEM_FONT. |
| %DS_MODALFRAME | Used in combination with %WS_CAPTION and %WS_SYSMENU to produce a dialog with a title bar and system-menu. |
| %DS_NOFAILCREATE | Dialog is created even if an error occurs during creation. Such an error may occur if a child control cannot be created successfully. |
| %DS_SETFONT | During dialog creation, the child controls in the dialog will be sent a %WM_SETFONT message in order to receive the handle of the font specified by the dialog. |

See Also

[Dynamic Dialog Tools \(DDT\)](#)
[Creating a Dialog](#)
[Adding Controls to the Dialog](#)
[Modal vs. Modeless](#)
[Controls](#)
[Control Styles](#)
[Menus](#)

Menus

Menus

Just like regular GUI windows and [dialog boxes](#), [DDT](#) dialogs can use menus too. With just a handful of statements, you can create a menu and add or remove items, depending on the context of your application.

A [menu bar](#) is positioned just below the [caption](#) bar of a dialog box. From this menu bar, [popup menus](#) (or sub-menus as they are also known) can be displayed, each containing commands. Popup menus may contain even deeper levels of popup menus.

Menus are constructed in a hierarchical manner: the top-most level is positioned on the menu bar, and the lower levels of the menu are the popup portions. The items on the menu bar are always visible, but the popup menus are never visible until a menu bar item is either clicked by the mouse, or activated by a command accelerator (hot-key) which is indicated by an underscored character in the menu item text.

Please note that command accelerators differ slightly from keyboard accelerators. The latter are configured and described in the [ACCEL ATTACH](#) statement topic.

Typically, a popup menu contains a range of associated commands. For example, a FILE popup menu usually contains a range of commands to permit the opening, saving and closing of files, etc.

When the user activates a popup menu item, and a command is selected, a %WM_COMMAND message is sent to the dialog Callback Function to notify the program that a menu item has been selected.

See Also

[Menu Walkthrough](#)
[More on the Menu](#)
[Menu State](#)
[Menu Example](#)

Menu Walkthrough

Menu Walkthrough

In order to create an example menu for our [DDT](#) dialog, we will need one [Double-word](#) variable to hold the [handle](#) of the menu, and one for each of the popup menu levels that our menu will contain. In the following code, we will work towards creating a menu with two items on the menu bar (therefore two popup menus). In all, we will need three 32-bit variables:

```

DIM hMenu AS DWORD
DIM hPopup1 AS DWORD

```

To begin creating our menu, we use the [MENU_NEW_BAR](#) statement:

```
MENU NEW BAR TO hMenu
```

The value returned in *hMenu* is termed the menu handle. We use this handle to attach each of our popup menus. In order to create these popup menus, we will also need to create a handle:

```
MENU NEW POPUP TO hPopup1
```

Now we will "glue" our new popup menu to the menu bar. We do this using the [MENU_ADD_POPUP](#) statement, which results in an entry on the menu bar labeled "*File*", complete with a command accelerator:

```
MENU ADD POPUP, hMenu, "&File", hPopup1, %MF_ENABLED
```

The ampersand character in "*&File*" means that pressing ALT+F on the keyboard, in addition to the conventional mouse click, can open the menu. The *hPopup1* parameter instructs the DDT engine to attach the menu to the menu bar (*hMenu*), and it is initially enabled.

Using the handle returned in *hPopup1*, we can begin adding items to the newly created popup menu. For each menu item that is a command (Open, Save, etc), we assign an ID value and specify the state of the item. When the user clicks on a menu item, the dialog [Callback](#) Function receives a %WM_COMMAND message.

In turn, we can then use the [CB_CTL](#) function to obtain this ID value, to determine which menu item the user has selected. The state parameter allows us to specify whether the menu item is initially enabled, grayed (disabled), checked, or unchecked, etc.

Now let's begin to add items to our new popup menu:

```
MENU ADD STRING, hPopup1, "&Open", 201, %MF_ENABLED
MENU ADD STRING, hPopup1, "&Exit", 202, %MF_ENABLED
MENU ADD STRING, hPopup1, "-", 0, 0
```

Here we created two items that form part of our first popup menu. These menu items have the ID values *201* and *202* respectively, and each is initially enabled. The third item is a special type of menu item, called a separator. A separator is a horizontal line within the menu, and can be used to visually separate groups of menu items from each other within the same popup menu.

We recommend using equates for the ID parameters, as they make your code more readable and maintainable. For this example we use hard-coded values simply for clarity.

Let's add an additional popup menu to this original popup menu, just to demonstrate how simple it can be to create menus with multiple "layers". First, we will need to create a new popup menu handle:

```
MENU NEW POPUP TO hPopup2
```

Using this new popup menu handle, we attach menu items in exactly the same order as we did as before:

```
MENU ADD STRING, hPopup2, "Option &1", 403, %MF_ENABLED
MENU ADD STRING, hPopup2, "Option &2", 404, %MF_ENABLED
```

Now comes the tricky part... we must attach this new menu to the previous menu, rather than the menu bar:

```
MENU ADD POPUP, hPopup1, "&More Options", hPopup2, %MF_ENABLED
```

This statement "glues" the second popup menu to the end of the first popup menu. If we changed the *hPopup1* parameter to *hMenu*, the popup menu would appear on the menu bar. Making multiple level menus is that simple!

With our menu created, we then attach the menu to our DDT dialog:

```
MENU ATTACH hMenu, hDlg
```

This code is almost self-explanatory - DDT is instructed to attach our menu structure to the dialog handle contained in *hDlg*. The only thing left now is to show the dialog, complete with a menu.

```
DIALOG SHOW MODAL hDlg, CALL DlgProc TO lResult
```

See Also

[Menus](#)

[Menu Walkthrough](#)

[More on the Menu](#)

[Menu State](#)[Menu Example](#)

More on the Menu

More on the Menu

When adding new menu items to a menu, additional parameters may be included in the following statements:

```
MENU ADD POPUP, hMenu, txt$, hPopup, state&[, AT [BYCMD] position&]
MENU ADD STRING, hMenu, txt$, hPopup, state&[, AT [BYCMD] position&] [, CALL callback]
```

AT *position&* An optional position parameter that allows the programmer to specify an absolute position of the menu item within the popup menu, inserted immediately before the value of *position&*. Omitting this parameter causes the menu item to be appended to the menu at the "current position". Position values are indexed to 1. For example:

```
' Insert a new menu item at position 3 in the popup menu hPopup
position& = 3
MENU ADD STRING, hPopup, "&Print", %id_Print, _
ItemState&, AT position&
```

BYCMD The BYCMD keyword (also applicable to other forms of the MENU statement) changes the interpretation of *position&* to an identifier value, rather than an absolute position value. For example:

```
' Insert the "Print Setup" menu item before the "Print" menu item
Position& = %id_Print
MENU ADD STRING, hPopup, "Print Se&tup", _
%id_PrintSetup, ItemState&, AT BYCMD Position&
```

callback ([MENU ADD STRING](#) only) The Callback parameter provides a mechanism to specify a [Callback](#) Function that is executed, to process %WM_COMMAND messages for the menu item.

See Also

[Menus](#)[Menu Walkthrough](#)[Menu State](#)[Menu Example](#)

Menu State

Menu State

The

statements provide for an *ItemState&* parameter. For popup menus, this may be either %MFS_ENABLED or %MFS_DISABLED. For menu items, the state may be one of %MFS_ENABLED, %MFS_DISABLED, %MFS_CHECKED, %MFS_UNCHECKED, or %MFS_GRAYED.

A [DDI](#) menu requires the [parent](#) DDT dialog to contain at least one child control for the menu to operate correctly. This control may be a [BUTTON](#) or [LABEL](#), etc, and the control may be located out of the visible client area of the dialog if necessary.

The Dessert Menu

In addition to creating menus dynamically, DDT provides a rich set of additional menu functions to allow you to manipulate your menus at run-time. The following is a brief summary of these functions:

| | |
|--------------------------------|---|
| MENU_DELETE | Delete (remove) a menu item from a menu, or a popup menu from a menu bar. |
| MENU_DRAW_BAR | Redraw the menu bar for a given menu. This must be used if a menu is changed at run-time, regardless of whether the menu is visible or not. |
| MENU_GET_STATE | Obtain the current state of a menu item (%MF_ENABLED, etc). If the menu item is a separator, the returned value will be %MF_SEPARATOR. |
| MENU_GET_TEXT | Retrieve the text for a given menu item. |
| MENU_SET_STATE | Set the current state of a menu item. |
| MENU_SET_TEXT | Change the text of a specific menu item, and can be used to change the command accelerator of the item. |

For a more comprehensive list of menu statements and functions, See the [Command Summary for DDT](#).

See Also

- [Menus](#)
- [Menu Walkthrough](#)
- [More on the Menu](#)
- [Menu Example](#)

Menu Example

Menu Example

In the following code example, we create a dialog with a menu, outlining the concepts discussed in this chapter. Feel free to use this code as a base for your own DDT projects. This example is also available in your PowerBASIC installation, in the \PBWIN\SAMPLES\DDT\MENU folder.

```
'=====
'
' Simple example of an application that has a menu and
' requires absolutely no API calls!
'
'=====

#COMPILE EXE

%IDOK = 1
%IDCANCEL = 2
%IDTEXT = 100
%BN_CLICKED = 0
%BS_DEFAULT = 1
%MF_ENABLED = 0
%WM_COMMAND = &H111

%ID_OPEN = 401
%ID_EXIT = 402
%ID_OPTION1 = 403
```

```
%ID_OPTION2 = 404
%ID_HELP = 405
%ID_ABOUT = 406
```

```
'-----
' ** Global variable to receive the user name
GLOBAL gsUserName AS STRING
'-----
```

```
CALLBACK FUNCTION OkButton()
  IF CB.MSG = %WM_COMMAND AND CB.CTLMSG = %BN_CLICKED THEN
    CONTROL GET TEXT CB.HNDL, %IDTEXT TO gsUserName
    DIALOG END CB.HNDL, 1
    FUNCTION = 1
  END IF
END FUNCTION
```

```
'-----
CALLBACK FUNCTION CancelButton()
  IF CB.MSG = %WM_COMMAND AND CB.CTLMSG = %BN_CLICKED THEN
    DIALOG END CB.HNDL, 0
    FUNCTION = 1
  END IF
END FUNCTION
```

```
'-----
CALLBACK FUNCTIONDlgProc()
  IF CB.MSG = %WM_COMMAND THEN
    IF CB.CTL => %ID_OPEN AND CB.CTL <= %ID_ABOUT THEN
      MSGBOX "WM_COMMAND received from a menu item!", &H00002000& ' = %MB_TASKMODAL
      FUNCTION = 1
    END IF
  END IF
END FUNCTION
```

```
'-----
FUNCTION PBMAIN () AS LONG
  LOCAL hDlg AS DWORD
  LOCAL lResult AS LONG
  LOCAL hMenu AS DWORD
  LOCAL hPopup1 AS DWORD
  LOCAL hPopup2 AS DWORD

  ' ** First create a top-level menu:
  MENU NEW BAR TO hMenu

  ' ** Add a top-level menu item with a popup menu:
  MENU NEW POPUP TO hPopup1
  MENU ADD POPUP, hMenu, "&File", hPopup1, %MF_ENABLED
  MENU ADD STRING, hPopup1, "&Open", %ID_OPEN, %MF_ENABLED
  MENU ADD STRING, hPopup1, "&Exit", %ID_EXIT, %MF_ENABLED
  MENU ADD STRING, hPopup1, "-", 0, 0

  ' ** Now we can add another item to the menu that will bring up a sub-menu.
  ' First we obtain a new popup menu handle to distinguish it from the first
```

```

' popup menu:
MENU NEW POPUP TO hPopup2

' ** Now add a new menu item to the first menu.
' This item will bring up the sub-menu when selected:
MENU ADD POPUP, hPopup1, "&More Options", hPopup2, %MF_ENABLED

' ** Now we will define the sub menu:
MENU ADD STRING, hPopup2, "Option &1", %ID_OPTION1, %MF_ENABLED
MENU ADD STRING, hPopup2, "Option &2", %ID_OPTION2, %MF_ENABLED

' ** Finally, we'll add a second top-level menu and popup.
' For this popup, we can reuse the first popup variable:
MENU NEW POPUP TO hPopup1
MENU ADD POPUP, hMenu, "&Help", hPopup1, %MF_ENABLED
MENU ADD STRING, hPopup1, "&Help", %ID_HELP, %MF_ENABLED
MENU ADD STRING, hPopup1, "-", 0, 0
MENU ADD STRING, hPopup1, "&About", %ID_ABOUT, %MF_ENABLED

' ** Create a new dialog template
DIALOG NEW 0, "What is your name?", ,, 160, 60, 0, 0 TO hDlg

' ** Add controls to it
CONTROL ADD TEXTBOX, hDlg, %IDTEXT, "", 14, 12, 134, 12, 0
CONTROL ADD BUTTON, hDlg, %IDOK, "OK", 34, 32, 40, 14, %BS_DEFAULT CALL OkButton
CONTROL ADD BUTTON, hDlg, %IDCANCEL, "Cancel", 84, 32, 40, 14, 0 CALL CancelButton

MENU ATTACH hMenu, hDlg

' ** Display the dialog
DIALOG SHOW MODAL hDlg, CALL DlgProc TO lResult

' ** Check the dialog return result
IF lResult THEN
    MSGBOX "Hello " & gsUserName
END IF
END FUNCTION

'-----

```

See Also

- [Menus](#)
- [Menu Walkthrough](#)
- [More on the Menu](#)
- [Menu State](#)

Files

Files

Files

PowerBASIC offers three distinct ways to store and retrieve information from disk: sequential, random, and

binary file input and output. Each has its advantages and disadvantages; the one that works best for you will depend on your application.

See Also

[Sequential Files](#)

[Random Access Files](#)

[Binary Files](#)

Sequential Files

Sequential Files

Sequential [file](#) techniques provide a straightforward way to read and write files. PowerBASIC's sequential file commands manipulate *text* files: files of [ANSI](#) or [WIDE](#) characters with carriage-return/linefeed pairs separating records.

Quite possibly, the best reason for using sequential files is their degree of portability to other programs, programming languages, and computers. Because of this, you can often look at sequential files as the common denominator of data processing, since they can be read by word-processing programs and editors (such as PowerBASIC's), absorbed by other applications (such as database managers), and sent over the Internet to other computers.

The idea behind sequential files is simplicity itself: write to them as though they were the screen and read from them as though they were the keyboard.

Create a sequential file using the following steps:

1. Open the file in sequential output mode. To create a file in PowerBASIC, you must use the [OPEN](#) statement. Sequential files have two options to prepare a file for output:
 OUTPUT: If a file does not exist, a new file is created. If a file already exists, its contents are erased, and the file is then treated as a new file.
 APPEND: If a file does not exist, a new file is created. If a file already exists, PowerBASIC appends (adds) data at the end of that file.
2. Output data to a file. Use [WRITE#](#) or [PRINT#](#) to write data to a sequential file.
3. Close the file. The [CLOSE](#) statement closes a file after the program has completed all I/O operations.

To read a sequential file:

1. First, [OPEN](#) the file in sequential INPUT mode. This prepares the file for reading.
2. Read data in from the file. Use PowerBASIC's [INPUT#](#) or [LINE INPUT#](#) statements.
3. Close the file. The [CLOSE](#) statement closes a file after the program has completed all I/O operations.

The drawback to sequential files is, not surprisingly, that you only have sequential access to your data. You access one line at a time, starting with the first line. This means if you want to get to the last line in a sequential file of 23,000 lines, you will have to read the preceding 22,999 lines.

Sequential files, therefore, are best suited to applications that perform sequential processing (for example, counting words, checking spelling, printing mailing labels in file order) or in which all the data can be held in memory simultaneously. This allows you to read the entire file in one fell swoop at the start of a program and to write it all back at the end. In between, the information can be stored in an array (in memory) which *can* be accessed randomly.

Although the [SEEK](#) statement can be used to change the point in the file where the next read or write will occur, the calculations required to determine the position of the start of each record in a sequential file would add considerable overhead. Sequential files typically consist of records of varying sizes. Either you

would have to maintain a separate index file indicating the starting byte position of each record, or you would have to seek randomly until you found the correct position. However, SEEK does have its uses with sequential files. For instance, after reading an entire file, you could use SEEK to reposition the file pointer to the start of the file, in order to process the data a second time. This is certainly quicker than closing and re-opening the file.

Sequential files lend themselves to database situations in which the length of individual records is variable. For example, suppose an alumni list had a comments field. Some people may have 100 bytes or more of comments. Others, perhaps most, will have none. Sequential files handle this problem without wasting disk space.

The OPEN statement provides an optional LEN parameter for use with sequential files. This instructs PowerBASIC to use internal buffering to speed up reading of sequential files, using a buffer of the size specified by the LEN parameter. A buffer of 8192 bytes is suggested for best general performance, especially when networks are involved. However, this value can be increased in size to gain additional performance - the best value will always be specific to a particular combination of hardware and software, and may vary considerably from PC to PC, network to network, etc.

The OPEN statement also provides an optional character mode parameter. This specifies the character mode for this file: [ANSI](#) or [WIDE](#) (Unicode). Since sequential files consist of text alone, the selected mode is enforced by PowerBASIC. All data read or written to the file is automatically forced to the selected mode, regardless of the type of variables or expressions used. With binary or random files, this specification has no effect, but it may be included in your code for self-documentation purposes.

ANSI characters in the U.S. range of [CHR\\$\(0\)](#) to [CHR\\$\(127\)](#) are known as [ASCII](#), and are always represented by a single byte. International ANSI characters in the range of [CHR\\$\(128\)](#) to [CHR\\$\(255\)](#) may be followed by one or more additional bytes in order to accurately represent non-U.S. characters. The exact definition of these characters depends upon the character set in use. WIDE characters are always represented by two bytes per character. If the Chr option is not specified, the default mode is ANSI.

See Also

[Files](#)

[Random Access Files](#)

[Binary Files](#)

Random Access Files

Random Access Files

Random access [files](#) consist of records that can be accessed in any sequence. This means the data is stored exactly as it appears in memory, thus saving processing time (because no translation is necessary) both in when the file is written and in when it is read.

Random files are a better solution to database problems than [sequential files](#), although there are a few disadvantages. For one thing, random files are not especially transportable. Unlike sequential files, you cannot peek inside them with an editor, or type them in a meaningful way to the screen. In fact, moving a PowerBASIC random file to another computer or language will probably require that you write a translator program to read the random file and output a text (sequential) file.

One example of the transportability problem strikes close to home. Interpretive BASIC uses Microsoft's non-standard format for

values, and PowerBASIC uses IEEE standard floating-point conventions, this means you cannot read the floating-point fields of random files created by Interpretive BASIC with a PowerBASIC program, or vice versa, without a bit of extra work.

The major benefit of random files is implied in their name: every record in the file is available at any time. For example, in a database of 23,000 alumni, a program can go straight to record number 11,663 or 22,709 without reading any of the other records. This capability makes it the only reasonable choice for large files,

and probably the better choice for small ones, especially those with relatively consistent record lengths.

However, random access files can be wasteful of disk space because space is allocated for the longest possible field in every record. For example, a 100-byte comment field forces every record to use an extra 100 bytes of disk space, even if only one in a thousand actually uses it.

At the other extreme, if records are consistent in length, especially if they contain mostly numbers, random files can save space over the equivalent sequential form. In a random file, every number of the *same* type ([Integer](#), [Long-integer](#), [Quad-integer](#), [Byte](#), [Word](#), [Double-word](#), [Single-precision](#), [Double-precision](#), [Extended-precision](#) or [Currency](#)) occupies the same amount of disk space, regardless of the value itself. For example, the following five Single-precision values each require four bytes (the same space they occupy in memory):

```
0
1.660565E-27
15000.1
641
623000000
```

By contrast, numbers in a sequential file require as many bytes as they have [ASCII](#) characters when printed (plus one for the delimiting comma if [WRITE#](#) was used instead of [PRINT#](#)). For example:

```
WRITE #1, 0;0           ' takes 3 bytes
PRINT #1, 0;0          ' takes 5 bytes
PRINT #1, 1.660565E-27 ' takes 13 bytes
```

You can create, write, and read random access files using the following steps:

1. First, [OPEN](#) the file and specify the length of each record:

```
OPEN filespec FOR RANDOM AS [#]filenum [LEN = recordsize]
```

The LEN parameter indicates to PowerBASIC the total size of each record in bytes. If you do not specify a LEN parameter, PowerBASIC assumes 128. Unlike sequential files, you do not have to declare whether you are opening for input or output because you can simultaneously read and write a random file.

2. Define a structure for records in the file using the [TYPE](#) statement.

```
TYPE StudentRecord
  LastName   AS STRING * 20 ' A 20-character string
  FirstName  AS STRING * 15 ' A 15-character string
  IDnum      AS LONG       ' Student ID, a Long-integer
  Contact    AS STRING * 30 ' Emergency contact person
  ContactPhone AS STRING * 14 ' Their phone number
  ContactRel AS STRING * 8  ' Relationship to student.
  AverageGrade AS SINGLE   ' Single-precision % grade
END TYPE
```

```
DIM Student AS StudentRecord
```

3. Fill the [UDTs](#) members with the values you want, and write records to the file using the [PUT](#) statement.

```
Student.LastName = "Anderson"
Student.FirstName = "Bob"
Student.IDnum = 494425610
Student.Contact = "Ma Anderson"
Student.ContactPhone = "(800) BOBSMOM"
Student.ContactRel = "Mother"
Student.AverageGrade = 98.9
```

```
PUT #fileNumber, recordNumber, Student
```

4. Read records from the file using the [GET](#) statement.

```
GET #fileNumber, recordNumber, Student
```

5. When finished, [CLOSE](#) the file.

See Also[Files](#)[Sequential Files](#)[Binary Files](#)**Binary Files**

Binary Files

PowerBASIC's binary file technique, an extension to Interpretive BASIC, allows you to treat any file as a numbered sequence of bytes without regard to anything, including the following: [ASCII](#) characters, number versus string considerations, record length, carriage returns. With the binary approach to a file problem, you read and write a file by specifying exactly which bytes to read or write. This is similar to the services provided by Windows API functions used for reading and writing files.

Flexibility always comes at a price. Binary files require that you do all the work to decide what goes where.

Binary may be the best option when dealing with alien files that aren't in ASCII format; for example, a file created by a spreadsheet or database product. Of course, you will have to know the precise structure of the file before you can even attempt to break it down into numbers and strings agreeable to PowerBASIC.

Every file opened in binary mode has an associated position indicator that points to the place in the file that will be read or written to next. Use the [SEEK statement](#) to set the position indicator, and the [SEEK function](#) to read it.

Binary files are accessed in the following way:

1. First, [OPEN](#) the file in BINARY mode. You need not specify whether you are reading or writing; you can do either, or both.
2. To read the file, use SEEK to position the file pointer at the byte you want to read. Then use [GET\\$](#) to read a specified number of characters into a string variable.
3. To write to the file, load a string variable with the information to be written. Then use SEEK to position the point in the file to which it should be written, and use [PUT\\$](#) to write the data.
4. When finished, [CLOSE](#) the file.

See Also[Files](#)[Sequential Files](#)[Random Access Files](#)**Graphics**

Graphics

This version of PowerBASIC offers an excellent graphics package for most any programming need. It's fast. It's complete. And it handles all those messy Windows details for you... automatically!

First, it's good to know that graphics in PowerBASIC are persistent. Create it once... and forget it. You'll never worry about redrawing when your window is minimized or temporarily covered. PowerBASIC handles everything. Automatically!

So, how about a quick overview? Just what can you do? First, how about some fancy text? Any font. Any size. Any color. Bold. Italic. Underline and Strikeout. Mix any combination of fonts on a single Window.

Print just about anything, just about anywhere. Then add bitmaps. Stretch them or condense them. Copy them or change them. Circles, ovals, lines and boxes. Fat lines, skinny lines, ellipses, rounded rectangles. Filled forms or empty. Colors or not. You'll create a custom scaling system -- even with fractional floating point coordinates!

So, let's get started. You should know that almost every graphical function name starts with the word `GRAPHIC`. You'll find all of them together in the help file or the book.

Step one -- you'll need a canvas. A place to create these works of art. So, create a [GRAPHIC WINDOW](#). Or two. Or ten. They'll be visible right away and give you quick feedback.

```
GRAPHIC WINDOW "PowerGraphics", 600, 200, 400, 300 TO hWin???
```

You'll get a new window, with the title "PowerGraphics". It's positioned on the upper right side of the screen at x=600, y=200. It's 400 pixels wide, and 300 pixels high.

A second option is a memory bitmap. These aren't visible at all. You create your image "behind-the-scenes", then copy or stretch it to a visible window whenever you're ready. Use [GRAPHIC BITMAP NEW](#) for a blank bitmap, or [GRAPHIC BITMAP LOAD](#) to get one from a [resource](#) or a disk file. You can have one window or five. One bitmap or twenty. As each is created, it returns a handle that you need to save. That's how you'll identify each of your canvases.

Step two Use [GRAPHIC ATTACH](#) to choose a "graphic target". This tells PowerBASIC which window or memory bitmap to use, for the actions which follow. Until you execute another `GRAPHIC ATTACH` to change it again. Move back and forth, as often as necessary. There is no limitation here.

Step three Draw-Draw-Draw. Arcs. Circles. Lines. Boxes. Text. Display them. Copy them. Save them to disk.

Step four Clean up when you're done. You must close every graphic window with [GRAPHIC WINDOW END](#), and every memory bitmap with [GRAPHIC BITMAP END](#).

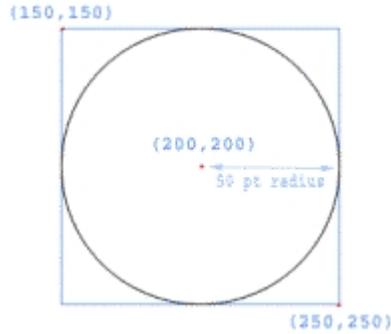
It's just that simple!

Some `GRAPHIC` functions use the concept of an implied "graphic position" to determine the default point on the graphic target where the next operation will take place. In PowerBASIC, we use the keyword `POS` to refer to this position (See [GRAPHIC GET POS](#) and [GRAPHIC SET POS](#) to alter or retrieve this position). `POS` is also commonly known as the LPR (Last Point Referenced) or even NPR (Next Point Referenced). For most purposes, you can consider these three terms to be synonymous.

When a Graphic Window or Graphic Bitmap is created, the default `POS` is set to (0,0), which is the upper left corner. Unless you specify otherwise, the first graphical operation starts at that point, and the completion point is then saved as the new `POS`. So, if you draw a line from (0,0) to (100,100), that last point (100,100) is saved as the new `POS`. The next line you draw would then, by default, start at (100,100), and then automatically save its completion point as the updated `POS` for next time.

The "Graphic Position" (`POS`) is used by [GRAPHIC LINE](#), [GRAPHIC PAINT](#), [GRAPHIC PRINT](#), and [GRAPHIC SET PIXEL](#). Other graphic functions neither use nor update `POS`.

Other `GRAPHIC` functions, namely those involved with the drawing of curves ([GRAPHIC ARC](#), [GRAPHIC ELLIPSE](#), and [GRAPHIC PIE](#)), utilize the concept of a "bounding rectangle" to determine their size and position on the graphic target. A bounding rectangle is defined as the smallest rectangle which can be drawn around the circle or ellipse. For example, let's say you wish to draw a circle centered at position (200,200), which has a radius of 50 pixels. The upper left corner (x1,y1) of the bounding rectangle would be at (150,150), while the lower right corner of the bounding rectangle would be at (250,250).



See Also

[Graphic Commands](#)

[GRAPHIC Code Group](#)

Printing

Printing

Printing

PowerBASIC supports two general classes of printers. We categorize them as Line Printers or Host Printers. Generally speaking, we recommend using Host Printers whenever possible, as they have far greater capabilities, including an extensive graphics package.

A line printer is one which will accept standard [ASCII](#) text and associated control codes, such as CR, LF, and FF. A line printer is identified by the port to which it is attached (LPT1, etc.) because data is sent directly to the port, not through a device driver. Print to Line Printers by using the LPRINT family of functions.

A host printer is one which works through the Windows printing system and a Windows printer driver. These printers are sometimes known as "Windows-only printers" or "GDI printers". They achieve device independence because the printer driver handles the task of converting ASCII text into the manufacturers proprietary binary format used by the printer. Print to Host Printers by using the XPRINT family of functions.

An interesting feature of this version is the new [PRINTERS\\$](#) function. This will let you retrieve both the printer name and the port name for every printer connected to the computer. Also, the new [XPRINT ATTACH](#) statement will optionally display a Printer Common Dialog to assist the user in selecting a printer, and the associated options.

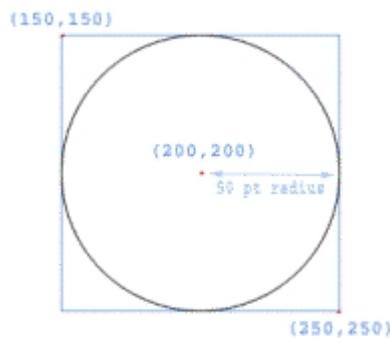
In contrast to single-tasking systems like DOS, you'll need to select a printer when you're ready to print. Use either [LPRINT ATTACH](#) or [XPRINT ATTACH](#) to do that. That assures two applications won't try to print to the same printer at the same time. Then print your report. Print your graphics. Print your charts. When you're done, don't forget to detach the printer with [LPRINT CLOSE](#) or [XPRINT CLOSE](#). This frees up the printer for another application to use. Perhaps even more important, Host Printers normally won't even begin to print to the physical paper until the print job is closed!

Some XPRINT functions use the concept of an implied "XPrint Position", to determine the default point on the host printer page where the next operation will take place. In PowerBASIC, we use the keyword POS to refer to this position (See [XPRINT GET POS](#) and [XPRINT SET POS](#) to alter or retrieve this position). POS is also commonly known as the LPR (Last Point Referenced) or even NPR (Next Point Referenced). For most purposes, you can consider these three terms to be synonymous.

When a new host printer page is created (with `XPRINT ATTACH` of a host printer, or `XPRINT FORMFEED` which ends a printer page), the default POS is set to (0,0), which is the upper left corner. Unless you specify otherwise, the first XPRINT operation starts at that point, and the completion point is then saved as the new POS. So, if you draw a line from (0,0) to (100,100), that last point (100,100) is saved as the new POS. The next line you draw would then, by default, start at (100,100), and then automatically save its completion point as the updated POS for next time.

The "XPrint Position" (POS) is used by `XPRINT`, `XPRINT LINE`, and `XPRINT SET PIXEL`. Other XPRINT functions neither use nor update POS.

Other XPRINT functions, namely those involved with the drawing of curves (`XPRINT ARC`, `XPRINT ELLIPSE`, and `XPRINT PIE`), utilize the concept of a "bounding rectangle" to determine their size and position on the host printer page. A bounding rectangle is defined as the smallest rectangle which can be drawn around the circle or ellipse. For example, let's say you wish to draw a circle centered at position (200,200), which has a radius of 50 pixels. The upper left corner (x1,y1) of the bounding rectangle would be at (150,150), while the lower right corner of the bounding rectangle would be at (250,250).



See Also

[Print Preview](#)

[Printing Commands](#)

[XPRINT Code Group](#)

Print Preview

Print Preview

Print Preview is a powerful concept which should be considered in most application programs which provide printed reports. Briefly, the idea involves displaying a replica of a printed document on the screen before it is committed to printing on paper. There are other related benefits available as well, such as the opportunity to save this replica report permanently to a disk file. PowerBASIC offers a simple and straightforward method to create printed reports which can be previewed on the screen.

The algorithm implemented by PowerBASIC can be summarized:

1. Select a printer to be used for the printed report using the `XPRINT ATTACH` statement.


```
XPRINT ATTACH {DEFAULT | PrinterName$} [,JobName$]
XPRINT ATTACH CHOOSE [USING Flags&] [,JobName$]
```
2. Use the `XPRINT PREVIEW` statement to select a graphic target (a [graphic bitmap](#), [graphic control](#), or [graphic window](#)) for the preview display. You may create a new graphic target, or reuse one which already exists. The target is identified by the handle and ID given when it was created. You can optionally specify a callback function which is called upon every execution of an `XPRINT FORMFEED`

or [XPRINT PREVIEW CLOSE](#). This statement should immediately follow the XPRINT ATTACH.

```
XPRINT PREVIEW hWin, ID [, CALL xxx]
```

3. At this point, all subsequent output will be redirected to the [graphic target](#). All data will be adjusted in size and position to the specification of the graphic target. It is best to use care to keep the proportions of the graphic page similar to the printer page to avoid distortion of the previewed report.
4. When [XPRINT PREVIEW CLOSE](#) is executed, it signals that the previewed report is completed. Redirection of XPRINT data is ended, and the XPRINT data stream is now sent to the original attached printer.
5. Repeat the XPRINT statements to create the desired report on the attached printer. Generally, these XPRINT statements are best placed in a [subroutine](#) which can be repeated with a single line of code.

A simplified PRINT PREVIEW:

```
GRAPHIC WINDOW NEW "Preview", 200, 100, 400, 550 TO h&
XPRINT ATTACH DEFAULT
XPRINT PREVIEW h&, 0
CALL PrintIt      ' print to the preview window
XPRINT PREVIEW CLOSE
CALL PrintIt      ' print to the host printer
XPRINT CLOSE
...
...
SUB PrintIt()
  XPRINT "This is a test of preview..."
  XPRINT ELLIPSE (300,300) - (500,400), %rgb_red
  XPRINT RENDER "xx.bmp", (300,500)-(500,700)
END SUB
```

XPRINT PREVIEW must be executed immediately after XPRINT ATTACH or an [error 98](#) "XPrint Preview Error" will be generated at run time. No XPRINT statements (other than the XPRINT\$ function) may be executed between XPRINT ATTACH and XPRINT PREVIEW.

If you include the Callback option, the callback procedure must be a simple SUB with no parameters and no return value. It is called automatically by the XPRINT engine at the completion of each preview page (upon execution of XPRINT FORMFEED or XPRINT PREVIEW CLOSE. This Sub can perform all sorts of housekeeping help, such as copying the preview bitmap for separate storage, counting pages in the report, or most anything else needed by your program. Copying the bitmap is important in multi-page reports as XPRINT FORMFEED erases the graphic target for preview of the next page.

See Also

[Printing](#)

[Printing Commands](#)

[XPRINT Code Group](#)

Serial Communications

Serial Communications

Serial Communications

This section introduces telecommunications. For many programmers, writing a communications program is difficult. It is not that the programs themselves are especially long; it is that the procedures and terminology are unfamiliar. That means programs take longer to write and [debug](#), making writing such programs frustrating. To compound the problem, performing serial communications using the Windows API can be a daunting task.

In this section, we define common communications terms and discuss some of the more regular ways of transmitting and receiving data, using the native COMM statements and related features of PowerBASIC. There are plenty of examples and some working PowerBASIC program code (included on your distribution disks) for you to try out. Feel free to use this code as a starting point for your own communications programs.

Before presenting any sample code or delving further into the mysteries of communications, let's define a few terms:

| | |
|--------------------|--|
| ACK | An acknowledgment signal sent by the receiver of a message. |
| Asynch | Asynchronous; not synchronous. The receiver and transmitter are free to send signals without matching clocks. |
| Baud Rate | Baud (from J. M. E. Baudot, a communications pioneer) refers to the total number of signal changes that could possibly be sent between transmitter and receiver per second. Signal changes do not necessarily mean bits, and not all bits are necessarily data, so baud rate isn't equivalent to a fixed number of characters (or even a fixed number of bits) per second. |
| Buffer | An area of memory used to hold transmitted or received signals before processing them. |
| CD | Carrier Detect. A signal used to tell that a carrier has been detected; the DCE (modem) has connected with another computer and is ready for use. |
| CRC | Cyclic Redundancy Check. A way of summing the data bits sent between transmitter and receiver so as to detect transmission errors. |
| CTS | Clear To Send. A handshaking signal that indicates the receiver is ready to receive data. Typically, a modem uses this signal for to control data flow from the computer. CTS (and sometimes DSR) are often used in response to an RTS signal. |
| DCE | Data Circuit-terminating Equipment. Typically, a DCE is a modem. A DCE is often inaccurately referred to as the "Data Communications Equipment". |
| DSR | Data Set Ready. A handshaking signal that serves to indicate that an RS-232C non-terminal device (usually a modem) is ready to receive data. Often used with CTS. |
| DTE | Data Terminal Equipment. Typically the computer. |
| DTR | Data Terminal Ready. A handshaking signal that indicates that an RS-232C serial terminal device (the computer) is ready to receive data. |
| Handshaking | A process whereby the receiver and transmitter match signals and correctly determine each other's status. See CTS, DSR, and RTS. |
| Modem | Modulator/Demodulator. A device used to convert digital signals to sounds that can be carried over standard telephone lines, and to convert such sounds back to digital signals. |
| NAK | Negative Acknowledgment. A signal sent from receiver to transmitter, indicating that an error was detected in the last message. |
| Null Modem | A way of connecting receive and transmit lines, so that one computer can send or receive signals directly from another without having to go through a modem. This typically requires a "null-modem" or "cross-over" cable to ensure the signals are correctly interconnected between devices. |
| Parity | One bit (the high-order bit) per byte sent or received, used to detect some of the possible transmission errors. Parity may be even, odd, none, mark (always on), or space (always off). |
| Port | A term used to refer to any one of the possibly several communications devices available to the operating system. Usually COM1, COM2, etc. |

| | |
|------------------|---|
| Protocol | A way of controlling transmissions or receptions. A protocol consists of a set of rules describing the form of a valid transmission, the proper response when a transmission is received, and ways of detecting and correcting errors. |
| RS-232 | A standard for wiring on serial communications ports, that describes which wires should carry which signals at what voltage. There are two basic standards: one for transmitting equipment (DTE) and one for receiving equipment (DCE). |
| RTS | Request To Send. A signal raised by the transmitter, to which the receiver should reply with CTS and/or DSR. |
| Serial | Refers to signals sent one bit after the other, as opposed to parallel. Parallel signals are sent more than one bit at a time. |
| Stop Bits | The number of bits added to each byte of data transmitted, to allow the receiver to get in step with the transmitter. |
| Synch | Synchronous. The receiver and transmitter match their clocks so that each will send and receive only at specific times. |

See Also[Communications Basics](#)[Communication Buffers](#)[Parity and general error checking](#)[Start and Stop bits](#)[Opening a communications port](#)[Reading and writing data](#)[A simple communications program](#)**Communications Basics****Communications Basics**

To communicate from one computer to another, you need a communications program on each machine, and some way to connect them (telephone lines, for example). Sometimes, those programs are built into the operating system. Even when that's the case, there will be times when you want to do something faster, more reliably, or in a different manner than what has been provided.

To communicate, you will need a way for each program to inform the other that:

1. It is ready/not ready to transmit/receive data.
2. Data has been received and is correct.
3. Data has been received and is not correct.
4. Transmission is over.

If it is not important to check for, or correct errors, items 2 and 3 in the previous list can be ignored. Those capabilities are often skipped when the programs are to be used for simple communications - short text or brief typed messages. Even the other two parts can be dropped if the programs are closely monitored, or if errors will not matter very much.

However, it is important to realize that [receiving and transmitting data](#) is not always quite as simple as it might appear, especially when you are coding under Windows. For example, suppose your program is receiving data and saving material to a disk file. What should happen if more data is received while the program is writing data to disk? Alternatively, suppose the user presses a key that means "clear the screen and display a menu" while data is being received?

Situations like this are common. The standard way of handling them is to use a [buffer](#).

See Also

- [Serial Communications](#)
- [Communication Buffers](#)
- [Parity and general error checking](#)
- [Start and Stop bits](#)
- [Opening a communications port](#)
- [Reading and writing data](#)
- [A simple communications program](#)

Communication Buffers

Communication Buffers

Buffers can be useful in solving various types of communication or data transfer problems. For example, a printer typically includes a buffer of at least a few thousand characters. Since the computer can send material to the printer faster than it is capable of putting the material on paper, the buffer serves three purposes:

1. To even the workload for the printer
2. To allow the computer to finish sending material sooner
3. To handle occasions when the printer cannot accept more material

If the printer did not have a buffer, the computer would be forced to send data one character at a time. Until each character is received and printed, the computer should not send more. To prevent this, the printer sends a busy signal back to the computer. When it gets this signal, the computer stops until the printer sends a "ready" signal. This "ready/busy" signaling is called *handshaking*.

Visualize what is taking place. The printer sends a ready signal; the computer sends a character; the printer sends a busy signal, forcing the computer to wait while it prints the character; and then the whole process repeats. That is a lot of signaling for just one transmitted character!

Further, there is a possibility of error. If the computer is fast or the printer is slow (or both), it's possible for the computer to send the next character before the printer is able to signal that it's busy - something called *buffer overflow*. This can also happen if there is something wrong with the handshaking signals. When this happens, the printer fails to print one or more characters. Those characters have been sent by the computer, but cannot be received by the printer because there is no place to put them.

With a buffer, the printer sends a busy signal only when the buffer is full (or nearly so). That way, even if additional characters have already been sent, there will be room to store them before they are printed. Most of the time, the computer sends and the printer receives. As a result, far less signaling is necessary, and more actual data is transmitted. Therefore, a buffer makes communications between computers and printers more efficient. Since there is room to store characters transmitted, there is less chance that a character will be missed; so a buffer makes transmissions more error free, too.

In general, all communications are affected by buffering in the same way. For that reason, PowerBASIC allows you to set aside one communications buffer for received data and a separate buffer for transmitted data. In your programs, you have two responsibilities: to make sure that the buffer you use is large enough, and to empty the buffer as often as needed to prevent a buffer overflow.

How large a buffer will you need? It depends on the sort of program you are writing, and is often a matter of trial and error. At low baud rates (up to 300 baud), 256 bytes is probably adequate. Under some circumstances, 256 bytes may well be adequate at 1200 baud or higher; it all depends on how often your

program checks the buffer and empties it. It's probably a good idea to use a buffer of 1024 bytes or more for 1200 baud, and it's not at all uncommon to use buffers of 4 Kilobytes or more. With the large amount of data memory available to your applications with PowerBASIC, you could specify a receive buffer of 1 MB (or even more) and have little impact on system memory.

See Also

- [Serial Communications](#)
- [Communications Basics](#)
- [Parity and general error checking](#)
- [Start and Stop bits](#)
- [Opening a communications port](#)
- [Reading and writing data](#)
- [A simple communications program](#)

Parity and general error checking

Parity and general error checking

The [ASCII](#) character set contains 128 defined characters. It takes 7 bits to represent all 128 characters. Since there are 8 bits per byte, the eighth bit can be used to detect errors. One sort of checking adds up all the on (1) bits in each character transmitted. If the number of bits is even, the eighth bit is turned on when the character is transmitted; that forces the total number of on bits to be odd and is called odd parity. When the receiver gets the character, it performs the same procedure in reverse. If it gets the same answer as was encoded in the eighth bit, the character is accepted. If it does not, the character is in error. A related method (even parity), sums the bits and turns the parity bit on if the number of bits is odd, forcing the total number of on bits to be even.

Either method of checking the correctness of received characters is called a parity check. Unfortunately, the method can easily be thwarted if the errors are bad enough. If the transmission is relatively clean and there are few errors, a simple parity check of this sort can be reasonably effective. If any even number of data bits are reversed (on to off or vice versa), or if any odd number of bits are wrong and the parity bit is also incorrect, the parity check will fail to detect an error.

Most communications programs do not rely on parity checks, however. That is especially true if you must send a full 8 bits of data, as is the case when sending executable programs, spread sheets, some kinds of word processing files, and any kind of binary data. You should set parity to none or off whenever you need to send a full 8 bits of data.

See Also

- [Serial Communications](#)
- [Communications Basics](#)
- [Communication Buffers](#)
- [Start and Stop bits](#)
- [Opening a communications port](#)
- [Reading and writing data](#)
- [A simple communications program](#)

Start and stop bits

Start and Stop bits

Stop bits are a way for a computer to "catch its breath" while sending or receiving data, while still letting the other end know that the connection is still there and is still valid; they're also used in error detection.

Stop bits are rather like [parity bits](#). They are sent with the data, but they are not part of the data. Unlike parity bits, they are not turned on and off by the number of bits in the data; instead, they are always on. If one or more of the stop bits are missing, it constitutes a framing error.

Some computers also use start bits for a similar purpose; however, that is not as common a practice as it used to be.

The number of stop bits generally increases with higher baud rates. At 300 baud, usually 0 or 1 stop bits are used. At 1200 baud, 1 or 2 stop bits are most common.

If you connect with another computer and everything seems to be correct, but you cannot read the material you're receiving, one of three possible problems is likely. Either the baud rates are set wrong, the parity is wrong, or the number of stop (or start) bits is incorrect. If the baud rate is correct and the errors are framing errors, it is probably the number of stop bits.

See Also

[Serial Communications](#)

[Communications Basics](#)

[Communication Buffers](#)

[Parity and general error checking](#)

[Opening a communications port](#)

[Reading and writing data](#)

[A simple communications program](#)

Opening a communications port

Opening a communications port

Before we can actually open a [communications port](#), we must first obtain a PowerBASIC *file number* so we may manage input and output to the communications port. The best method of obtaining a file number is to use the [FREEFILE](#) function:

```
DIM hComm AS LONG
hComm = FREEFILE
```

The general way of opening a communications port in a PowerBASIC program is with a [COMM OPEN](#) statement. The syntax is similar to a simple [random-access file](#) OPEN, where *n* is the communications port number

```
COMM OPEN "COMn" AS #hComm
```

Note the trailing colon typical in DOS communications is not permitted with COMM OPEN.

If you are familiar with serial communications with DOS compilers (where all of the communications parameters are configured within a single OPEN statement), you will realize that we must instead configure these parameters individually. For this purpose, PowerBASIC offers the [COMM SET](#) statement:

```
COMM SET #hComm, Comfunc = value
```

Although configuring a serial port for communications can mean using quite a few COMM SET statements, PowerBASIC offers a greater control of the serial port than was possible before, plus a completely new method of querying existing settings and status. Retrieving a setting is performed with the [COMM](#) function,

which returns a [Long-integer](#) value:

```
x& = COMM(#hComm, Comfunc)
```

Comfunc **must** be one of the following keywords:

| Comfunc | Return values (TRUE <> 0, FALSE = 0) |
|----------------|--|
| BAUD | Port Baud Rate (9600, 14400, 19200, etc). See notes below. |
| BREAK | TRUE/FALSE Break is asserted. Break is generally used to "get the attention" of the connected modem, terminal or system. |
| BYTE | Number of bits per byte (4, 5, 6, 7, or 8). |
| CD | TRUE/FALSE Carrier Detect state. Synonym for RLSD (<i>READ-ONLY</i>). When CD is TRUE, the DCE (modem) has a suitable connection on the communications channel present. When CD is FALSE, there is no suitable connection. |
| CTS | TRUE/FALSE Clear-To-Send state is returned (<i>READ-ONLY</i>). |
| CTSFLOW | TRUE/FALSE Enable CTS output flow control (Input signal). When CTSFLOW is enabled, it causes the DTE (computer) to stop sending data whenever the CTS signal is set to logic low by the DCE (modem). Transmission continues when the DCE (modem) sets the CTS signal back to logic high. The CTS signal is usually used in response to an RTS signal. |
| DSR | TRUE/FALSE Data-Set-Ready state is returned (<i>READ-ONLY</i>). |
| DSRFLOW | TRUE/FALSE Enable DSR output flow control (Input signal). When DSRFLOW is enabled, it causes the DTE (computer) to stop sending data whenever the DSR signal is set to logic low by the DCE (modem). Transmission is enabled when the DSR signal returns to logic high. The DSR signal is often used in conjunction with CTS in response to a RTS signal. |
| DSRSENS | TRUE/FALSE Enable DSR sensitivity. When DSRSENS is enabled, data received by the DTE (computer) is placed into the receive buffer only if DSR is set to logic high. If DSR is set low, received data is discarded. Enabling DSRSENS allows DSR to enable or disable the DTE (the computer) to receive data from the DTE (the modem). DSRSENS is rarely used in practical communications situations. |
| DTRFLOW | TRUE/FALSE Enable DTR handshaking flow control (Output signal). When DTRFLOW is enabled, it signals that the DCE (modem) should prepare to connect to the communications channel. DTR is usually used for modem on-hook/off-hook control, but can also be used in conjunction with DSR for handshaking. |
| DTRLINE | TRUE/FALSE Enable DTR line. When enabled, DTRLINE leaves the DTR line active when the port is closed by the DTE (computer). This ensures that the DCE (modem) does not close the communications channel when the port is closed. |
| NULL | TRUE/FALSE Null (\$NUL) bytes are discarded when read. |
| PARITY | TRUE/FALSE Enable parity checking. This mode must be enabled for the other Parity options to be selected. |
| PARITYCHAR | Character to use for parity error replacement. PARITY must be enabled. |
| PARITYREPL | TRUE/FALSE Enable character replacement on parity error. PARITY must be enabled. |
| PARITYTYPE | 0 = None, 1 = Odd, 2 = Even, 3 = Mark, 4 = Space. PARITY must be enabled. Default = 0. |
| RING | TRUE/FALSE Ring indicator is on (<i>READ-ONLY</i>). When RING returns TRUE, a ringing signal is being received on the communications channel (by the modem). RING approximates the state of the ringing signal; however, it may not report accurately in all Windows platforms. |
| RLSD | Receive-line-signal-detect (<i>READ-ONLY</i>). See CD/Carrier Detect above. |
| RTSFLOW | Ready To Send (Output signal). 0 = Disable, 1 = Enable, 2 = Handshake, 3 = Toggle. Toggle is used for half-duplex (2-wire) operations to "reverse" the line. While the DTE (computer) is busy sending data, it raises the RTS signal, and the DCE (modem) blocks its data receive channel. When RTS signal reverts to logic low, the DCE (modem) reverts to transmit mode and the DTE (computer) switches to receive mode. Handshake mode causes the DTE (computer) to check the receive buffer (RXQUE) after each character is placed into the buffer. When the buffer is 5/6th full, the RTS signal is dropped. When the receive buffer drops to below 1/6th full, RTS is raised |

| | |
|----------|---|
| | again. |
| RXBUFFER | Size of the receive buffer in bytes. |
| RXQUE | Bytes currently in the receive buffer (<i>READ-ONLY</i>). |
| STOP | 0 = 1 stop bits , 1 = 1.5 stop bits, 2 = 2 stop bits. |
| TXBUFFER | Size of the transmit buffer in bytes. In some cases, Windows may not be able to report the transmit size. |
| TXQUE | Bytes currently in the transmit buffer (<i>READ-ONLY</i>). |
| XINPFLOW | TRUE/FALSE Enable XON/XOFF input flow control. When the DTE (computer) receive buffer is full, an XOFF character is sent to the DCE (modem) to instruct it to halt transmission. When the DCE is ready to resume transmission, an XON character is sent to the DCE. Typically, XOFF is sent when the receive buffer has less than 1/16th remaining, and XON is sent when the receive buffer drops to less than 1/16th of its maximum size. Default = FALSE. |
| XOUTFLOW | TRUE/FALSE Enable XON/XOFF out flow control. When enabled, the DCE (modem) sends an XOFF to the DTE (computer) to halt data transmission to the DCE. When the DCE is ready to receive more data, an XON character is sent. XOUTFLOW typically uses the same 1/16th rules as XINPFLOW. Default = FALSE. |

Common baud rates range from 110 to 256000. There are equates defined in the [WIN32API.INC](#) file, prefixed with %CBR_ to assist you with specifying a common baud rate, but you are not restricted to a limited set of rates.

To open a communication port and initialize it for use, you will need to set the following parameters. The values are for demonstration purposes, you may choose your own settings as necessary.

```
' Minimum recommended settings
COMM SET #hComm, BAUD      = 9600   ' 9600 baud
COMM SET #hComm, BYTE     = 8       ' 8 bits
COMM SET #hComm, PARITY   = %FALSE  ' No parity
COMM SET #hComm, STOP     = 0       ' 1 stop bit
COMM SET #hComm, TXBUFFER = 2048    ' 2 Kb transmit buffer
COMM SET #hComm, RXBUFFER = 4096    ' 4 Kb receive buffer

' Optional settings for flow control
COMM SET #hComm, CTSFLOW  = 1       ' Enable CTS flow control
COMM SET #hComm, RTSFLOW  = 1       ' Enable RTS flow control
COMM SET #hComm, XINPFLOW = 0       ' Disable XON/OFF Input
                                       ' flow control
COMM SET #hComm, XOUTFLOW = 0       ' Disable XON/XOFF output
                                       ' flow
```

When we have finished using our communication channel, we can terminate it using the [COMM CLOSE](#) function:

```
COMM CLOSE #hComm
```

If any errors occur when attempting to open the communications port, or as a result of an invalid *Commfunc* value, PowerBASIC will set the [ERR](#) system variable.

See Also

[Serial Communications](#)

[Communications Basics](#)

[Communication Buffers](#)

[Parity and general error checking](#)

[Start and Stop bits](#)

[Reading and writing data](#)

[A simple communications program](#)

Reading and writing data

Reading and writing data

To complement the new [COMM OPEN](#) statement, PowerBASIC introduces four new statements to help you write serial communications programs:

```

COMM PRINT #hComm, expr [;]
COMM SEND #hComm, expr
COMM RECV #hComm, count, expr
COMM LINE [INPUT] #hComm, expr

```

[COMM PRINT](#) and [COMM SEND](#) are used to send data out of the communications port (via the transmit buffer). [COMM PRINT](#) sends the data specified by *expr* followed by a CR/LF byte pair {[\\$CRLF](#) or [CHR\\$\(13,10\)](#)}. By adding a trailing semicolon to the [COMM PRINT](#) statement, PowerBASIC suppresses these CR/LF bytes. [COMM SEND](#) is identical to [COMM PRINT](#) with a trailing semicolon.

[COMM RECV](#) and [COMM LINE](#) [INPUT] are used to receive data from a communications port (via the receive buffer). The [COMM](#)(#hComm, RXQUE) function can be used to identify the number of bytes that can be retrieved with [COMM RECV](#). [COMM LINE](#) is used to return a CR/LF delimited "line" of data from the receive buffer.

If your communications application is primarily dealing with binary data transmission and reception, [COMM SEND](#) and [COMM RECV](#) will suit this purpose exactly. [COMM PRINT](#) and [COMM INPUT](#) are very useful for sending "AT" commands to a modem and receiving the modem response. For example:

```

COMM PRINT #hComm, "AT"
SLEEP 1000 ' Give modem time to respond
WHILE COMM(#hComm, RXQUE)
  COMM LINE #hComm, a$
  ' Display "AT" (the modem echo),
  ' followed by "OK" (the modem response)
  #IF %DEF(%PB_CC32)
    PRINT a$
  #ELSE
    MSGBOX a$
  #ENDIF
WEND

```

The [COMM RESET](#) statement allows you to switch off all flow control during a serial communications session.

```

COMM RESET #hComm, FLOW

```

See Also

[Serial Communications](#)

[Communications Basics](#)

[Communication Buffers](#)

[Parity and general error checking](#)

[Start and stop bits](#)

[Opening a communications port](#)

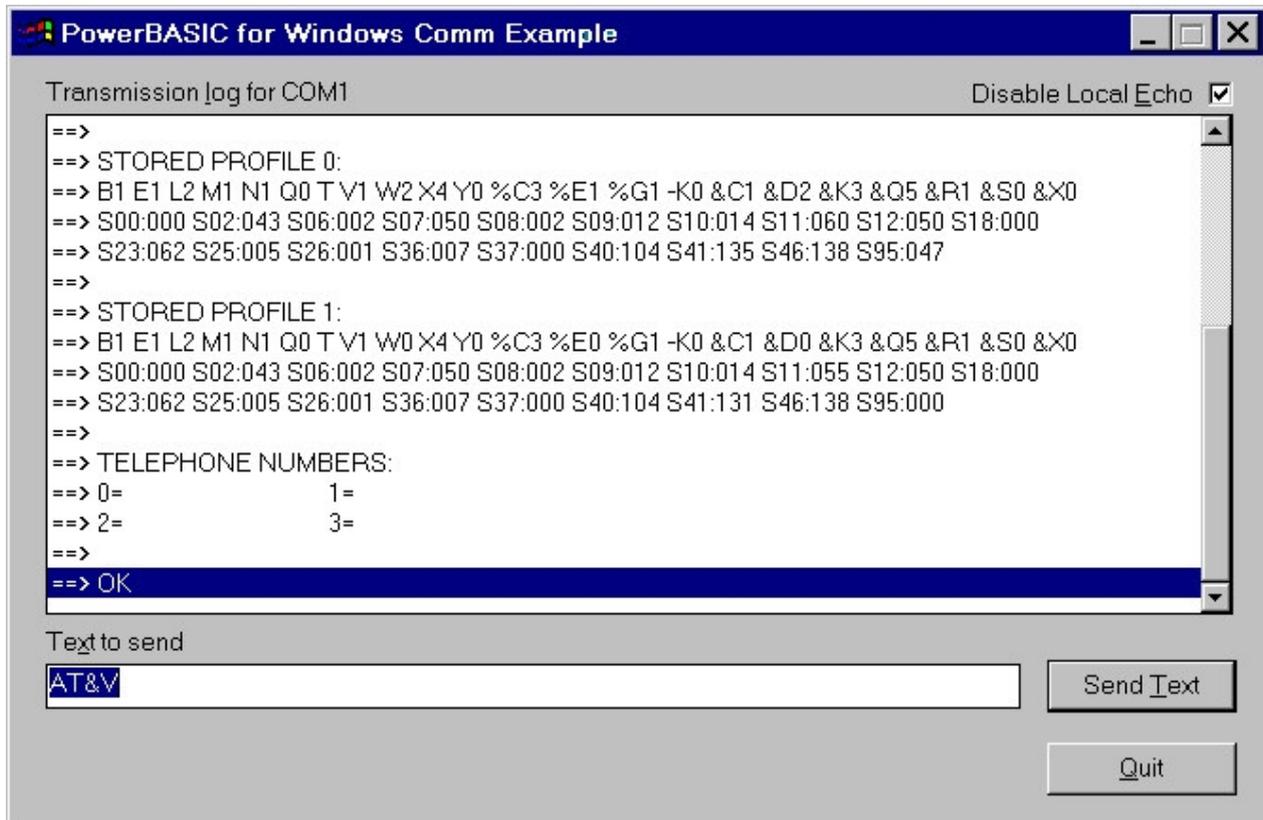
[A simple communications program](#)

A simple communications program

A simple communications program

Let's assume you want a simple communications program to use for accessing a local computer bulletin board. You know the parameters for the board: it is 14400 baud, 8 data bits, one stop bit, and no parity.

You want to display data on your screen, be able to type data, and have it sent to the bulletin board. You intend to use a modem connected to COM1. The following short program serves as a starting point, and uses PowerBASIC's new [DDI](#) features to create the user interface:



```

-----
|
|   Serial Communications Example for PowerBASIC for Windows
|           Copyright (C) 2004-2009 PowerBASIC, Inc.
|
|   Be sure to set the $ComPort constant to the appropriate
|   COM port before compiling this example!
|
|-----
#COMPILE EXE
#DIM ALL
#INCLUDE "WIN32API.INC"

$ComPort      = "COM1"
$AppTitle     = "PowerBASIC for Windows Comm Example"
%IDD_MAIN     = 100
%IDC_LISTBOX1 = 101
%IDC_EDIT1    = 102
%IDC_SEND     = 103
%IDC_QUIT    = 106
%IDC_ECHO     = 107

```

```

GLOBAL hComm          AS LONG
GLOBAL Updating       AS LONG
GLOBAL hThread        AS DWORD
GLOBAL ThreadClose    AS LONG

DECLARE FUNCTION StartComms          AS LONG
DECLARE FUNCTION SendLine(ASCIIZ)   AS LONG
DECLARE FUNCTION ReceiveData(BYVAL LONG) AS LONG
DECLARE FUNCTION EndComms           AS LONG
DECLARE FUNCTION AddLine(BYVAL LONG, BYVAL LONG, ASCIIZ) AS LONG

CALLBACK FUNCTION Dialog_Callback() AS LONG
  SELECT CASE CB.MSG
    CASE %WM_INITDIALOG
      ' Set focus to the edit control
      CONTROL SET FOCUS CB.HNDL, %IDC_EDIT1

      ' Set SELECTION range to highlight the initial entry
      CONTROL SEND CB.HNDL, %IDC_EDIT1, %EM_SETSEL, 0, -1

      ' Return 0 to stop dialog box engine setting focus
      FUNCTION = %FALSE
  END SELECT
END FUNCTION

CALLBACK FUNCTION Send_Callback() AS LONG
  DIM SendText AS ASCIIZ * 1024, ListCount AS LONG
  DIM lResult AS LONG, hListBox AS DWORD

  ' Obtain the text to send from the edit control
  CONTROL GET TEXT CB.HNDL, %IDC_EDIT1 TO SendText

  ' Set the update flag
  Updating = %TRUE

  ' Send the line to the comm port
  IF SendLine(SendText) THEN
    SendText = "Transmission Error!"
  ELSE
    ' Check the Echo mode state
    CONTROL GET CHECK CB.HNDL, %IDC_ECHO TO lResult
    IF ISTRUE lResult THEN SkipEcho
  END IF

  ' Add the echo to the listbox
  CALL AddLine(CB.HNDL, %IDC_LISTBOX1, "<== " + SendText)

SkipEcho:
  ' Set the SELECTION range for the edit control so the
  ' next keypress "clears" the existing text
  CONTROL SEND CB.HNDL, %IDC_EDIT1, %EM_SETSEL, 0, -1

  ' restore the keyboard focus to the edit control
  CONTROL SET FOCUS CB.HNDL, %IDC_EDIT1

  ' Release the update flag
  Updating = %FALSE
  FUNCTION = %TRUE
END FUNCTION

```

```

CALLBACK FUNCTION Quit_Callback() AS LONG
  ' Kill the dialog and let PBMAIN() continue
  DIALOG END CB.HNDL, 0

  FUNCTION = 1
END FUNCTION

FUNCTION AddLine(BYVAL hWnd AS DWORD, BYVAL nID AS LONG, SendText AS ASCIIZ) AS LONG
  DIM ListCount AS LONG

  ' Find the current listbox count
  LISTBOX GET COUNT hWnd, nID TO ListCount

  ' Update the listbox
  LISTBOX ADD hWnd, nID, SendText

  ' Scroll the new item into view
  LISTBOX SELECT hWnd, nID, ListCount + 1
END FUNCTION

FUNCTION PBMAIN
  ' Build our GUI interface.
  DIM hDlg AS DWORD, Txt(1 TO 1) AS STRING, lResult AS LONG

  ' Initialize the port ready for the session
  IF ISFALSE StartComms THEN
    MSGBOX "Failure to start communications!",, $AppTitle
    EXIT FUNCTION
  END IF

  Txt(1) = "Listbox holds the transmission I/O stream..."

  ' Create a modal dialog box
  DIALOG NEW 0, $AppTitle,,, 330, 203, %WS_POPUP OR %WS_VISIBLE OR %WS_CLIPCHILDREN OR
  _
  %WS_CAPTION OR %WS_SYSMENU OR %WS_MINIMIZEBOX, 0 TO hDlg

  ' Add our application controls
  CONTROL ADD LABEL, hDlg, -1, "Transmission &log for " & $ComPort, 9, 5, 100, 10, 0

  CONTROL ADD LISTBOX, hDlg, %IDC_LISTBOX1, Txt(), 9, 15, 313, 133, %WS_BORDER OR _
  %LBS_WANTKEYBOARDINPUT OR %LBS_DISABLENOSCROLL OR %WS_VSCROLL OR %WS_GROUP OR _
  %WS_TABSTOP OR %LBS_NOINTEGRALHEIGHT
  CONTROL ADD LABEL, hDlg, -1, "Text to send", 9, 151, 100, 10, 0
  CONTROL ADD TEXTBOX, hDlg, %IDC_EDIT1, "ATZ", 9, 161, 257, 12, %ES_AUTOHSCROLL OR _
  %ES_NOHIDESEL OR %WS_BORDER OR %WS_GROUP OR %WS_TABSTOP
  CONTROL ADD BUTTON, hDlg, %IDC_SEND, "Send &Text", 273, 160, 50, 14, %WS_GROUP OR _
  %WS_TABSTOP OR %BS_DEFPUSHBUTTON CALL Send_Callback
  CONTROL ADD BUTTON, hDlg, %IDC_QUIT, "&Quit", 273, 182, 50, 14, %WS_GROUP OR %
  WS_TABSTOP _
  CALL Quit_Callback
  CONTROL ADD CHECKBOX, hDlg, %IDC_ECHO, "Disable Local "+ "&Echo", 252, 5, 70, 10, _
  %WS_GROUP OR %WS_TABSTOP OR %BS_AUTOCHECKBOX OR %BS_LEFTTEXT

  ' Erase our array to free memory no longer required
  REDIM Txt()

  ' Create a "listen" Thread to monitor input from the modem
  THREAD CREATE ReceiveData(hDlg) TO hThread

```

```

' Start the dialog box & run until DIALOG END executed.
DIALOG SHOW MODAL hDlg, CALL Dialog_Callback TO lResult

' Close down our "listen" Thread
ThreadClose = %TRUE

DO
  THREAD CLOSE hThread TO lResult

  ' Release time-slice for improved multitasking
  SLEEP 0
LOOP UNTIL ISTRUE lResult

' Flush & close the comm port
CALL EndComms

FUNCTION = %TRUE
END FUNCTION

FUNCTION StartComms AS LONG
  hComm = FREEFILE
  COMM OPEN $COMPORT AS #hComm
  IF ERRCLEAR THEN EXIT FUNCTION      ' Port problem?

  COMM SET #hComm, BAUD      = 14400  ' 14400 baud
  COMM SET #hComm, BYTE     = 8      ' 8 bits
  COMM SET #hComm, PARITY   = %FALSE ' No parity
  COMM SET #hComm, STOP     = 0      ' 1 stop bit
  COMM SET #hComm, TXBUFFER = 4096   ' 4 Kb transmit buffer
  COMM SET #hComm, RXBUFFER = 4096   ' 4 Kb receive buffer

  FUNCTION = %TRUE
END FUNCTION

FUNCTION SendLine(SendText AS ASCIIZ) AS LONG
  COMM PRINT #hComm, SendText
END FUNCTION

FUNCTION ReceiveData(BYVAL hWnd AS DWORD) AS LONG
  DIM InboundData AS STRING
  DIM Stuf AS STRING, ListCount AS LONG
  DIM Qty AS LONG, x AS LONG, a AS STRING

  WHILE ISFALSE ThreadClose
    ' Test the RX buffer
    Qty = COMM(#hComm, RXQUE)

    ' Abort this iteration if sending
    IF ISFALSE Qty OR Updating THEN
      SLEEP 100
      ITERATE LOOP
    END IF

    ' Read incoming characters
    COMM RECV #hComm, Qty, Stuf

    InBoundData = InBoundData & Stuf

    ' strip out LF characters
    REPLACE CHR$(10) WITH "" IN InBoundData

```

```

' process only complete lines of data terminated by CR
WHILE INSTR(InboundData, CHR$(13))
  ' Display the data
  CALL AddLine(hWnd, %IDC_LISTBOX1, "==" + EXTRACT$(InBoundData, CHR$(13)))

  ' reduce the buffer to remove the "displayed" line
  InBoundData = STRDELETE$(InBoundData, 1, LEN(EXTRACT$(InBoundData, CHR$(13))) +
1)
WEND
WEND

FUNCTION = %TRUE
END FUNCTION

FUNCTION EndComms() AS LONG
  DIM dummy AS STRING

  ' Flush the RX buffer & close the port
  SLEEP 1000

  IF COMM(#hComm, RXQUE) THEN
    COMM RECV #hComm, COMM(#hComm, RXQUE), dummy
  END IF

  COMM CLOSE #hComm
END FUNCTION

```

This short program allows you to connect with the bulletin board, but it will not dial the number of the bulletin board through the program itself. You can do that easily though, in one of two ways:

You can dial the bulletin board manually. When you're done dialing, connect the telephone line to the modem (or press a button on your modem, switching the line from the telephone back to the modem). The program should now be ready to receive whatever the bulletin board sends.

You can send the appropriate signals directly to the modem itself. Most modems recognize a common command set originated by the Hayes Company. To initialize the modem and dial, you would enter the following commands:

```

ATZ
ATDT18005551212

```

Note: some modems require capital letters for AT commands. Lowercase letters will not work.

After you have entered the ATZ command, the modem responds. You will see the message "OK" on your screen. After you have entered ATDT and the telephone number, the modem's lights flicker for a moment. If your modem is capable of making a sound, you should hear the sounds of the number being dialed, and the telephone ringing at the other end.

If the number is busy, you may hear a busy signal through your modem speaker, or you may not hear anything more. If the connection is made, you may see some garbage characters on your screen.

At this point, many users become concerned and think that something must be wrong. Why are there illegible characters on screen? Relax: this happens often. The computer you called does not yet know what baud rate and communications parameters you are using. In most cases, you should press ENTER a few times; the computer at the other end will use that character to determine what your parameters are and will adjust itself accordingly. Soon afterward, you should see a welcoming message. You may now type whatever you like.

If you see double lines of characters, click on the Disable Local Echo button. This simply prevents the code from adding your characters to the transmission log window.

If you wish to send a stream of AT commands to a modem in quick succession, you may be required to add a small delay between each AT command, in order to give the modem time to decode each command and

respond appropriately. A delay of 100 to 200 milliseconds (mSec) is usually sufficient.

Using disk files

The sample program does not let you save material to a disk file, or send data from a [disk file](#) to the bulletin board. Nevertheless, those two options are very useful. How do you do it?

Let us suppose you wanted to send a disk file to the bulletin board. To do that, the routine that sends your keystrokes to the bulletin board must be altered. The usual way to do this is to assign a special keystroke a different meaning: instead of being sent, it is interpreted as a command to get the name of a disk file, read that disk file, and send it to the bulletin board.

Let's add a new button to our dialog window to provide access to this feature - we will label this button Send File. In addition, we must also add a [Callback Function](#) to handle the event from this button. Let's start by adding the following equate definition to the block near the beginning of the file:

```
%IDC_SENDFILE = 104
```

Now we will insert the new Callback Function to the code. We'll add this immediately after the Send Callback() function ends:

```
CALLBACK FUNCTION SendFile_Callback() AS LONG
    STATIC SendFileName AS STRING
    LOCAL hReadFile AS LONG, FileLen AS LONG, Chunk AS LONG
    LOCAL i AS LONG, Buff1 AS STRING

    Buff1 = INPUTBOX$("Name of disk file to transmit?", $AppTitle, SendFileName)
    IF ISFALSE LEN(Buff1) OR ISFALSE LEN(DIR$(Buff1)) THEN EXIT FUNCTION

    SendFileName = Buff1
    CALL AddLine(CB.HNDL, %IDC_LISTBOX1, "Wait... Sending " & SendFileName)
    DIALOG DOEVENTS

    ' send the file
    hReadFile = FREEFILE
    OPEN SendFileName FOR BINARY AS #hReadFile ' Binary mode
    FileLen = LOF(hReadFile) ' File length
    Chunk = MAX(32, COMM(#hComm, TXBUFFER) \ 2) ' 1/2*Buf

    FOR ix = 1 TO FileLen \ Chunk
        GET$ #hReadFile, Chunk, Buff1 ' Read a chunk
        COMM SEND #hComm, Buff1 ' and send it
        SLEEP 0
    NEXT i

    IF FileLen MOD Chunk <> 0 THEN ' More to send?
        GET$ #hReadFile, FileLen MOD Chunk, Buff1
        COMM SEND #hComm, Buff1
    END IF

    CLOSE #hReadFile
    CALL AddLine(CB.HNDL, %IDC_LISTBOX1, "Transmission complete!")
END FUNCTION
```

Finally, we insert the code that adds a new control button on the dialog box. Add the following line to the group of

statements in the [PBMAIN](#) function.

```
CONTROL ADD BUTTON, hDlg, %IDC_SENDFILE, "&Send File", 9, 182, 50, 14, %WS_GROUP OR _
    %WS_TABSTOP CALL SendFile_Callback
```

The routine works, but there's no error checking in it. If the disk file does not exist, nothing is sent, but a zero-length file is created. If you enter an illegal file name, the program will set the [ERR system variable](#) to

indicate that [a potentially fatal] error has occurred. You'll probably want to add some kind of [error checking](#) to the program for those reasons.

To receive a disk file, we will add yet another button to the dialog window titled Receive File. However, things are not quite as simple as the code we added to send a file: you must be able to use the program at the same time as the data is stored, as it comes in from the serial port. We also need a way to stop receiving a disk file.

First, we will add another equate to the beginning of the file, exactly as before:

```
%IDC_RECEIVEFILE = 105
```

Add the following line at the end of the [GLOBAL](#) variable declarations, just below the equates:

```
GLOBAL hWriteFile AS LONG
```

Next, add the Callback Function code, immediately after the SendFile_Callback() function that we just added.

```
CALLBACK FUNCTION ReceiveFile_Callback() AS LONG
  STATIC ReceiveFileName AS STRING
  LOCAL Buff2 AS STRING

  ' First check if file is already open
  IF hWriteFile THEN
    ' Close the file
    CLOSE #hWriteFile

    CALL AddLine(CB.HNDL, %IDC_LISTBOX1, "Finished writing file!")

    ' Update the button label
    CONTROL SET TEXT CB.HNDL, %IDC_RECEIVEFILE, "&Receive File"

    RESET hWriteFile

  EXIT FUNCTION
  END IF

  ' Create a new file
  Buff2 = INPUTBOX$("Output file name?", $AppTitle, ReceiveFileName)
  IF ISFALSE LEN(Buff2) THEN EXIT FUNCTION

  ReceiveFileName = Buff2
  hWriteFile = FREEFILE

  OPEN ReceiveFileName FOR APPEND AS #hWriteFile
  IF ERRCLEAR THEN
    ' Error opening the file
    RESET hWriteFile
  ELSE
    ' Update the dialog
    CALL AddLine(CB.HNDL, %IDC_LISTBOX1, "Receiving data stream to " &
ReceiveFileName)
    CONTROL SET TEXT CB.HNDL, %IDC_RECEIVEFILE, "Stop &Receive"
  END IF
  END FUNCTION
```

Now add the CONTROL ADD statement into PBMAIN in the same manner as before.

```
CONTROL ADD BUTTON, hDlg, %IDC_RECEIVEFILE, "&Receive File", 62, 182, 50, 14, %
WS_GROUP OR _
  %WS_TABSTOP CALL ReceiveFile_Callback
```

Finally, to ensure that the disk file is closed correctly, if the program is closed before the file is closed, insert the following lines just before the END FUNCTION within PBMAIN.

```
IF hWriteFile THEN CLOSE #hWriteFile
```

When we click on the new Receive File button, we enter the file name that will be used to save the data. At this point, the output file is opened. The received data will be appended to the end of any existing file of that name. However, we have not provided any way to actually save any of that information. To do that, add one more small line of code to the ReceiveData() function, immediately after the line:

```
InBoundData = InBoundData & Stuf
```

The added line reads:

```
' If Receive mode is on, write raw data to the file
IF hWriteFile THEN PRINT #hWriteFile, Stuf;
```

Finishing touches

If we examine this example file, we find that we have overlooked one problem: if the program is terminated while the output file is in use, the file is not closed.

While this is not a fatal condition, it is a poor approach to program design: we should always close the files we have opened. Remembering to perform this chore will stand you in good stead when it comes to using the Windows API functions. In many cases, failing to close a registry key or delete a GDI object can cause both deceptive and difficult bugs to locate; or memory leaks that reduce system memory even after your program has ended. The golden rule should always be before you leave, clean up after yourself.

So, faced with this problem, how do we know if the output file is open before we end the program? Simple... we set the global variable that holds the file number when the file was open. If this number is non-zero (logical TRUE), we can simply assume we need to close the file before finally exiting the program.

After the line that reads:

```
CALL EndComms
```

We add the following line to the file:

```
IF hWriteFile THEN CLOSE #hWriteFile
```

In this instance, we control three possible scenarios with only one line of code:

1. the output file feature was not used (hFile2 = 0)
2. the output file remained open when the program was about to end (hFile2 <> 0)
3. the output file had been used, but had been closed before program termination (hFile2 <> 0)

It is true that we could have just closed the file associated with hWriteFile regardless of the state of the file or the value of the file number. However, in most programming circles, that is considered to be a poor approach. It is always better to write code that is fail-safe in as many conditions as possible.

The final program can be found in the PB\SAMPLES\COMM folder of your PowerBASIC installation. It is not very large, but it handles a surprising number of ordinary communications tasks. It lacks some error checking, as has been noted. If you choose to modify this program, you might want to put some error checking in. You might also want to test for such problems as the [List box](#) control filling up to the limits of the operating system (i.e., 32767 entries in Windows 95/98/ME), and even add a few more buttons to send certain preformatted strings to modem, for example "ATZ" or "ATDT555-1234".

Compared to DOS applications, this communications application may seem overly complex. This is because we simply cannot afford to use 100% of the CPU just to monitor a serial port. If we did, your multitasking operating system would suddenly take a huge drop in performance. If you examine the code a little more deeply, you will see it takes advantage of a very handy feature of 32-bit Windows: [multi-threading](#).

This communications program consists of two threads in total: (1) the main thread handles the user commands and sending data to the modem; (2) the second thread simply monitors the serial port for receive data. If we used only one single thread in this application, the code would need to share its time between both data reception and transmission, but by using two, we ensure that the CPU is not heavily loaded unnecessarily.

Using a second thread in this way effectively splits the application into two (almost) independent sections.

The only time these threads need to be aware of each other is when one is writing to the list box control.

To handle this, we used a GLOBAL variable to signal when data was being displayed; temporarily "locking" the other thread until the task was complete.

For further experimentation, you could split the main thread down even further and create a separate thread just for writing data to the serial port. You could even try replacing the [TEXTBOX](#) control with a [COMBOBOX](#) so users can scroll back through the most recent "send" strings, providing a simple "history" feature.

See Also

[Communications Basics](#)

[Communication Buffers](#)

[Parity and general error checking](#)

[Start and Stop bits](#)

[Opening a communications port](#)

[Reading and writing data](#)

TCP and UDP Communications

TCP and UDP Communications

TCP and UDP Communications

Network Communications is one of the hottest programming topics today. Whether you need to send an email message to an SMTP server on your Intranet, or transfer a file from a remote Internet server halfway around the world, PowerBASIC can handle your network communications requirements.

Networks typically consist of many computers, all with a number of different hardware architectures and operating systems. Your local area network might have machines running Windows, Linux, DOS, OS/2, or Mac OS. Your network may use IPX, ATM, or some other transmission protocol for sending data packets from one computer to the next. The architects of the Internet needed a transmission protocol that could be used on any platform.

See Also

[The Internet Protocol \(IP\)](#)

[User Datagram Protocol \(UDP\)](#)

[Transmission Control Protocol \(TCP\)](#)

[Winsock](#)

[Request for Comments \(RFC\)](#)

[TCP clients and servers](#)

[Simple Mail Transfer Protocol \(SMTP\)](#)

[An ECHO client and server using TCP](#)

The Internet Protocol (IP)

The Internet Protocol (IP)

The Internet Protocol was designed for transmitting blocks of data called datagrams from a source location, to one or more destinations. It is specifically limited to provide the functions necessary to deliver a datagram from a source to a destination over an interconnected system of networks. There is no

functionality for data reliability, flow-control, or sequencing. It works by using one local network to connect with another local network, until the datagram is delivered to its destination - although, a datagram does not have to leave the local network at all if the destination does not reside outside of the network.

The source and the destination are specified as numeric addresses, also known as IP addresses. An IP address consists of four bytes. The combined sequence of the four bytes is unique for each connection to the network (a single computer can have more than one connection to the network, and therefore can have more than one IP address).

Let's say that you want to send the message "Hello" from your computer to another computer on the network. Your computer cannot simply transmit the 5 bytes of your message over the network cable. It first has to create a datagram. In simple terms, the datagram would include the identity of your computer (the sender), the identity of the computer you are sending the message to, and some kind of checksum that allowed the receiving computer to verify that the datagram arrived intact. Your computer would deliver that datagram to a host or gateway on your network.

The gateway will then determine where the datagram needs to go next. If the destination computer is on the same local network, it may simply deliver it to the destination. If the destination is outside of the local network, the datagram is delivered to another host or gateway "downstream" from your network. After that, either that host or gateway would then send the datagram even further downstream toward the destination; or if the destination resides on the local network of the current host or gateway, it will deliver the datagram to the final destination itself.

During this journey, it is possible for the datagram to become corrupted, be misrouted (and lost), or simply expire because the journey was too long. The Internet Protocol does not provide any notification capabilities to inform the sender of a delivery problem. It is also possible for large datagrams to be chopped into multiple smaller datagrams if any host or gateway along the path cannot handle the size of the datagram. Each datagram is then broken into as many smaller datagrams as it needs to hold all of the data. Those datagrams then have to be reassembled at the destination.

See Also

[User Datagram Protocol \(UDP\)](#)

[Transmission Control Protocol \(TCP\)](#)

[Winsock](#)

[Request for Comments \(RFC\)](#)

[TCP clients and servers](#)

[Simple Mail Transfer Protocol \(SMTP\)](#)

[An ECHO client and server using TCP](#)

User Datagram Protocol (UDP)

User Datagram Protocol (UDP)

Obviously, writing code to deal with reassembling fragmented datagrams would make you think twice about how badly your application needs to communicate over a network. Fortunately, the Internet architects provided a protocol layer that sits on top of the [Internet Protocol](#).

UDP uses the Internet Protocol to send datagrams from a source to a destination. When the datagram arrives at the destination, it hands the complete datagram packet to the client. If the datagram was fragmented along the way, it reassembles the fragments into a complete datagram beforehand.

Like the Internet Protocol it uses, UDP does not guarantee delivery of a datagram. Its purpose is simply to format a datagram with your data, send it via the Internet Protocol to a destination, and at the destination, deliver the complete datagram to a client.

One interesting aspect of the Internet Protocol is that datagrams can be delivered to a destination in a different sequence than the one in which they were sent. For example: your application sends two datagrams to another computer. The first datagram is routed along a longer path than the second datagram, and therefore arrives at the destination after the second datagram has arrived.

See Also

- [The Internet Protocol \(IP\)](#)
- [Transmission Control Protocol \(TCP\)](#)
- [Winsock](#)
- [Request for Comments \(RFC\)](#)
- [TCP clients and servers](#)
- [Simple Mail Transfer Protocol \(SMTP\)](#)
- [An ECHO client and server using TCP](#)

Transmission Control Protocol (TCP)

Transmission Control Protocol (TCP)

TCP is a connection-based protocol layer that guarantees delivery of data to the destination. The reliability and flow control of TCP requires that status information be sent with each datagram indicating sequence numbers and checksums. So that TCP transmissions can recover from data that is damaged, lost, duplicated, or delivered out of order, each datagram is checked for its sequence number, and the data is verified against the checksum. An acknowledgment (ACK) is then required from the recipient for each successful datagram received. If an ACK is not received within a timeout period, the datagram is resent.

Unlike [UDP](#), TCP does not reassemble fragmented datagrams into the original data packet. It simply extracts the data portion of the datagram and adds it to the incoming data stream. This can be problematic if a source has sent 20 bytes of data that is fragmented into two datagrams with 10 bytes each. TCP will give the first 10 bytes to the client without waiting for the next 10 bytes to arrive. UDP will give all 20 bytes of the data, or nothing.

See Also

- [The Internet Protocol \(IP\)](#)
- [User Datagram Protocol \(UDP\)](#)
- [Winsock](#)
- [Request for Comments \(RFC\)](#)
- [TCP clients and servers](#)
- [Simple Mail Transfer Protocol \(SMTP\)](#)
- [An ECHO client and server using TCP](#)

Winsock

Winsock

In Windows, Microsoft has encapsulated the [Internet Protocol](#) and the [TCP](#) and [UDP](#) protocol layers into the Windows Sockets Layer, or "Winsock". Winsock allows an application to send datagrams using either TCP or UDP without having to do low-level programming to create IP datagram packets, deal with receipts

and acknowledgments, or reassemble fragmented datagrams.

PowerBASIC further encapsulates the process by handling DNS resolution of IP addresses, and presents statements familiar to the programming model used by BASIC programmers. You are free to concentrate on the data being sent and ignore the details of sending it.

PowerBASIC requires version 2.0 or later of Winsock.

See Also

- [The Internet Protocol \(IP\)](#)
- [User Datagram Protocol \(UDP\)](#)
- [Transmission Control Protocol \(TCP\)](#)
- [Request for Comments \(RFC\)](#)
- [TCP clients and servers](#)
- [Simple Mail Transfer Protocol \(SMTP\)](#)
- [An ECHO client and server using TCP](#)

Request for Comments (RFC)

Request for Comments (RFC)

All of the technical specifications for the Internet are contained in white papers called "Request for Comments". For example, the RFC document describing the [UDP](#) protocol is RFC768.TXT and can be downloaded from <http://www.rfc-editor.org>.

See Also

- [The Internet Protocol \(IP\)](#)
- [User Datagram Protocol \(UDP\)](#)
- [Transmission Control Protocol \(TCP\)](#)
- [Winsock](#)
- [TCP clients and servers](#)
- [Simple Mail Transfer Protocol \(SMTP\)](#)
- [An ECHO client and server using TCP](#)

TCP clients and servers

TCP clients and servers

The [Internet Protocol](#) driver in [Winsock](#) actually sends and receives the datagrams itself, and the [UDP](#) and [TCP](#) layers take care of data integrity. However, to actually communicate with another computer over the Internet your code will have to handle the data itself. That is typically done using a high-level protocol such as [SMTP](#), POP3, FTP, and others.

Think of [IP](#) as the telephone wire that carries a voice from a transmitter of one telephone to a receiver of another telephone. UDP and TCP are simply different types of telephones that make sure each sound is received exactly as it was sent. Therefore, SMTP, POP3, FTP, etc, should be considered the language that you use to speak. Both the caller and the person being called need to speak the same language if they wish to understand the conversation. Obviously, you cannot speak Latin to a person who only understands

English or French.

See Also

[The Internet Protocol \(IP\)](#)
[User Datagram Protocol \(UDP\)](#)
[Transmission Control Protocol \(TCP\)](#)
[Winsock](#)
[Request for Comments \(RFC\)](#)
[Simple Mail Transfer Protocol \(SMTP\)](#)
[An ECHO client and server using TCP](#)

Simple Mail Transfer Protocol (SMTP)

Simple Mail Transfer Protocol (SMTP)

One of the easiest high-level [TCP](#) protocols to use is [SMTP](#) for sending an email message. This application simply connects to an SMTP server via TCP, identifies itself, and identifies who the message is for, sends the text of the message, and finally says goodbye. As each line of text is sent to the server, it returns a status code and message to indicate progress. The following code demonstrates this:

```
' Be sure to change the following two string equates
' to the name of your SMTP mail server and your email
' address.
#COMPILE EXE

$mailhost = "mailserver.mydomain.com"
$mailfrom = "email@address.com"

FUNCTION PBMAIN() AS LONG
  ' Get the local computer's IP address and name
  HOST ADDR TO ip&
  HOST NAME ip& TO hostname$

  ' ** Connect to the mailhost
  hTCP& = FREEFILE
  TCP OPEN "smtp" AT $mailhost AS hTCP&
  IF ERR THEN
    MSGBOX "Error connecting to mailhost"
    EXIT FUNCTION
  ELSE
    TCP LINE hTCP&, buffer$
    IF LEFT$(buffer$, 3) <> "220" THEN
      MSGBOX "Mailhost Error: " & buffer$
      EXIT FUNCTION
    END IF
  END IF

  ' Get the local computer's IP address and name
  HOST NAME TO hostname$

  ' ** Greet the mailhost
  TCP PRINT hTCP&, "HELO " + hostname$
```

```

TCP LINE hTCP&, buffer$
IF LEFT$(buffer$, 3) <> "250" THEN
  MSGBOX "HELO Error: " & buffer$
  TCP CLOSE hTCP&
  EXIT FUNCTION
END IF

' ** Tell the mailhost who we are
TCP PRINT hTCP&, "MAIL FROM:<" & $mailfrom & ">"
TCP LINE hTCP&, buffer$
IF LEFT$(buffer$, 3) <> "250" THEN
  MSGBOX "MAIL FROM Error: " & buffer$
  TCP CLOSE hTCP&
  EXIT FUNCTION
END IF

' ** Tell the mailhost who we want to send the message to
TCP PRINT hTCP&, "RCPT TO:<info@powerbasic.com>"
TCP LINE hTCP&, buffer$
IF LEFT$(buffer$, 3) <> "250" THEN
  MSGBOX "RCPT TO Error: " & buffer$
  TCP CLOSE hTCP&
  EXIT FUNCTION
END IF

' ** Now we can send the message
TCP PRINT hTCP&, "DATA"
TCP LINE hTCP&, buffer$
IF LEFT$(buffer$, 3) <> "354" THEN
  MSGBOX "DATA Error: " & buffer$
  TCP CLOSE hTCP&
  EXIT FUNCTION
END IF

TCP PRINT hTCP&, "From: " & $mailfrom
TCP PRINT hTCP&, "To: info@powerbasic.com"
TCP PRINT hTCP&, "Subject: Greetings!"
TCP PRINT hTCP&, ""
TCP PRINT hTCP&, "Just wanted to say hello."
TCP PRINT hTCP&, "This TCP stuff is great!"

' ** End of the message
TCP PRINT hTCP&, "."
TCP LINE hTCP&, buffer$
IF LEFT$(buffer$, 3) <> "250" THEN
  MSGBOX "DATA Error: " & buffer$
  TCP CLOSE hTCP&
  EXIT FUNCTION
END IF

' ** Say goodbye
TCP PRINT hTCP&, "QUIT"
TCP LINE hTCP&, buffer$
IF LEFT$(buffer$, 3) <> "221" THEN
  MSGBOX "QUIT Error: " & buffer$
  TCP CLOSE hTCP&
  EXIT FUNCTION
END IF

TCP CLOSE hTCP&

```

END FUNCTION

The SMTP protocol is fully described in RFC 821 <http://www.rfc-editor.org>

See Also

[TCP and UDP Communications](#)

[TCP clients and servers](#)

[An ECHO client and server using TCP](#)

An ECHO client and server using TCP

An ECHO client and server using TCP

The simplest [TCP server](#) application is an Echo Server (RFC 862). It simply listens to port 7, and when it receives a data packet, it returns the data packet back to the client.

Writing a TCP server in PowerBASIC is quite straightforward, but your application must contain a (GUI) window or [dialog](#) to receive notification requests from [Winsock](#). It is therefore necessary to either: (1) create a dialog with [DDT](#), or (2) use the Windows API to create a GUI window for the application to receive these notifications. The following function will register a window class, and create a hidden window that can be used by your server.

```

FUNCTION MakeWindow() AS DWORD
    LOCAL wce          AS WndClassEx
    LOCAL szClassName AS ASCIIZ * 80
    LOCAL hWnd        AS DWORD
    STATIC registered AS LONG

    IF ISFALSE registered THEN
        szClassName      = "PBTCPCOMM"
        wce.cbSize       = SIZEOF(wce)
        wce.style        = %NULL
        wce.lpfnWndProc  = CODEPTR(TcpProc)
        wce.cbClsExtra   = 0
        wce.cbWndExtra   = 0
        wce.hInstance   = GetModuleHandle(BYVAL %NULL)
        wce.hIcon        = %NULL
        wce.hCursor      = %NULL
        wce.hbrBackground = %NULL
        wce.lpszMenuName = %NULL
        wce.lpszClassName = VARPTR(szClassName)
        wce.hIconSm      = %NULL
        RegisterClassEx wce
        registered = %TRUE
    END IF

    hWnd = CreateWindow("PBTCPCOMM", "", 0,0,0,0,0, %NULL, %NULL, _
        GetModuleHandle(BYVAL %NULL), BYVAL %NULL)
    ShowWindow hWnd, %SW_HIDE

    FUNCTION = hWnd
END FUNCTION

```

To create a TCP server, your program must first open a socket using the [TCP_OPEN_SERVER](#) statement. Then, when a client contacts your server, this socket will receive the notification. To specify which notifications your code will process, use the [TCP_NOTIFY](#) statement:

```
%TCP_ACCEPT = %WM_USER + 4093 ' user-defined message value
```

```

...
hServer = FREEFILE
TCP OPEN SERVER PORT 7 AS hServer
TCP NOTIFY hServer, ACCEPT TO hWnd AS %TCP_ACCEPT

```

TCP NOTIFY tells Winsock that it should send the %TCP_ACCEPT message to the window specified by hWnd. Your [callback](#) will then include a message handler for the %TCP_ACCEPT message. The lParam& parameter to your callback will tell you what type of notification was sent:

```

%TCP_ECHO = %WM_USER + 4094 ' user-defined message value
...
CASE %TCP_ACCEPT
  SELECT CASE LO(WORD, lParam&)

    '* An ACCEPT notification was sent
    CASE %FD_ACCEPT
      hEcho = FREEFILE
      TCP ACCEPT hServer AS hEcho
      TCP NOTIFY hEcho, RECV CLOSE TO hWnd AS %TCP_ECHO

    .
    . 'other notification code goes here
    .
  END SELECT

```

Once your code receives the ACCEPT notification, it uses the [TCP ACCEPT](#) statement to "close" the socket. A new socket is created for the actual communication with the client. The original socket (hServer) is used strictly to process ACCEPT notifications only. TCP NOTIFY is then used with the new socket handle to process RECV and CLOSE notifications.

When the Echo Client sends its message to your server, a RECV notification will be sent to your window. Your code can then log the incoming message, and send it right back to the client. When the CLOSE notification is received, you can close the socket:

```

CASE %TCP_ECHO
  SELECT CASE LO(WORD, lParam&)

    CASE %FD_READ
      IF hEcho <> %INVALID_SOCKET THEN
        TCP RECV hEcho, 1024, buffer
        TCP SEND hEcho, buffer
        LogEvent $DQ + Buffer + $DQ
      END IF

    CASE %FD_CLOSE
      TCP CLOSE hEcho
      hEcho = %INVALID_SOCKET

  END SELECT

```

To connect with the Echo Server, our Client simply needs to open a socket at port 7, send a , and display the string echoed back from the server.

```

FUNCTION PBMAIN() AS LONG
  LOCAL hSocket AS LONG

  hSocket = FREEFILE
  TCP OPEN PORT 7 AT "" AS hSocket
  IF ERR THEN
    MSGBOX "OPEN Error" + STR$(ERR)
    EXIT FUNCTION
  END IF

  IF LEN(COMMAND$) = 0 THEN
    TCP SEND hSocket, "This is a test"

```

```

ELSE
    TCP SEND hSocket, COMMAND$
END IF

TCP RECV hSocket, 1024, buffer$
IF ERR THEN
    MSGBOX "RCV Error" + STR$(ERR)
    EXIT FUNCTION
END IF

MSGBOX buffer$

TCP CLOSE hSocket
END FUNCTION

```

The complete Echo Server and Echo Client sample can be found in your PB\SAMPLES\INTERNET\TCP folder.

Finally, it should be noted that there is no direct correlation between the number of TCP SEND statements executed, compared to the number of %FD_READ messages received. This is because Winsock may concatenate multiple data packets and issue a lesser number of %FD_READ messages in response.

Therefore, it is usually necessary to construct your code so that it continues to read data from the incoming data stream until either the returned string is empty, or an error is detected. For example:

```

DIM InBuffer AS STRING
...
CASE %FD_READ
    InBuffer = ""
    IF hEcho = %INVALID_SOCKET THEN EXIT SELECT

DO
    TCP RECV hEcho, 1024, buffer
    IF LEN(buffer) = 0 OR ISTRUE ERR THEN EXIT LOOP
    InBuffer = InBuffer + buffer
    TCP SEND hEcho, buffer
    LogEvent $DQ + Buffer + $DQ
LOOP
...

```

See Also

[TCP and UDP Communications](#)

[Simple Mail Transfer Protocol \(SMTP\)](#)

Objects and COM Programming

What is an object, anyway?

What is an object, anyway?

An object is a pre-defined set of data ([variables](#)), neatly packaged with a group of (code) which manipulate the data and provide any other functionality you need.

For example, a [string array](#) containing names and addresses (data) might be packaged with a subroutine (code) that displays a popup [dialog](#) to edit the data, another subroutine (code) to [print](#) mailing labels, and so forth. That's a great candidate for an object.

In short, an object is a complete little programming package, code and data, all in one tightly contained place. It's safer and protected, easier to debug, maintain, and reuse. An object can be written to perform

most any task you might imagine.

In object terminology, a [CLASS](#) is used to define an object. A CLASS is much like an enhanced [user-defined type](#); it's a description of both the variables and the subroutines which make up the object. When you instruct the compiler to create an object, it uses the definitions found in the CLASS to do so. It allocates memory for the variables, establishes [pointers](#) to the subroutines, and makes this new object available to your program.

Each time you create a new OBJECT, it is called an INSTANCE of its definition (an instance of the CLASS). That's why these variables are called [INSTANCE](#) variables. When you create multiple objects (from the same CLASS definition), each instance gets its own individual copy of these INSTANCE variables, and each instance gets individual access to the subroutines.

In PowerBASIC, objects are optional. Objects are a great programming tool, but your existing code remains fully functional. Standard [Subs](#) and [Functions](#) will always be supported, so you can blend the techniques at a comfortable pace.

PowerBASIC objects are practical. They're lightning fast with very little overhead. We've tried very hard to give you the best ratio of straightforward design to performance and features. We think you'll find PowerBASIC objects very hard to resist.

Thousands of books have been written to describe objects and object oriented programming. In most cases, the buzz words and abstract definitions make it seem as though they're designed to confuse, not enlighten. We'll try to limit the use of strange descriptors, but some of it just can't be avoided. In these cases, we'll try to give you clear definitions as they're needed.

A key trait of PowerBASIC objects (and objects in general) is the concept of encapsulation. Data is "hidden" within the object, so INSTANCE variables cannot be accessed from the outside.

INSTANCE variable data may only be set, altered, or retrieved by the subroutines in the object. These variables are hidden from the rest of the program.

Over the years, objects have gained a reputation for slow, bloated programming. In many cases, this reputation was well deserved. But don't let that fool you. With PowerBASIC, you'll find you have a whole new "Object World"! All the power, yet all the performance, too. PowerBASIC objects give you every ounce of performance possible... the same breathtaking speed as procedural programming!

See Also

[Where are objects located?](#)

[Why should I use objects?](#)

[What are the parts of an object?](#)

[Are there other important "Buzz-Words"?](#)

Where are objects located?

Where are objects located?

Since an [object](#) is a complete programming package (sort of like the idea of a sub-program), it can be located in many different places. However, regardless of where the object is found, PowerBASIC will still handle all the messy details for you... automatically.

In many cases, objects will be located right within your main program. You can create a single, self-contained program, with one object or a thousand objects. Get all the power of objects, but keep the details private -- for your eyes only.

Objects can be located in a [Dynamic Link Library](#) (DLL). This is usually called a [COM](#) object, but is also known as an OCX or an ActiveX object. The actual file extension is largely irrelevant. The

offered by these objects are generally available to any program which knows the subroutine definitions, and wishes to access them. This type of object is known as an "in-process" object because it is loaded

into the address space of the calling application, just like a standard DLL.

Objects can also be located in an executable program (EXE). In this case, the calling application is frequently called a "controller", as it can control how the executable operates by manipulating its objects. A good example of this functionality is Microsoft Word -- by simply calling object subroutines, you can load a DOC file, display it to the user, make changes, then save the new document. All under the control of your calling application. Once again, the object subroutines are generally available to any program which knows the subroutine definitions. This type of object is known as an "out-of-process" object because it does not share address space with the calling application.

Whenever an object is accessed outside of your program, PowerBASIC uses the COM (Component Object Model) services of Windows to make the "connection" for you. COM is an important tool which will open many opportunities for you. But more about COM later...

See Also

[What is an object, anyway?](#)

[Why should I use objects?](#)

[What are the parts of an object?](#)

[Are there other important "Buzz-Words"?](#)

Why should I use objects?

Why should I use objects?

- [Objects](#) help you maintain your code. Objects break up your project into small, easily viewed parts. Usually, the input and output is clearly defined. You have all of the code and all of the data right at your fingertips.
- Objects help you write bug-free code. When you keep an object small and well-defined, you greatly enhance the stability of your programs. Consider the comparison to procedural programming: With standard [Subs](#) and [Functions](#), it's typical to create the data ([variables](#)) in the calling code, but manipulate the data in the target procedures when they are executed. This separation of code and data has caused some of the most insidious bugs known to programmers. When you need to extend the range of data to a larger data type, it's easy to change the code. A piece of cake, so to speak. But what about the data? Now you must search out every reference to every involved Sub and Function. Find every data creation, every data change, and every other reference to these variables. What are the chances of missing a critical one? Far too great to ignore.
- Objects help you re-use your code. Since the object contains all the [code](#), and all the data, how could it be easier? Put one object source in one [include](#) file... Or put it in one [DLL](#)... Just use it when you need it!
- Objects help with team programming. Objects are self-contained. All of the subroutines and all of the data, all in one concise place. It's easy to create a precise definition for each object, and there's little dependency between the implementation of various objects. Each team member builds an object, one at a time, so it all comes together neatly in the end.
- Objects are an increasingly popular standard. Do you need to access the Windows API? Many of the newer API functions (DirectX graphics, for example) use only an object interface, and nothing else. If you don't use objects, you simply can't access them. Do you want to control an important application, like an Internet browser, word processor, or spreadsheet? COM objects are the only way to do it. As time goes by, objects will only become more embedded in day-to-day programming. Don't be left behind!

See Also

[What is an object, anyway?](#)

[Where are objects located?](#)

[What are the parts of an object?](#)

[Are there other important "Buzz-Words"?](#)

What are the parts of an object?

What are the parts of an object?

- **METHOD:** A subroutine, very similar to a user-defined [Sub/Function](#). A method has the special attribute that it can access the variables stored in the [object](#). A method can return a value like a Function, or return nothing, like a Sub.
- **PROPERTY:** This is a METHOD, but in a specific form, for a specific purpose. A PROPERTY has all the attributes of a standard METHOD. It has a special syntax, and is specifically used to read or write private data to/from the internal variables in an object. This helps to maintain the principle of "encapsulation". Properties are usually created in pairs, a GET PROPERTY to read a variable, and a SET PROPERTY to write to a variable. Paired properties use the same name for both, since PowerBASIC will choose the correct one based upon the usage in your source code. You should note this important fact: Since a PROPERTY is a form of METHOD, all of the documentation about METHODS also applies to PROPERTIES, unless we specifically state otherwise.

: A definition of a set of methods and properties which are implemented on an object. You might think of it as a list of [DECLARE](#) statements where the sequence of the Declares must be preserved. Remember, the interface is just the definition, not the actual code. Every interface is associated with a [GUID](#) (a 128-bit number or string) which uniquely identifies this particular interface from all other interfaces, anywhere in the world. This identifier is called the Interface ID, or IID for short.

An interesting note is that one particular interface definition may become a part of several different [classes](#) and objects. In fact, the internal code for an interface in CLASS A may be entirely different from the internal code for the same interface in CLASS B. Method names, parameters, and return values must be identical, but the internal code could vary significantly. An important point: interfaces are immutable. Once an interface has been defined and published, the Method and Property definitions (sequence, names, parameters, return values, etc.) may never be altered. If you find you must change or extend an interface, you would usually define a new interface instead.

- **CLASS:** A definition of a complete object, which may include one or more interfaces. This is the place where you declare [INSTANCE](#) variables, and write your code for the enclosed METHOD and PROPERTY procedures. While some object implementations allow only a single interface per class, PowerBASIC objects (and COM objects in general) support the idea of optional multiple interfaces. Still, remember that a CLASS is the complete definition of an object. It defines all of the code and all of the data which will be found in a particular object. For this reason, there is only one copy of a CLASS. Every class is associated with a GUID (a 128-bit number or string) which uniquely identifies this particular class from all others, anywhere in the world. This identifier is called the Class ID, or [CLSID](#). A friendlier version of the CLSID is a shorter text name, which also identifies the Class. This text name is known as the Program ID ([PROGID](#)), though it's possible this PROGID may not be totally unique. As it's a simpler construct, it might be duplicated in another program.
- **CLASS METHOD:** This is a private method, which may only be called from within the same CLASS. It is not a part of any interface, so it is never listed there. It is called a CLASS METHOD because it is a member of the class, not an interface. It is not visible to any code outside the class where it is defined. Code in a CLASS METHOD may call other CLASS METHODS in the same CLASS. Class Properties do not exist because there is no need for them. Within the object, variables can be accessed directly, so there is no need to use a PROPERTY procedure as an intermediary.
- **CONSTRUCTOR:** This is a special form of CLASS METHOD, which is executed automatically whenever an object is created. It is optional, but if present, it must be named CREATE.

- **DESTRUCTOR**: This is a special form of CLASS METHOD, which is executed automatically whenever an object is destroyed. It is optional, but if present, it must be named DESTROY.
- **OBJECT**: An instance of a class. When you create an object in your running program, using the [LET \(with objects\)](#) statement, or its implied form, PowerBASIC allocates a block of memory for the set of instance variables you defined, and establishes a virtual function table (a set of function code pointers) for each of the interfaces. You can create any number of OBJECTS based upon one CLASS definition.

It might be useful to think of an OBJECT in terms of an electrical appliance, like a television set. The TV is the equivalent of an OBJECT, because it's an instance of the plans which define all the things which make it a television. Of course, those plans are the equivalent of a CLASS. You can make many instances of a television from one set of plans, just as you can make many OBJECTS from one CLASS. The individual buttons and controls on the television are the equivalent of METHODS, while all of the controls, taken as a whole, are equivalent to the INTERFACE.

We don't need to know how a television works internally to use it and benefit from it. Likewise, we don't need to know how an object works internally to use it and benefit from it. We only need to know the intended job of the object, and how to communicate with it from the outside. The internal workings are well "hidden", which is called encapsulation. Since we can't "look inside" an Object, it's not possible to directly manipulate internal variables or memory. This provides an increased level of security for the internal code and data.

- **INSTANCE DATA**: Each CLASS defines some INSTANCE variables which are present in every object. When you create multiple objects (of the same class), each object gets its own unique copy of them. These variables are called INSTANCE variables because a new set of them is created for each instance of the object. For example, if you created a CUSTOMER object for each customer of your business, you might have INSTANCE variables for the Name, Address, Balance owed, etc. Each object would have its own set of INSTANCE variables to describe the attributes of that particular customer. INSTANCE variables are always private to the object. They can be accessed directly from any METHOD on the object, but they are invisible to any code outside of the object.
- **VIRTUAL FUNCTION TABLE**: Commonly called a VFT or VTBL, this is a set of function code pointers, one for each METHOD or PROPERTY in an interface. This is a tool used internally to direct program execution to the correct method or property you wish to execute. While it is a vital and integral part of every object, you need give it no concern other than to be aware of its existence. PowerBASIC manages these items for you, with no programmer intervention required.

See Also

[What is an object, anyway?](#)

[Where are objects located?](#)

[Why should I use objects?](#)

[Are there other important "Buzz-Words"?](#)

Are there other important "Buzz-Words"?

Are there other important "Buzz-Words"?

- **GUID**: This is a "Globally Unique Identifier", a very large number which is used to uniquely identify every [interface](#), every [class](#), and every [COM](#) application or library which exists anywhere in the world. GUID's identify the specific components, wherever and whenever they may be used. A GUID is a 16-byte (128-bit) value, which could be represented as an integral value or a string. This 128-bit item is large enough to represent all the possible values, anywhere in the world. The PowerBASIC [GUID\\$\(\)](#) function (or a [hot-key](#) in the PowerBASIC IDE) can generate a random GUID which is statistically guaranteed to be unique from any other generated GUID. Each of these identifying GUID's may be assigned by the programmer, or they will be randomly assigned by the PowerBASIC compiler. When a GUID is written in text, it takes the form: {00CC0098-0000-0000-0000-0000000000FF}.

- **[DIRECT INTERFACE](#)**: This is the most efficient form of interface. When you call a particular [METHOD](#) or [PROPERTY](#), the compiler simply performs an indirect jump to the correct entry point listed in the virtual function table (VFT or VTBL). This is just as fast as calling a standard [Sub](#) or [Function](#), and is the default access method used by PowerBASIC.
- **[DISPATCH INTERFACE](#)**: This is a slow form of interface, originally introduced as a part of Microsoft Visual Basic. When you use DISPATCH, the compiler actually passes the name of the METHOD you wish to execute as a text string. The parameters can also be passed in the same way. The [object](#) must then look up the names, and decide which METHOD to execute, and which parameters to use, based upon the text provided. This is a very slow process. Many scripting languages still use DISPATCH as their sole method of operation, so continued support is necessary.
- **[DUAL INTERFACE](#)**: This is a combination of a Direct Interface and a Dispatch Interface. This most flexible form allows either option to be used, depending upon how the calling application is implemented.
- **[AUTOMATION](#)**: This is a special calling convention, defined by MS later in the evolution of COM and objects. An Automation object is simply one which adheres to the rules for Automation COM Objects. It may offer just a direct interface, just a Dispatch interface, or both of them (DUAL). It should be noted that some programmers use the word AUTOMATION to mean DISPATCH. Even though that's not correct, you should keep the possibility in mind whenever you encounter the term. Automation Methods must use parameters, return values, and assignment variables which are AUTOMATION compatible: [BYTE](#), [WORD](#), [DWORD](#), [INTEGER](#), [LONG](#), [QUAD](#), [SINGLE](#), [DOUBLE](#), [CURRENCY](#), [OBJECT](#), [STRING](#), [WSTRING](#), and [VARIANT](#). A [User Defined Type](#) used as a return value or parameter will be converted to a BYVAL DWORD. All Automation Methods return a hidden result code which is called the HRESULT. This is not really a handle, as the name suggests, but a result code to report the success or failure of a call to a METHOD or PROPERTY.
- **[IUNKNOWN](#)**: This is the name of a special interface which is the basis for every object. It has three methods, which are always defined as the first three methods in every interface. These 3 methods are used by compilers (PowerBASIC or others) to look up other interfaces on the object, and to keep track of usage of this object. While IUNKNOWN is mandatory for every object, you won't ever need to reference it directly. PowerBASIC handles all those messy details automatically.
- **[OBJECT REFERENCE](#)**: This is a reference (a pointer) to an object, which is the only way objects are used. In PowerBASIC, an object variable initially contains [NOTHING](#). When you create an object, or duplicate one, a reference to that object is placed in an object variable by the compiler. That is, a pointer to the object is automatically inserted in the object variable. It is now considered to contain an OBJECT REFERENCE until such time as the reference is deleted or set to NOTHING.
- **[COMPONENT](#)**: An object that encapsulates code and data, providing a set of publicly available services.
- **MONIKER**: An object that implements the IMoniker interface. A moniker acts as a name that uniquely identifies a COM object. In the same way that a path identifies a file in the file system, a moniker identifies a COM object in the directory namespace.

See Also

[What is an object, anyway?](#)

[What are the parts of an object?](#)

[What does a Class look like?](#)

[What is a Base Class?](#)

What does a Class look like?

What does a Class look like?

Here is the PowerBASIC source code for a very simple [class](#). It has just one interface and one instance variable.

```

CLASS MyClass
  INSTANCE Counter AS LONG
  INTERFACE MyInterface
    INHERIT IUNKNOWN          ' inherit the base class
    METHOD BumpIt(Inc AS LONG) AS LONG
      Temp& = Counter + Inc
      INCR Counter
      METHOD = Temp&
    END METHOD
  END INTERFACE
  ' more interfaces could be implemented here
END CLASS

```

Just like other blocks of code in PowerBASIC, a class is enclosed in the [CLASS](#) statement and the [END CLASS](#) statement. Every class is given a text name (in this case "MyClass") so it can be referenced easily in the program.

The [INSTANCE](#) statement describes [INSTANCE variables](#) for this class. Each [object](#) you create from this class definition contains its own private set of any [INSTANCE](#) variables. So, if you had a SHIRT class, you might have an instance variable named COLOR, among others. Then, if you create two objects from the class, the COLOR instance variable in the first object might contain WHITE, while the second might be BLUE.

Next comes the [INTERFACE](#) and [END INTERFACE](#) statements. They define the one interface in this class, and they enclose the [methods](#) and [properties](#) in this interface. Every interface is given a text name (in this case "MyInterface") so it can be referenced easily in the program. You could add any number of additional interfaces to this class if it suited the needs of your program.

The first statement in every Interface Block is the [INHERIT](#) statement. As you learned earlier, every interface must contain the three methods of [IUNKNOWN](#) as its first three methods. In this case, INHERIT is a shortcut, so you don't have to type the complete definitions of those methods in every interface. There are more complex (and powerful) ways to use INHERIT as well, but more about that later.

Finally, we have the [METHOD](#) and [END METHOD](#) statements. They are just about identical to a [FUNCTION](#) block, but they may only appear in an interface. In this case, the METHOD is named "BumpIt". It takes one ByRef parameter, and returns a [long integer](#) result.

How do you reference this object?

```

FUNCTION PBMAIN()
  DIM Stuff AS MyInterface
  LET Stuff = CLASS "MyClass"
  x& = Stuff.BumpIt(77)
END FUNCTION

```

The first line of [PBMain](#) ([DIM](#)...) defines an object variable for an interface of the type "MyInterface". The [LET](#) statement creates an object of the CLASS "MyClass", and assigns an object reference to the object variable named "Stuff". The next line tells PowerBASIC that you want to execute the method "BumpIt", and assign the result to the variable "x&". It's just that simple!

See Also

[What is an object, anyway?](#)

[What is a Base Class?](#)

[What does an Interface look like?](#)

[Just what is COM?](#)

What is a Base Class?

What is a Base Class?

The term "Base Class" is truly a misnomer, since it's actually an [interface](#). The truth is, this term probably originated from those who use a programming language which supports only one interface per [class](#). (Note: PowerBASIC allows an unlimited number of interfaces.) On those limited platforms, the distinction between a class and an interface tends to blur. However, since the term "Base Class" enjoys fairly wide usage already, it's probably best if we just learn to live with it and love it.

Every PowerBASIC interface must ultimately derive from the [IUnknown](#) interface, since it provides information about an [object](#) that the compiler must have to manage these affairs accurately. [Previously](#), we discussed the concept of adding INHERIT IUNKNOWN as the first line of every Interface Block. In that way, PowerBASIC just inserts the necessary source code for you, so that the new interface you are creating will derive all the functionality of IUNKNOWN, but still save you from all of that typing. What we didn't tell you at first was that there are really 3 System Base Classes in PowerBASIC. The other two can be used, because they, too, are derived from IUNKNOWN.

So, the real definition of a Base Class is "The interface from which a newly created interface is derived". To implement any of the system interfaces, you would just use [INHERIT](#) followed by the Base Class name as the first line of the interface block. They are:

INHERIT IUNKNOWN

If this option is chosen, your [methods](#) may only be accessed using a [Direct Interface](#), the most efficient form of access. It uses the STDCALL calling conventions, and uses return value conventions normally associated with C++. This style of Base Class is also known as a CUSTOM INTERFACE, so you can use "INHERIT CUSTOM" in place of "INHERIT IUNKNOWN" if that's more comfortable for you.

INHERIT IAUTOMATION

If this option is chosen, your methods may only be accessed using a Direct Interface, the most efficient form of access. It uses the STDCALL calling conventions, and uses return value conventions involving a hidden parameter on the [stack](#). Automation Methods must use parameters, return values, and assignment variables which are AUTOMATION compatible: [BYTE](#), [WORD](#), [DWORD](#), [INTEGER](#), [LONG](#), [QUAD](#), [SINGLE](#), [DOUBLE](#), [CURRENCY](#), [OBJECT](#), [STRING](#), [WSTRING](#), and [VARIANT](#). A [User Defined Type](#) used as a return value or parameter will be converted to a BYVAL DWORD. All Automation Methods return a hidden result code which is called the HRESULT. This is not really a handle, as the name suggests, but a result code to report the success or failure of a call to a [METHOD](#) or [PROPERTY](#). "AUTOMATION" is a synonym for "IAUTOMATION", so you can substitute "INHERIT AUTOMATION" in your code if that's more comfortable for you. Automation Interfaces have become more popular than Custom Interfaces in recent times, likely due to availability of the HRESULT hidden result code.

INHERIT IDISPATCH

If this option is chosen, PowerBASIC will automatically create a DUAL Interface for you. That means your methods can be accessed using a Direct Interface (using Automation conventions described above), or the slower [DISPATCH](#) Interface, if that's what is needed. This is certainly the most flexible Base Class, and the only one which should be used if your methods will be accessed by code from a programming language other than PowerBASIC. In a DUAL interface, both forms return the HRESULT hidden result to report the success or failure of the operation. You may use the term "INHERIT DUAL" in place of "INHERIT IDISPATCH", if that's more comfortable for you. While a class may have any number of direct interfaces, only one DUAL or IDISPATCH interface is allowed.

See Also

[What is an object, anyway?](#)

[What does a Class look like?](#)

[What does an Interface look like?](#)

[Just what is COM?](#)

What does an Interface look like?

What does an Interface look like?

An [INTERFACE](#) is a definition of a set of [methods](#) and [properties](#) which may be implemented on an [object](#). Think of it as much like a [TYPE](#) declaration, except that it contains Method and Property declarations instead of member variables. One interface definition may be used in many different [classes](#) and objects.

An Interface may appear in two general forms: the declaration form and the implementation form.

In the declaration form, the Interface just provides the "signature" of the member methods, without any other source code:

```
INTERFACE MyInterface
  INHERIT IAutomation
  METHOD Method1(parm AS LONG)
  PROPERTY GET Prop1() AS WSTRING
  PROPERTY SET Prop1(BYVAL TEXT AS WSTRING)
END INTERFACE
```

This type of declaration interface can be used to provide a description of external interfaces, which you plan to access through [COM](#) services, or just as additional self-documentation of internal code.

In the implementation form, it is part of a CLASS definition, so it contains the complete source code to implement each of the member Methods and Properties.

```
CLASS AnyClass
  INTERFACE AnyInterface
    INHERIT IAutomation
    METHOD Method1(parm AS LONG)
      CALL abc(parm)
    END METHOD

    METHOD Method2(parm AS LONG)
      CALL abc(Parm*1)
    END METHOD
  END INTERFACE
END CLASS
```

In this case, you have the complete definition of an object, with code implemented so the methods can be called and executed.

The first entry in every INTERFACE block must be the [base class](#) upon which it is built. In PowerBASIC, you choose one of the System Base Classes ([IUnknown](#), [IAutomation](#), or [IDispatch](#)), or you might decide to inherit a User Base Class instead.

```
INTERFACE CustomIface
  INHERIT IUNKNOWN
  METHOD MethodDef()...
END INTERFACE
```

The above code defines a custom interface whose methods are available for direct access only. It uses custom calling conventions and does not support an HRESULT ([OBJRESULT](#)) return value.

```
INTERFACE AutoIface
  INHERIT IAutomation
  METHOD MethodDef()...
END INTERFACE
```

The above code defines an automation interface whose methods are available for direct access only. It uses automation calling conventions and always supports an HRESULT (OBJRESULT) return value. The above two forms will typically be used for internal objects, since they offer the best performance. Every PowerBASIC interface and every COM interface must ultimately inherit from IUnknown. As required base classes, the IUnknown and IAutomation declarations are built into the PowerBASIC Compiler.

```
INTERFACE DispatchIface
```

```

INHERIT IDISPATCH
METHOD MethodDef()...
END INTERFACE

```

The above code defines a dual interface whose methods are available for both direct access and Dispatch access. This is the form you will typically use for COM objects, since it offers the best compatibility with varied client modules.

Every method and property in a dual interface needs a positive, [long integer](#) value to identify it. That integer value is known as a DisplID (Dispatch ID), and it's used internally by COM services to call the correct function on a Dispatch interface. You can specify a particular DisplID by enclosing it in angle brackets immediately following the Method/Property name in an Interface definition block.

```

INTERFACE DualIface
  INHERIT IDISPATCH
  METHOD MethodOne <76> ()
  METHOD MethodTwo <77> ()
END INTERFACE

```

If you don't specify a DisplID, PowerBASIC will assign a random value for you. This is fine for internal objects, but may cause a failure for published COM objects, as the DisplID could change each time you compile your program.

See Also

[What is an object, anyway?](#)

[What does a Class look like?](#)

[What is a Base Class?](#)

[Just what is COM?](#)

Just what is COM?

Just what is COM?

COM is an acronym. It represents the words "Component Object Model".

The short answer is that COM defines a way to communicate between modules of code. The slightly longer answer follows.

You should know that every [object](#) created or defined in PowerBASIC is fully compatible with the COM specification. Many popular compilers are not able to make that claim accurately. The COM specification defines a standardized method of communication between modules of code (frequently called [components](#)), regardless of the platform or the tool used to create them. COM components are reusable chunks of code and associated data, which may be accessed by other "COM-Aware" components and applications.

One of the most frustrating things about this technology has been the ever-changing list of buzz-words used to describe it. We've evolved through OLE, VBX, and OCX, to COM, ActiveX, and more. Though nuances of difference abound, the important thing to remember is that COM and ActiveX describe a means of accessing code and data located outside of the current module. COM+ refers to some extensions which are specific to Win2000, WinXP, and WinVista. Throughout this discussion, we'll use the terms COM Object and ActiveX Object to describe components: reusable chunks of code and associated data.

Prior versions of PowerBASIC introduced client COM services, which were accessible through the COM [DISPATCH](#) interface. While the DISPATCH interface is very flexible and easy-to-use, that very flexibility adds a level of overhead which is unacceptable for many applications. This version of PowerBASIC adds the capability to create and access COM objects through a [DIRECT INTERFACE](#) or a [DISPATCH INTERFACE](#).

All objects in PowerBASIC, COM or not, follow all the guidelines and implementation rules established for COM Objects. This simplifies usage by the programmer, yet adds no measurable overhead at run-time. PowerBASIC encapsulates all the low-level details of the actual COM communication process. This provides a straightforward way to load and communicate with a COM component using BASIC syntax.

You'll find that the PowerBASIC object implementation is very efficient, with virtually no degradation of execution speed as compared to standard [Subs](#) and [Functions](#).

See Also

[What is an object, anyway?](#)

[What is a COM component?](#)

[How do you publish an object?](#)

[How are GUID's used with objects?](#)

What is a COM component?

What is a COM component?

A [COM](#) component is commonly referred to as a COM [Object](#). We can visualize a COM component or Object as simply a "black box" that comprises a set of [methods](#) and associated data. Internally, these Objects contain reusable code (Methods), and provide ways for an application to call the object's Methods and read/write its associated data through its [Interfaces](#). Notice that this is the same definition as an object internal to your program. The difference is that COM offers a way to perform this functionality on an object external to your program.

A COM Component is generally known as a COM SERVER, because it serves up information or actions requested by a COM CLIENT. A COM SERVER makes its Methods and [Properties](#) public, so that a COM CLIENT can call them as needed.

COM Components usually take the form of an EXE, or [DLL](#)/OCX file, but the actual file extension is largely irrelevant. However, DLL/OCX versions of a component are generally referred to as "in-process", since they are loaded into the address space of the calling application. EXE-versions are typically "out-of-process" because they will not share the address space of the calling application.

To summarize, a COM Object (COM Server) is a special form of code library (similar to a standard DLL) that conforms to the COM specification. It provides at least one public interface, and is identified by a globally unique [PROGID](#) and [CLSID](#).

Every class is associated with a [GUID](#) (a 128-bit number or string) which uniquely identifies this particular [class](#) from all others, anywhere in the world. This identifier is called the Class ID, or CLSID. A friendlier version of the CLSID is a shorter text name, which also identifies the Class. This text name is known as the PROGID, though it's possible this PROGID may not be totally unique. As it's a simpler construct, it might be duplicated in another program. These identifiers are stored in the Windows Registry when the COM component is installed and registered. PowerBASIC programmers reference COM components by their PROGID string, and rarely by their CLSID. However, since these two items are stored in pairs, it is straightforward to retrieve the matching PROGID for a known CLSID, and vice versa.

As mentioned earlier, you don't need to know how a television works internally to use it and benefit from it. Likewise, you don't need to know how a COM Object works internally to use it and benefit from it. You only need to know the intended job of the object, and how to communicate with it from the outside. The internal workings are well "hidden", which is called encapsulation. Since we aren't able to "look inside" a COM Object, it's not possible to directly manipulate internal variables or memory. This provides a increased level of security for the internal code and data.

See Also

[What is an object, anyway?](#)

[Just what is COM?](#)

[How do you publish an object?](#)

[How are GUID's used with objects?](#)

How do you publish an object?

How do you publish an object?

Publishing an [object](#) means making it available for access and use by other applications through the facilities of the [COM](#) Services of Windows. With some compilers, this requires pages upon pages of code.

With PowerBASIC, you'll find it's fairly straightforward. Just add a Class Id (CLSID) [GUID](#) and the words "AS COM" to the end of the [CLASS](#) statement. Then, add an Interface ID (IID) to the end of the [INTERFACE](#) statement. Believe it or not, that's just about it!

```
$MyClassGuid = GUID$("{00000099-0000-0000-0000-000000000008}")
$MyIfaceGuid = GUID$("{00000099-0000-0000-0000-000000000009}")

CLASS MyClass $MyClassGuid AS COM
  INTERFACE MyInterface $MyIfaceGuid
    INHERIT IAutomation
    METHOD Method1(parm AS LONG)
      CALL abc(parm)
    END METHOD
  END INTERFACE
END CLASS
```

PowerBASIC handles all the messy details of COM for you. The name of the CLASS (in this case MyClass) will be used as the [ProgID](#) for COM registration of the [DLL](#). The GUID's you selected will be used for the [CLSID](#) and IID, so you're ready to go...

See Also

[What is an object, anyway?](#)

[Just what is COM?](#)

[What is a COM component?](#)

[How are GUID's used with objects?](#)

What is inheritance?

What is inheritance?

Inheritance is all about code reuse. You can reuse the definitions of an [interface](#), or you can reuse complete sections of code.

INTERFACE INHERITANCE is defined by [COM](#) standards, and available for use by any COM [object](#). This form of inheritance applies only to the definition of each item in an interface, rather than the underlying code.

Interface inheritance gives you the option to use one interface in multiple [classes](#) (objects). Because the interface definition remains identical in each instance, you can often use the identical (or similar) code to manipulate different objects. With this form of inheritance, the programmer must provide appropriate code for each of the [Methods](#) and [Properties](#) in every implementation of the interface.

IMPLEMENTATION INHERITANCE is the process whereby a CLASS derives all of the functionality of an interface implemented elsewhere. That is, the derived class now has all the methods and properties of this new, extended version of a [Base Class](#)! This form of inheritance is offered by PowerBASIC, even though it is not required by the COM Specification.

You can extend the functionality of an interface you created earlier by adding new methods and properties to the derived interface/class. The syntax for adding extra methods (not in the Base Class) is the same as adding methods to a standard class -- just add methods and properties, as always.

You can add to, or replace, the functionality of a particular method or property by coding a replacement

which is preceded by the word [OVERRIDE](#). The overriding method must have the same name and signature (parameters, return value, etc.) as the one it replaces. When you implement a new method in a derived class, you may call a method in the Base Class by using the pseudo-object [MYBASE](#). This allows you to extend the original functionality, or replace it entirely.

Inheritance is implemented by use of the INHERIT statement within an [INTERFACE / END INTERFACE](#) block. The word INHERIT is followed by the class name and interface name of the code to be inherited. Both are necessary, because COM allows you to have multiple implementations of any particular interface.

```

CLASS MyClass
  INTERFACE MyFace
    INHERIT IDISPATCH
    METHOD aaa()
      ' code...
    END METHOD
    METHOD bbb()
      ' code...
    END METHOD
    METHOD ccc()
      ' code...
    END METHOD
    METHOD ddd()
      ' code...
    END METHOD
  END INTERFACE
END CLASS

CLASS TheClass
  INTERFACE TheFace
    INHERIT MyClass, MyFace
    OVERRIDE METHOD bbb()
      ' new code
    END METHOD
    OVERRIDE METHOD ddd()
      ' new code
    END METHOD
    METHOD xxx()
    END METHOD
  END INTERFACE
END CLASS

```

Note that the derived interface "TheFace" first inherits IDISPATCH, and then, all four methods from "MyFace" (aaa,bbb,ccc,ddd). However, because of the OVERRIDE statements, both bbb() and ddd() are replaced by newer versions of these methods. Note that a derived class may be inherited by yet another class, repetitively. The depth of this inheritance is limited only by available memory.

The pseudo-object MYBASE may be used within a derived class to access a method in the original base class. For example, if you placed:

```
MyBase.bbb()
```

in the above derived code, it would execute the method bbb() in the parent interface/class. You could then use the results to extend or modify actions in your newer code.

When you inherit an interface, the inherited [constructor and destructor](#) methods (CREATE and DESTROY) are disabled, in case you wish to change their functionality in the derived interface. If you wish to execute them as-is, you can simply add [MYBASE.CREATE](#) and/or [MYBASE.DESTROY](#) in the derived CREATE/DESTROY methods.

See Also

[What is an object, anyway?](#)

[What does an Interface look like?](#)

[Just what is COM?](#)

[How do you create an object?](#)

How do you create an object?

How do you create an object?

This operation is frequently known as "Creating an INSTANCE of an [OBJECT](#)." Yes, this is just one more buzz-word -- but you'll hear it frequently.

In order to create an object, you first need an OBJECT VARIABLE. This object variable can be located most anywhere in your program, and have any scope: [LOCAL](#), [GLOBAL](#), [THREADED](#), etc. This object variable is declared by using the name of the [interface](#) you wish to access on the object. This is done so that PowerBASIC knows which [Methods](#) can be called via this variable. This variable is expected to be a "container" for an [OBJECT REFERENCE](#) (that is, a pointer to the actual object). Initially, this variable is automatically set to "[NOTHING](#)". If you wish to use the generic DISPATCH interface to access the object, you would use the name [IDISPATCH](#) instead.

```
LOCAL object1 AS MyInterface
LOCAL object2 AS IDISPATCH
```

There is actually one more special case, that of an [IDBIND DISPATCH](#) interface. Since object creation works the same on those interfaces, as well, we'll have more on that special topic in a later section. So, now that you have two empty object variables, what do you do with them? Use the assignment statement ([LET](#)) to create an object!

To create an object, you need to specify a [CLASS](#) and an INTERFACE. The interface is implied by the object variable you use, so it only remains that you specify the CLASS name. If the requested CLASS is internal to your program, use the word CLASS:

```
LET object1 = CLASS "MyClass"
```

The class name ("MyClass") must be specified as a quoted [string literal](#), which is the name of a class implemented within the program. Since the class is internal (the name is known at compile-time), you may not use a string variable or expression. Upon execution, a new object is created, and a reference to that object is assigned to the object variable *object1*. The interface requested is determined by the original declaration of *object1*. If the interface name is DISPATCH, you can call the methods with the [OBJECT](#) statement -- otherwise, regular Method and Property references are used for direct interfaces.

```
LET objvar = NEWCOM PROGID$
LET objvar = GETCOM PROGID$
LET objvar = ANYCOM PROGID$
```

This form of the LET statement is used to obtain an object reference external to the program using the [COM](#) facilities of Windows. If the requested object is in a [DLL](#) (an in-process server), you will always use the [NEWCOM](#) option, as you're asking Windows to supply a new object. If the request is successful, an OBJECT REFERENCE (a pointer to the object) is assigned to the *objvar*.

If the requested object is in an EXE (out-of-process server), you may use any of the three options. If the director word NEWCOM is specified, a new instance of a COM application is created. With [GETCOM](#), an interface will be opened on an existing, running application, which has been registered as the active automation object for its class. With [ANYCOM](#), the compiler will first try to use an existing, running application if available, or a new instance if not.

Of course, as with any other [LET](#) (assignment) statement, you are free to simply omit the word LET entirely.

If an object creation or assignment fails for any reason, the object variable is set to NOTHING. If this statement fails, no errors are generated, nor is an [OBJRESULT](#) set. You should test for success of the operation with [ISOBJECT\(objvar\)](#) before trying to use the object or execute its methods.

But what about the rare case when there's no [ProgID\\$](#) available? There's an answer for that, too.

```
LET objvar = NEWCOM CLSID ClassID$
LET objvar = GETCOM CLSID ClassID$
LET objvar = ANYCOM CLSID ClassID$
```

This new form also obtains a COM object reference, just as in the previous example. However, it is only used in the unusual case of a COM Object which has no ProgID. It works exactly as the original form above, except that it describes the requested object by its 16-byte [GUID](#) which is the ClassID of the object.

```
LET objvar = NEWCOM CLSID ClassID$ LIB DLLPath$
```

PowerBASIC offers the unique ability to create and reference COM objects without any reference to the registry at all. As long as you know the [CLSID](#) (Class ID) and the file path/name of the DLL to be accessed, you can do so with no registry access at all. You don't need a special type of COM server. This technique can be used with any server, whether created by PowerBASIC or another compiler. By using this method of object creation, there is simply no need for the server to be registered at all. That allows you to keep local copies of the COM servers you use, with no chance they will be altered or replaced by another application. You use the above form, where the clause "CLSID ClassID\$" identifies the 16-byte Class ID, and the clause "LIB DllPath\$" identifies the file path and file name of the COM Server. Once you've obtained the COM object reference in objvar, it is used exactly as you would with a traditional object.

See Also

[What is an object, anyway?](#)

[Just what is COM?](#)

[How do you duplicate an object variable?](#)

[How do you call a Direct Method?](#)

How do you duplicate an object variable?

How do you duplicate an object variable?

In the [previous section](#), you learned to create an [object](#), which assigns an OBJECT REFERENCE to the object variable:

```
LOCAL object1 AS MyInterface
LET object1 = CLASS "MyClass"
```

What if you need to duplicate it? Well, you first must decide whether you want to create a completely new object, or if you just want a second object [variable](#) which points the same object. This is a very important distinction. With two objects, they each have their own set of [INSTANCE](#) variables. The variables in each set remain independent of the other set until they are destroyed. You would create two objects by writing:

```
LOCAL object1, object2 AS MyInterface
LET object1 = CLASS "MyClass"
LET object2 = CLASS "MyClass"
```

If you have two object variables pointing to the same object, they would share the same set of INSTANCE variables. You would create two OBJECT REFERENCES to one OBJECT by writing:

```
LOCAL object1, object2 AS MyInterface
LET object1 = CLASS "MyClass"
LET object2 = object1
```

Of course, now we can take this one step further. You already know that an OBJECT may have two (or even more) [interfaces](#) defined in a [CLASS](#). How would you actually use two interfaces on the same object? Just declare an object variable for each interface, much like:

```
LOCAL object1 AS MyInterface
LOCAL object2 AS HisInterface
LET object1 = CLASS "MYClass"
LET object2 = object1
```

The code is very much like the preceding example, except that the two object variables are declared as two different interfaces. When the last line is executed, PowerBASIC looks at the object variables to determine if they represent the same interface or not. If they do, it simply creates an extra variable, pointing to the same object. If they differ, PowerBASIC checks object to ensure the new interface is supported. If so, it creates a new OBJECT REFERENCE via the new interface, and assigns it to *object2*. It's just that simple!

The final issue in this topic is how to destroy an object variable. Generally speaking, you do nothing at all. When an object variable goes out of [scope](#), PowerBASIC will handle all the messy details for you. For the most part, just forget about it. However, in the rare case that you need to destroy an object variable at a specific time and place, you can do so with the following statement:

```
object1 = NOTHING
```

Setting an object variable to [NOTHING](#) handles it all for you.

See Also

[What is an object, anyway?](#)

[Just what is COM?](#)

[How do you create an object?](#)

[How do you call a Direct Method?](#)

How do you call a Direct Method?

How do you call a Direct Method?

First, you should remember that [INSTANCE](#) variables may only be accessed from within the [object](#). The only way to access them from the "outside", is by a parameter or return value of a [METHOD](#) or [PROPERTY](#) function. Of course, Methods and Properties may also utilize the other data [scopes](#): [Global](#), [Local](#), [Static](#), and [Threaded](#).

In PowerBASIC, the basic unit of code in an [object](#) is the METHOD. A METHOD is a block of code, very similar to a user-defined function. Optionally, it can return a value, like a [FUNCTION](#), or merely act as a subroutine, like a [SUB](#). Methods are implemented when you write:

```
METHOD NAME [ALIAS "altname"] (var AS type...) [AS TYPE]
    [statements]
METHOD = expression
END METHOD
```

Methods can only be called through an object variable, which is an integral part of the calling syntax. The object variable must be valid, that is, it must contain a valid [object reference](#) which was assigned to it with the [LET](#) statement. If you attempt to call a method on a null object, you'll likely experience a GPF and a total failure of your program. Methods may be called by writing:

```
DIM ObjVar AS MyInterface
LET ObjVar = CLASS "MyClass"
```

```
[CALL] objvar.Method1(param)
```

Note the word [CALL](#) is optional. This example shows how to call "Method1" when "Method1" does not return a value. If it did have a return value, use this form instead:

```
var = ObjVar.Method1(param)
```

A PROPERTY is a special type of METHOD, which is only designed to GET or SET INSTANCE data in an object. While the work of a PROPERTY could readily be accomplished with a standard METHOD, this distinction is convenient to emphasize the concept of encapsulation of INSTANCE data within an object.

There are two forms of PROPERTY procedures, PROPERTY GET and PROPERTY SET. As implied by the names, the first form is used to retrieve a data value from the object, while the second form is used to assign a value. Properties are implemented:

```
PROPERTY GET NAME [ALIAS "altname"] (BYVAL var AS type...) [AS TYPE]
    [statements]
PROPERTY = expression
END PROPERTY
```

```
PROPERTY SET NAME [ALIAS "altname"] (BYVAL var AS type...)
    [statements]
```

```

    variable = value
END PROPERTY

```

When you use PROPERTY SET, the last (or only) parameter is used to pass the value to be assigned. A PROPERTY may be considered "Read-Only" or "Write-Only" by simply omitting one of the definitions. However, if both GET and SET forms are defined for a particular Property, parameters and the property must be identical in both forms, and they must be paired. That is, the PROPERTY SET must immediately follow the PROPERTY GET. It's important to note that all PROPERTY parameters must be declared as BYVAL.

Properties can only be called through an object variable, which is an integral part of the calling syntax. The object variable must be valid, that is, it must contain a valid object reference which was assigned to it with the LET statement.

You can access a PROPERTY GET with:

```

DIM ObjVar AS MyInterface
LET ObjVar = CLASS "MyClass"

```

```

var = ObjVar.Prop1(param)

```

You can access a PROPERTY SET with:

```

DIM ObjVar AS MyInterface
LET ObjVar = CLASS "MyClass"

```

```

[CALL] ObjVar.Prop1(param) = expr

```

Note that the choice of Property procedure is syntax directed. In other words, depending upon the way you use the name, PowerBASIC will automatically decide whether the GET or SET PROPERTY should be called.

In every Method and Property, PowerBASIC automatically defines a pseudo-variable named [ME](#), which is treated as a reference to the current object. Using ME, it's possible to call any other Method or Property which is a member of the class:

```

var = ME.Method1(param)

```

Methods and Properties may be declared (using AS type...) to return a string, any of the numeric types, a specific class of object variable (AS MyInterface), a [Variant](#), or a user defined Type.

See Also

[What is an object, anyway?](#)

[Just what is COM?](#)

[How do you create an object?](#)

[What is a Compound Object Reference?](#)

What is a Compound Object Reference?

What is a Compound Object Reference?

There is an interesting "shortcut" available to you by using "Compound [Object](#) References". In some cases, you'll find that you can combine two, three, or more method calls into a single line of PowerBASIC source code.

The notion here is that you may need to execute a [METHOD](#) which returns an object variable, just so you can use that temporary object variable to call another method. In fact, you may even find you need to nest this type of operation several levels deep! While this is certainly workable, you may find yourself with a maze of temporary objects and object variables, all of which need to be destroyed at some point.

For example, assuming you have an object variable named MyDBase, which is an instance of the [interface](#) named DataBase. The interface DataBase offers a method named ErrorObject which returns an Errors object. Errors is a second interface, which has a method named Count. Count returns a [long integer](#), to tell

the number of errors which have occurred. In order to retrieve Count, you would normally have to write:

```
LOCAL MyErrors AS Errors
LET MyErrors = MyBase.ErrorObject
ErrorCount& = MyErrors.Count
MyErrors = NOTHING
```

However, with Compound Object References, this can be combined into a single line of code:

```
ErrorCount& = MyBase.ErrorObject.Count
```

In particular, note that the temporary object called MyErrors is gone completely, since PowerBASIC automatically handles the lifetime of temporary objects. You can even declare the methods and [properties](#) with parameters, if it's appropriate to allow:

```
ErrorCount& = MyBase.ErrorObject(item&).Count
```

See Also

[What is an object, anyway?](#)

[Just what is COM?](#)

[How do you create an object?](#)

[What is an HRESULT?](#)

What is an HRESULT?

What is an HRESULT?

[Methods](#) may optionally have an explicit return value which you specifically declare. However, in addition to this, all [Automation](#) or [Dispatch](#) Methods and Properties have another "Hidden Return Value", which is cryptically named HRESULT. While the name would imply a handle for a result, it's really not a handle at all, but just a [long integer](#) value, used to indicate the success or failure of the Method. After calling a Method or [Property](#), you can retrieve the HRESULT value with the PowerBASIC function [OBJRESULT](#). The most significant bit of the value is known as the severity bit. That bit is 0 (value is positive) for success, or 1 (value is negative) for failure. The remaining bits are used to convey error codes and additional status information. If you call any [object](#) Method/Property (either Dispatch or [Direct](#)), and the severity bit in the returned HRESULT is set, PowerBASIC generates Run-Time [error 99](#): Object error. When you create a Method or Property, PowerBASIC automatically returns an HRESULT of zero, which implies success. You can return a non-zero HRESULT value by executing a METHOD OBJRESULT = *expr* within a Method, or PROPERTY OBJRESULT = *expr* within a Property.

See Also

[What is an object, anyway?](#)

[Just what is COM?](#)

[How do you create an object?](#)

[How do you register a COM Component?](#)

How do you register a COM Component?

How do you register a COM Component?

All [COM Components](#) (COM Servers) must be listed in the system registry. A variety of information is kept there, but the most important is the definition of the [PROGID](#) and the [CLSID](#). These are the terms used to uniquely identify the component, so that the operating system can locate them for a client program that wants to use their services. PowerBASIC COM DLL's provide self-registration and unregistration services by

automatically exporting two Subs:

```
Declare Function DllRegisterServer alias "DllRegisterServer" as long
Declare Function DllUnregisterServer alias "DllUnregisterServer" as long
```

You could write a small executable program to call these registration functions, or use the Microsoft registration utility (REGSVR32.EXE) for that purpose. REGSVR32.EXE is included with Windows.

See Also

- [What is an object, anyway?](#)
- [Just what is COM?](#)
- [What is a COM component?](#)
- [How do you publish an object?](#)
- [What is a Class Method?](#)

What is a Class Method?

What is a Class Method?

A CLASS METHOD is one which is private to the [class](#) in which it is located. That is, it may only be called from a [METHOD](#) or [PROPERTY](#) in the same class. It is invisible elsewhere. The CLASS METHOD must be located within a [CLASS](#) block, but outside of any [INTERFACE](#) blocks. This shows it is a direct member of the class, rather than a member of an interface.

```
CLASS MyClass
  INSTANCE MyVar AS LONG

  CLASS METHOD MyClassMethod(BYVAL param AS LONG) AS WSTRING
    METHOD = "My" + STR$(param + MyVar)
  END METHOD

  INTERFACE MyInterface
    INHERIT IUNKNOWN
    METHOD MyMethod()
      Result$$ = ME.MyClassMethod(66)
    END METHOD
  END INTERFACE
END CLASS
```

In the above example, MyClassMethod() is a CLASS METHOD, and is always accessed using the pseudo-object ME (in this case ME.MyClassMethod). Class methods are never accessible from outside a class, nor are they ever described or published in a type library. By definition, there is no reason to have a private [PROPERTY](#), so PowerBASIC does not offer a CLASS PROPERTY structure.

See Also

- [What is an object, anyway?](#)
- [What does a Class look like?](#)
- [Just what is COM?](#)
- [What are Constructors and Destructors?](#)

What are Constructors and Destructors?

What are Constructors and Destructors?

There are two special [class methods](#) which you may optionally add to a [class](#). They meet a very specific need: automatic initialization when an [object](#) is created, and cleanup when an object is destroyed.

Technically, they are known as constructor and destructor [methods](#), and can perform almost any functionality needed by your object: initialization of variables, reading/writing data to/from disk, etc. You do not call these methods directly from your code. If they are present in your class, PowerBASIC automatically calls them each time an object of that class is created or destroyed. If you choose to use them, these special class methods must be named CREATE and DESTROY. They may take no parameters, and may not return a result. They are defined at the class level, so they may never appear within an [INTERFACE](#) definition.

```

CLASS MyClass
  INSTANCE MyVar AS LONG

  CLASS METHOD CREATE()
    ' Do initialization
  END METHOD

  CLASS METHOD Destroy()
    ' Do cleanup
  END METHOD

  INTERFACE MyInterface
    INHERIT IUNKNOWN
    METHOD MyMethod()
      ' Do things
    END METHOD
  END INTERFACE
END CLASS

```

As displayed above, CREATE and DESTROY must be placed at the class level, before any INTERFACE definitions. You should note that it's not possible to name any standard method (one that's accessible through an interface) as CREATE or DESTROY. That's just to help you remember the rules for a constructor or destructor. However, you may use these names as needed to describe a method external to your program.

A very important caution: You must never [create an object](#) of the current class in a CREATE method. To do so will cause CREATE to be executed again and again until all available memory is consumed. This is a fatal error, from which recovery is impossible.

See Also

[What is an object, anyway?](#)

[Just what is COM?](#)

[What is a Class Method?](#)

[What is DISPATCH?](#)

What is DISPATCH?

What is DISPATCH?

The DISPATCH INTERFACE is a slower form of [interface](#), originally introduced as a part of Microsoft Visual Basic. An implementation of [COM DISPATCH](#) support was introduced in a prior version of PowerBASIC. It has now been substantially improved to offer COM SERVER as well as client support, Dual Interfaces, relaxed typing, exception information, and much more.

When you use DISPATCH, the compiler actually passes the name of the [METHOD](#) you wish to execute as

a text string. The parameters can also be passed in the same way. The [object](#) must then look up the names, and decide which METHOD to execute, and which parameters to use, based upon the text strings provided. As if that weren't enough, DISPATCH requires that all parameters and return values be passed as [VARIANT](#) variables, with all those conversions the responsibility of the programmer. That's right, you. This is a slow process. However, DISPATCH is flexible, convenient, and forgiving. Further, you'll find that many scripting languages and application use DISPATCH as their sole method of operation, so continued support is absolutely necessary.

See Also

[What is an object, anyway?](#)

[Just what is COM?](#)

[Late Binding](#)

[ID Binding](#)

Late Binding

Late Binding

The standard methodology of [DISPATCH](#) is called "Late Binding", because nothing is done in advance. No method definitions. No Interface signatures. You can pretty much just start writing code:

```
LOCAL DispVar AS IDISPATCH
LET DispVar = NEWCOM "DispProgID"
OBJECT CALL DispVar.Method1(x&, y$)
```

It's just that easy. The first line declares an [object](#) variable which assumes the DISPATCH [interface](#), while the second line creates an object and assigns a reference to DispVar. The third line just executes a [method](#) on the new object.

The [OBJECT](#) statement is always used to execute methods on a DISPATCH interface. This differentiates it from [direct](#) access, so PowerBASIC can handle your request in the appropriate manner.

It's important to note that this version of PowerBASIC relaxes the strict type checking of Dispatch parameters. While DISPATCH interfaces require that all parameters and return values be passed as a [VARIANT](#) variable, this version of PowerBASIC relaxes that requirement for you. You may substitute any [COM](#)-compatible variable, and PowerBASIC will convert them automatically to and from Variant variables as an integral part of the OBJECT statement. How could it get easier?

So, how does this work internally?

Well, each method name is assigned a positive integer number as its Dispatch ID (or DispID), to differentiate it from the other methods. In a similar fashion, each parameter is numbered from 0 - n to identify each of them uniquely. When you execute a statement like:

```
OBJECT CALL DispVar.Method1(x&, y$)
```

PowerBASIC packages up the Method Name (*Method1*) and the names of any named parameters (none in this example - more about that later), and passes them to a special DISPATCH function. After a bit of time for lookup, the Dispatch ID (let's say the number 77) is returned. PowerBASIC then converts the two parameters to Variants and packages the whole thing up to call another special Dispatch function. This tells the server to execute Method number 77 using the two enclosed parameters. Finally, it returns with an hResult code to indicate success or failure. That's classic "Late Binding" Dispatch.

"Late Binding" is flexible and easy to use because everything is resolved at run-time. That flexibility comes at a price – it's the slowest form of COM.

See Also

[What is an object, anyway?](#)

[Just what is COM?](#)[What is DISPATCH?](#)[ID Binding](#)

ID Binding

ID Binding

So, how can we speed things up?

Well, the worst bottleneck is the name lookup, and that's something we can deal with! We usually know all the [METHOD](#) definitions at compile-time. If we can tell the compiler the DispID's and the parameter info at compile-time, one whole step can be eliminated! That's called ID-BINDING of the [Dispatch](#) Interface. We create a simple [IDBIND Interface](#), which is written like this:

```

INTERFACE IDBIND MyDispIfaceName
    MEMBER CALL Method1<77> (WideVal AS LONG, WideText AS WSTRING)
    MEMBER CALL Method2<78> ()
    MEMBER CALL MethodX<79> ()
END INTERFACE

```

PowerBASIC can use this IDBIND Interface to create faster Dispatch execution. Just create this structure, and place it in your source code prior to any references. Then, when you create an object variable, just use the IDBIND Interface Name instead of DISPATCH:

```

LOCAL DispVar AS MyDispIfaceName
LET DispVar = NEWCOM "DispProgID"
OBJECT CALL DispVar.Method1(abc&, xyz$$)

```

"ID Binding" is faster than "Late Binding", but you must supply interface definitions in your source code.

How do you get this information? Most likely from the [PowerBASIC COM Browser](#)! At your convenience, it will scan your system registry, and find any COM objects available. It will create all of the Interface definitions for you with just a click.

See Also

[What is an object, anyway?](#)[Just what is COM?](#)[What is DISPATCH?](#)[Late Binding](#)[Creating a DISPATCH Object](#)

Creating a DISPATCH Object

Creating a DISPATCH Object

[DISPATCH](#) objects are easy to create. The technique is virtually identical to that for [direct interfaces](#). You must first declare the object variable -- if you wish to use "[Late Binding](#)", you'll use the generic name [IDISPATCH](#).

```

LOCAL DispVar AS IDISPATCH
LET DispVar = NEWCOM "DispProgID"

```

If you wish to use "[ID Binding](#)", you'll use the interface name from your Interface IDBIND structure.

```
LOCAL DispVar AS MyDispIfaceName
LET DispVar = NEWCOM "DispProgID"
```

If all went well, you now have an [object](#)! (And an [object reference](#) in your object variable). Of course, it's always a good idea to use the [ISOBJECT\(DispVar\)](#) function to be certain that the operation was a success. If it failed, an attempt to use the object variable could cause a fatal exception.

See Also

[What is an object, anyway?](#)

[What is DISPATCH?](#)

[Late Binding](#)

[ID Binding](#)

[How do you call a DISPATCH METHOD?](#)

How do you call a DISPATCH METHOD?

How do you call a DISPATCH METHOD?

To call a Method through the [DISPATCH](#) interface, you will use the [OBJECT](#) statement. This differentiates it from [direct access](#), so PowerBASIC can handle your request in the appropriate manner.

There are five general forms of the OBJECT statement:

| | |
|-------------------|---|
| OBJECT GET | Retrieve the value of a PROPERTY . This is similar to retrieving the value of a variable. |
| OBJECT LET | Write a value to a PROPERTY. This is similar to assigning a value to a variable. |
| OBJECT SET | Write an object reference to a PROPERTY. This is similar to assigning to an object variable. |
| OBJECT CALL | Call a DISPATCH METHOD . This is equivalent to calling a standard Sub or Function . |
| OBJECT RAISEEVENT | Call an EVENT METHOD. (Event Methods are fully covered in a later section). |

```
OBJECT GET DispVar.Prop1 TO ResultVar
OBJECT LET DispVar.Prop1 = NewValue
OBJECT SET DispVar.Prop1 = NewReference
OBJECT CALL DispVar.Meth1(param1, TEXT=MyStr$$)
OBJECT RAISEEVENT EventMeth1
```

All parameters, return values, and assignment values must be in the form of [COM-compatible](#) variables. Literals and expressions are not allowed. COM-compatible variables include [BYTE](#), [WORD](#), [DWORD](#), [INTEGER](#), [LONG](#), [QUAD](#), [SINGLE](#), [DOUBLE](#), [CURRENCY](#), [OBJECT](#), [STRING](#), [WSTRING](#), and [VARIANT](#). You should use caution passing

data since COM Objects assume that [Unicode](#) format is used. When string data is contained in a [VARIANT](#) variable, conversion to/from Unicode is automatic, and no intervention is needed from the programmer. However, if you pass data in a dynamic string variable, you must use the [ACODES\\$\(\)](#) and [UCODES\\$\(\)](#) functions to convert the data to an appropriate format.

The OBJECT statement can use both positional and named parameters, but you should keep in mind that not all COM Dispatch Servers support named parameters. Positional parameters are universally supported.

A positional parameter is a variable containing an appropriate value. It is identified by its position in the parameter list, just as in a traditional SUB or FUNCTION. A named parameter consists of a parameter identifier (a name), an equal (=) sign, and a variable containing an appropriate value. Positional parameters

must precede any and all named parameters, but named parameters may be specified in any sequence.

Each time you call a Method or Property using the OBJECT statement, a status code is returned in a hidden parameter to indicate the success or failure of the operation. You can retrieve information about this status code with the [OBJRESULT](#) function, and also by using the [IDISPINFO](#) Dispatch Information Object.

If the failure was severe, then a PowerBASIC [error 99](#) (Object Error) is also generated and the [ERR](#) system variable is set. You can find more information about these items by referring to OBJRESULT, IDISPINFO, and ERR.

See Also

[What is an object, anyway?](#)

[What is DISPATCH?](#)

[Late Binding](#)

[ID Binding](#)

[What are Connection Points?](#)

What are Connection Points?

What are Connection Points?

Generally speaking, a client module calls a server module to perform specific operations as they are needed. However, in many situations, it's convenient and efficient for a server to notify its client of a condition or event immediately, without forcing the client to inquire about the status. At the appropriate time, the server calls back to a client [method](#), passing information via the method parameters. This is the exact opposite of normal communication, because the server module is now calling the client module. In effect, the client is acting as a server for the purpose of handling these events. In the world of [objects](#), a server which can call such "Event Methods" is said to offer a "Connection Point". A Connection Point can be used with [COM](#) objects or internal objects. Further, it may use either a [direct interface](#) or the [DISPATCH](#) interface. Event methods may take parameters, but may not return a result.

In COM terminology, a server which offers a Connection Point is known as an "Event Source". A client which can attach to a Connection Point and handle events is known as an "Event Sink" or "Event Handler". The terms source and sink are analogous to the electrical engineering terms source and sink.

Perhaps you have a server object which performs complex arithmetic, and may take quite some time to finish. You'd like to notify the client of your progress towards completion at regular intervals. In that way, the client can continue other work, or just notify the user of the status. If a server object offers a Connection Point, it must declare the event interface:

```
INTERFACE STATUS $StatusGuid AS EVENT
  INHERIT IUNKNOWN
  METHOD Progress(Percent AS LONG)
END INTERFACE
```

Finally, the server class must include a declaration of the event interfaces it supports via a Connection Point by adding one or more [EVENT SOURCE](#) statements within the [class](#) definition:

```
EVENT SOURCE STATUS
EVENT SOURCE DISPATCH
```

Each server class created by PowerBASIC may offer up to four event interfaces. A client module may subscribe to any or all of these event interfaces. When it's time for the server object to notify the client of an event, the [RAISEEVENT](#) statement is used. For the Dispatch interface, [OBJECT RAISEEVENT](#) is used instead. RAISEEVENT may only appear within a class which declares the Event Source interface. The concept of RAISEEVENT is very similar to the [CALL](#) statement, but it may only be used to execute event methods:

```
RaiseEvent Status.Progress(10) ' advise the code is 10% done
```

It should be noted that RaiseEvent does not reference an object variable at all, because it calls any and all

Event Methods which are currently attached to the Connection Point. Instead, it references the interface name (in this case "Status"), followed by the name of the Event Method to be executed (in this case "Progress").

The client may choose to support the event by creating the appropriate event code (it must precisely match the declaration in the server), or the client could just ignore the event completely. If supported, the client must have an event method to handle the event, and create an event object to do so. In effect, the client actually becomes an object server for this one purpose. The client code might be something like:

```
CLASS EventClass AS EVENT
  INTERFACE STATUS AS EVENT
    INHERIT IUNKNOWN
    METHOD Progress(Percent AS LONG)
      CALL DisplayIt(Percent)
    END METHOD
  END INTERFACE
END CLASS
```

In addition, the client must initiate a connection to the server with [EVENTS FROM](#), and disconnect when done with [EVENTS END](#):

```
DIM oEvent AS STATUS
oEvent = CLASS "EventClass"
EVENTS FROM MyObject CALL oEvent

' execute some code here...

EVENTS END oEvent
```

A Connection Point may be attached to one Event Method, multiple Event Methods, or no Event Method at all. Whenever a RAISEEVENT statement is executed, all Event Methods attached to the source object are called, one after another. There is no guarantee of the sequence of the calls, and you must consider the possibility that RAISEEVENT with a ByRef parameter could change the value of a parameter variable before any particular Event Method is executed.

Here is a complete program which demonstrates the execution of a Connection Point in a single, self-contained application. It uses only internal objects. Since the objects are all internal, it is not necessary to assign a [GUID](#) to each class and interface.

```
#COMPILE EXE

CLASS EvClass AS EVENT
  INTERFACE Status AS EVENT
    INHERIT IUNKNOWN
    METHOD Done
      MSGBOX "Done!"
    END METHOD
  END INTERFACE
END CLASS

CLASS MyClass
  INTERFACE MyMath
    INHERIT IUNKNOWN
    METHOD DoMath
      MSGBOX "Calculating..." ' Do some math calculations here
      RAISEEVENT Status.Done()
    END METHOD
  END INTERFACE

  EVENT SOURCE Status

END CLASS

FUNCTION PBMAIN()
```

```

DIM oMath AS MyMath, oStatus AS Status
LET oMath = CLASS "MyClass"
LET oStatus = CLASS "EvClass"

EVENTS FROM oMath CALL oStatus
oMath.DoMath
EVENTS END oStatus
END FUNCTION

```

Here is a set of programs which demonstrate the execution of a Connection Point using a COM SERVER and a COM CLIENT. It uses an in-process COM server ([DLL](#) created with PB/Win), and a COM CLIENT as an executable program. First the COM SERVER:

```

#COMPILE DLL "EvServer.dll"

$EvIFaceGuid = GUID$("{00000098-0000-0000-0000-000000000002}")
$MyClassGuid = GUID$("{00000098-0000-0000-0000-000000000003}")
$MyIFaceGuid = GUID$("{00000098-0000-0000-0000-000000000004}")

INTERFACE Status $EvIFaceGuid AS EVENT
  INHERIT IUNKNOWN
  METHOD Done
END INTERFACE

CLASS MyClass $MyClassGuid AS COM
  INTERFACE MyMath $MyIFaceGuid
    INHERIT IUNKNOWN
    METHOD DoMath
      MSGBOX "Calculating..." ' Do some math calculations here
      RAISEEVENT Status.Done()
    END METHOD
  END INTERFACE

  EVENT SOURCE Status

END CLASS

```

Next the COM CLIENT:

```

#COMPILE EXE "EvClient.exe"

$EvClassGuid = GUID$("{00000098-0000-0000-0000-000000000001}")
$EvIFaceGuid = GUID$("{00000098-0000-0000-0000-000000000002}")
$MyIFaceGuid = GUID$("{00000098-0000-0000-0000-000000000004}")

CLASS EvClass $EvClassGuid AS EVENT
  INTERFACE STATUS $EvIFaceGuid AS EVENT
    INHERIT IUNKNOWN
    METHOD Done
      MSGBOX "Done!"
    END METHOD
  END INTERFACE
END CLASS

INTERFACE MyMath $MyIFaceGuid
  INHERIT IUNKNOWN
  METHOD DoMath
END INTERFACE

FUNCTION PBMAIN()
  DIM oMath AS MyMath
  DIM oStatus AS STATUS

```

```

LET oMath = NEWCOM "MyClass"
LET oStatus = CLASS "EvClass"

EVENTS FROM oMath CALL oStatus
oMath.DoMath
EVENTS END oStatus
END FUNCTION

```

See Also

[What is an object, anyway?](#)

[Just what is COM?](#)

[Enumerating Collections](#)

[What are Type Libraries?](#)

Enumerating Collections

Enumerating Collections

A [collection](#) is simply a set or group of items, where each can be accessed through its own [interface](#). For example, Microsoft Word™ can have multiple documents open at the same time, and it can provide an interface reference for each open document.

Therefore, enumerating a collection is simply a matter of determining the number of items in the collection, looping through and retrieving the appropriate information for one or more interface members of the collection.

We'll start off with the Visual Basic syntax and show how to perform the same kind of task with PowerBASIC.

Visual Basic syntax for enumerating a collection looks something like this:

```

Dim Item As InterfaceItem
Dim Items As InterfaceItemsCollection
[statements]
For Each Item In Items
  'do something with the Item.member Method/Property, e.g.,
  var$ = Item.StringProp
Next

```

In PowerBASIC, we can perform the same enumeration. For example:

```

DIM oItem AS InterfaceItem
DIM oItems AS InterfaceItemsCollection
[statements]
OBJECT GET oItems.Count TO c&
FOR Index& = 1 TO c&
  OBJECT GET oItems.Item(Index&) TO oItem
  'do something with the Item.member Method/Property, e.g.,
  OBJECT GET oItem.StringProp TO var$$
NEXT

```

See Also

[COLLECTION Object Group](#)

[What is an object, anyway?](#)

[Just what is COM?](#)

[What are Type Libraries?](#)

What are Type Libraries?

What are Type Libraries?

A Type Library is a block of data which describes one or more [COM](#) Object Classes. The internal format of the data is not important, because it is seldom accessed by application programs. Typically, it is only accessed by COM Browsers such as [PBROW.EXE](#) (supplied with PowerBASIC), TypeLib Browser from Jose Roca, or OLEVIEW.EXE from Microsoft. In the unusual circumstance that you must access this data directly, the Windows API provides numerous functions for just that purpose.

A Type Library is usually supplied by the author of the COM server. It's frequently supplied as a standalone data file with a file name extension of TLB. The data can also be embedded as a [resource](#) in the associated [DLL](#) or EXE. In practice, you would generally use a COM Browser to extract enough information about a COM [Object](#) to allow you to use these [classes](#) in your program. Generally speaking, a Type Library usually supplies specific details about every [METHOD](#) and [PROPERTY](#) (function), and the parameters of each of them. This would include the names, data types, return values, and more. The Type Library may also offer information about related [equates](#), [User-Defined-Types](#), and more. To include a [numeric equate](#) in your type library, just append the words AS COM to the equate definition:

```
%ABCD = 99 AS COM
```

Traditionally, it was common to use Interface Definition Language (IDL) to create the source code for the definitions you wish to describe in a Type Library. IDL was created specifically for this purpose and resembles C++ syntax. Once the source code was written, you would use Microsoft's MIDL Compiler to create the final Type Library. That's a fairly cumbersome process.

With PowerBASIC, it's a bit simpler than that. Whenever you create a COM server, simply add the [#COM TLIB ON](#) metastatement to your source and your Type Library will be created automatically. You can prevent a Type Library from being created by using the [#COM TLIB OFF](#) metastatement. A Type Library is created with the same primary name as your COM server, and a file extension of TLB. That is, if you create a COM server named XX.DLL, PowerBASIC will name the Type Library as XX.TLB. The Type Library offers a description of every published class on the server. You can then use any COM Browser to display the type information in a format that meets your needs. The PowerBASIC COM Browser converts it directly to PowerBASIC source code declarations which can then be dropped into your COM client program. If any of your Methods or Properties use data types not supported by Type Libraries, you will receive a [Error 581 - Type Library creation error](#). If you wish to create a Type Library for your COM server, then only use data types that are compatible with Type Libraries, which are [BYTE](#), [WORD](#), [DWORD](#), [INTEGER](#), [LONG](#), [QUAD](#), [SINGLE](#), [DOUBLE](#), [CURRENCY](#), [OBJECT](#), [STRING](#), [WSTRING](#), and [VARIANT](#).

As mentioned earlier, you can consolidate your distribution files by embedding your Type Library right into your DLL or EXE as a resource. A utility program named PBTYP.EXE is provided for just that purpose.

PBTYP.EXE is executed with one or two command line parameters used to specify the files to be used in the embedding process. The syntax is:

```
PBTYP.EXE TargetFile [ResourceFile]
```

The PBTYP.EXE utility requires that you supply two or three files: the Target File (the DLL or EXE which receives the resource), the TypeLib File (the Type Library to be embedded), and optionally a resource file to be used. Since it's assumed that the Target File and the TypeLib file share the same primary name, only the Target file name is needed. If an extension is not supplied, the default of ".DLL" is used. When executed, PBTYP.EXE scans the original resource file (such as ABC.RC), and replaces any references to a Type Library with a reference to the new Type Library. It then compiles it to a resource object file (such as ABC.RES), and then creates a final PowerBASIC version (such as ABC.PBR). Finally, it removes any prior resource from the target file, and replaces it with the newly created resource. It should be noted that RC.EXE and PBRES.EXE must be present in your path for the process to complete.

See Also

[What is an object, anyway?](#)

[Where are objects located?](#)

[Why should I use objects?](#)

[How do you publish an object?](#)

How are GUID's used with objects?

How are GUID's used with objects?

A [GUID](#) is a "Globally Unique Identifier", a very large number which is used to uniquely identify every [interface](#), every [class](#), and every [COM](#) application or library which exists anywhere in the world. GUID's identify the specific components, wherever and whenever they may be used. A GUID is a 16-byte (128-bit) value, which could be represented as an integral value or a string. This item is large enough to represent all the possible values needed.

The PowerBASIC [GUID\\$\(\)](#) function (or a [hot-key](#) in the PowerBASIC IDE) can generate a random GUID which is statistically guaranteed to be unique from any other generated GUID.

When a GUID is written in text, it takes the form:

```
{00CC0098-0000-0000-0000-0000000000FF}
```

When a GUID is used in a PowerBASIC program, it is typically assigned to a [string equate](#), as that makes it easier to reference.

```
$MyLibGuid = GUID$("{00000099-0000-0000-0000-000000000007}")
$MyClassGuid = GUID$("{00000099-0000-0000-0000-000000000008}")
$MyIfaceGuid = GUID$("{00000099-0000-0000-0000-000000000009}")
```

Every [COM COMPONENT](#), every CLASS, and every INTERFACE is assigned a GUID to uniquely identify it, and set it apart from another similar item. As the programmer, you can assign each of these identifiers, or they will be randomly assigned by the PowerBASIC compiler.

When you create [objects](#) just for internal use within your programs, it's common to ignore the GUID's completely. PowerBASIC will assign them for you automatically, so you don't need to give it a thought.

However, if you plan to publish an object for any external use through COM services, it's very important that you assign an explicit identifier to each item in your code. Otherwise, the compiler will assign new identifiers randomly, every time you compile the source. No other application could possibly keep track of the changes.

The APPID or LIBID identifies the entire application or library. You specify this item with the [#COM GUID](#) metastatement:

```
#COM GUID $MyLibGuid
```

The CLSID identifies each CLASS. You specify this item in the [CLASS](#) statement:

```
CLASS MyClass $MyClassGuid AS COM
  [statements]
END CLASS
```

The IID identifies each INTERFACE. You specify this item in the INTERFACE statement:

```
INTERFACE MyInterface $MyIfaceGuid
  [statements]
END INTERFACE
```

See Also

[What is an object, anyway?](#)

[Just what is COM?](#)

[What is inheritance?](#)

[How do you create an object?](#)

Built-in Interfaces

Built-in Interfaces

The compiler provides a set of built-in Interfaces, including:

ICLASSFACTORY
 ICONNECTIONPOINTCONTAINER
 ICONNECTIONPOINT
 IDISPATCH
 IUNKNOWN

See Also

- [What are the parts of an object?](#)
- [Are there other important "Buzz-Words"?](#)
- [What does an Interface look like?](#)
- [Built-in numeric equates](#)
- [Built-in string equates](#)
- [Built-in User Defined Types](#)
- [Built-in RGB Color Equates](#)

The PowerBASIC COM Browser

The PowerBASIC COM Browser

What is the PowerBASIC COM Browser

The PowerBASIC COM Browser is an application that exposes the data stored in a [type library](#) and generates PowerBASIC Compatible source code for this data. A Type Library is a block of data which describes one or more [COM](#) Object Classes.

If you are unfamiliar with COM programming, you may wish to review the COM Programming section in the PowerBASIC For Windows Help file to gain an insight into COM programming concepts before reading this topic.

A Type Library is usually supplied by the author of the COM server. It's frequently supplied as a standalone data file with a file name extension of TLB. The data can also be embedded as a resource in the associated DLL, EXE, OCX, etc. The PowerBASIC COM Browser is used to extract information about a COM [Object](#) to allow you to use these classes in your program. Generally speaking, a Type Library usually supplies specific details about every [Method](#) and [Property](#), and the parameters of each of them. This would include the names, data types, return values, and more. The Type Library may also offer information about related equates, [User-Defined-Types](#), and more.

The PowerBASIC COM Browser can be launched from the Tools menu in the [PowerBASIC IDE](#), launched as a stand-alone application by double-clicking PBROW.EXE in the \PB\BIN folder, or run from the command-line by typing PBROW.EXE (and then press ENTER).

When launched, the PowerBASIC COM Browser offers a straightforward user interface, with which you open specific type-library files or choose from a list of registered libraries.

Before we start, we should first clarify a few terms so avoid confusion:

COM Object An instance of an initialized COM library or application. COM Objects usually come

in EXE (out-of-process), and DLL, or OCX formats (in-process). These discussions pertain to COM libraries that act as COM Servers, regardless of whether they are in-process or out-of-process Servers.

Type-Library A type-library is a file that contains a database or data dictionary describing the Interfaces and Interface members exposed by a COM Object.

See Also

[The PowerBASIC COM Browser user interface](#)

[The PowerBASIC COM Browser Tutorial](#)

[What is an object, anyway?](#)

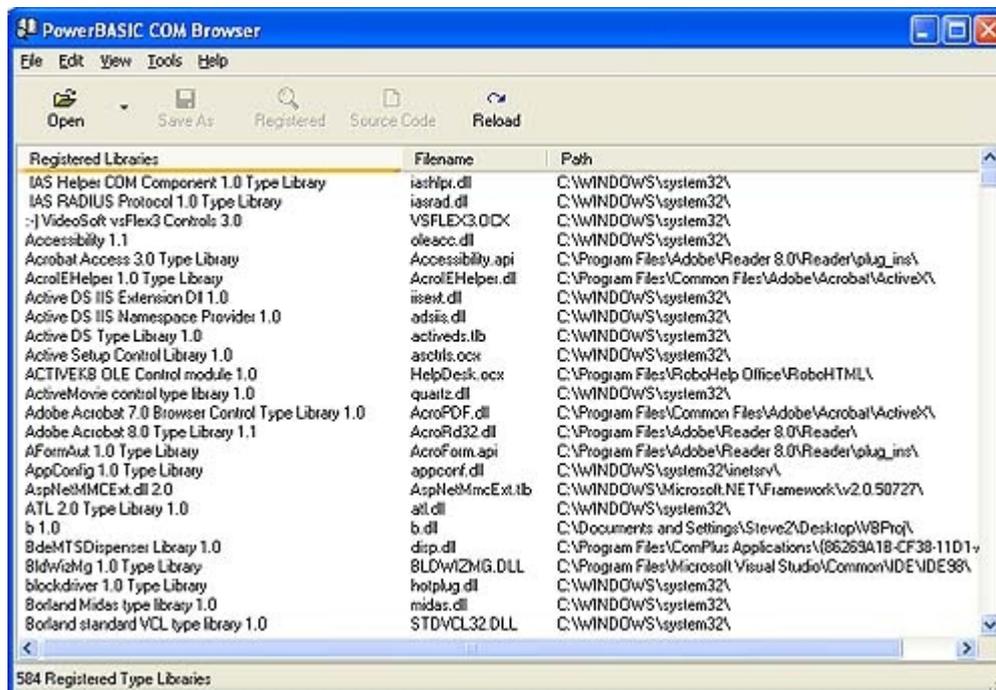
[Just what is COM?](#)

[What are Type Libraries?](#)

The PowerBASIC COM Browser user interface

The PowerBASIC COM Browser User Interface

The PowerBASIC COM Browser has two views, a list of all registered [type libraries](#) installed on the system and a source code view which displays the PowerBASIC declarations for this type library. The PowerBASIC COM Browser opens up with a list of all the registered type libraries installed on the users system.



See Also

[The PowerBASIC COM Browser](#)

[The PowerBASIC COM Browser Menu](#)

[What is an object, anyway?](#)

[Just what is COM?](#)

[What are Type Libraries?](#)

The PowerBASIC COM Browser Menu

The PowerBASIC COM Browser Menu

This topic briefly describes each menu option available from the PowerBASIC COM Browser's menu.

File menu

| | |
|----------------------------|--|
| Open File | Open a type library file. |
| Save File As | Save the currently loaded source code to disk. |
| [recent files list] | A list of the most recently loaded type libraries. |
| Exit | Exits the PowerBASIC COM Browser. |

Edit menu

| | |
|-------------------|---|
| Select All | Select all the text in the current source code window. |
| Copy | Copy the selected text in the source code window and place it in the Clipboard. |

View menu

| | |
|-----------------------------|---|
| Registered Libraries | Show a list of all the Registered Libraries view . |
| Source Code | Show the Source Code window view. |
| Reload | If in Registered Library view, this options reloads the list of all Registered Libraries installed on the system. If in Source Code view, this option reloads the source code generated from the selected type library. |

Tools menu

| | |
|----------------|--|
| Options | Display the Options dialog , for configuring the PowerBASIC COM Browser. |
|----------------|--|

Help menu

| | |
|-------------------------|---|
| Help For PBRow | Displays the PowerBASIC COM Browser help file. |
| Help For Library | Displays the help file for the currently loaded type library if one exists. |
| About | Display version information for the PowerBASIC COM Browser. |

See Also

[The PowerBASIC COM Browser](#)

[The PowerBASIC COM Browser User Interface](#)

[What is an object, anyway?](#)

[Just what is COM?](#)

[What are Type Libraries?](#)

The PowerBASIC COM Browser Toolbar

The PowerBASIC COM Browser Toolbar

This topic briefly describes each menu option available from the PowerBASIC COM Browser's toolbar.



Open a type library file



Save the currently loaded [source code](#) to disk.



Show a list of all the [Registered Libraries view](#).



Show the PowerBASIC compatible source code for the loaded type library.



If in Registered Library view, this options reloads the list of all Registered Libraries installed on the system. If in Source Code view, this option reloads the source code generated from the selected type library.

See Also

[The PowerBASIC COM Browser User Interface](#)

[Menu Items](#)

[Shortcut Keys](#)

[Registered Type Library View](#)

[What is an object, anyway?](#)

[Just what is COM?](#)

[What are Type Libraries?](#)

Shortcut Keys

Shortcut Keys

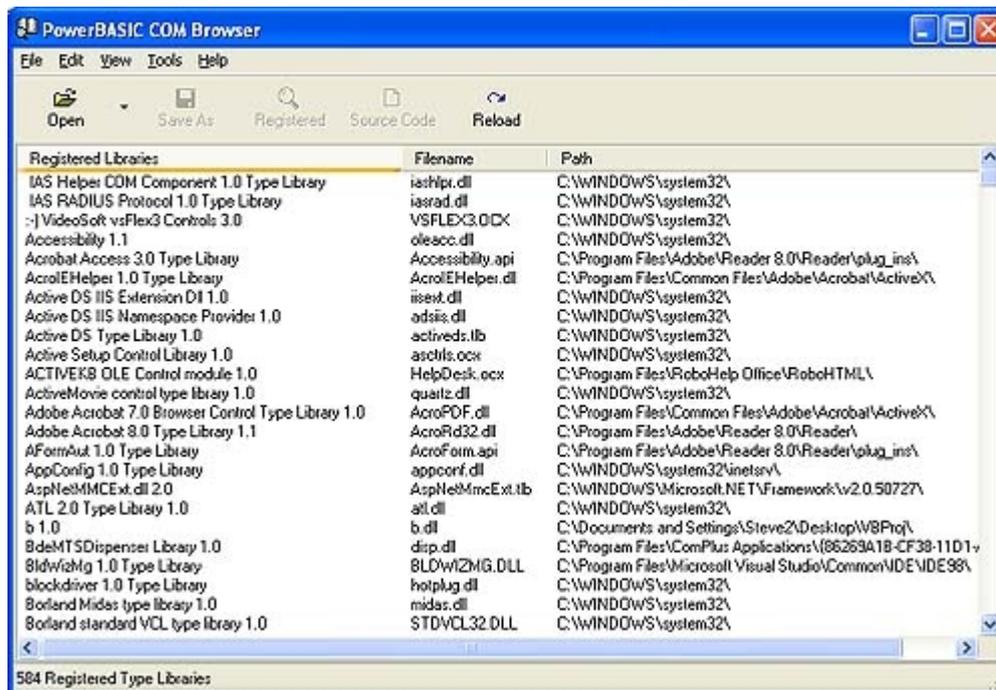
The following table summarizes the shortcut-keys available in the PowerBASIC COM Browser.

| Keystroke | Description |
|-----------|---|
| F1 | Display the help file for the type library if available, otherwise display the PowerBASIC COM Browser help file |
| CTRL+A | Select all the text in the Source Code View |
| CTRL+C | Copy the selected text in the Source Code window to the clipboard |
| CTRL+D | Display the Source Code View. |
| CTRL+L | Reload the Type library View or the Source Code View |
| CTRL+O | Open a Type Library file |
| CTRL+R | Display the Registered Type Library View. |
| CTRL+S | Save the current source code |

See Also[The PowerBASIC COM Browser User Interface](#)[Registered Type Library View](#)[Source Code View](#)[What is an object, anyway?](#)[Just what is COM?](#)[What are Type Libraries?](#)**Registered Type Library View**

Registered Type Library View

The Registered Library view displays a list of all the registered [type libraries](#) installed on the system. This Registered Library view is initially displayed when the PowerBASIC COM Browser is started. When in the [Source Code view](#), you can switch to the Registered Library View by clicking the [Registered Button](#) or by selecting View | Registered Libraries from the [menu](#).



The Registered Libraries column, displays the descriptive name for the registered library. The Filename column displays the filename of the registered type library. The Path column displays the path to the registered type library. Each column header can be clicked to sort the column in ascending order, if you click the same column header again the column will be sorted in descending order. The PowerBASIC COM Browser remembers the column and the sort order you last used and will display the list of registered type libraries using this information the next time you open the PowerBASIC COM Browser.

To generate PowerBASIC compatible declarations, double-click on the library name. The PowerBASIC COM Browser will display the declarations in the Source Code view.

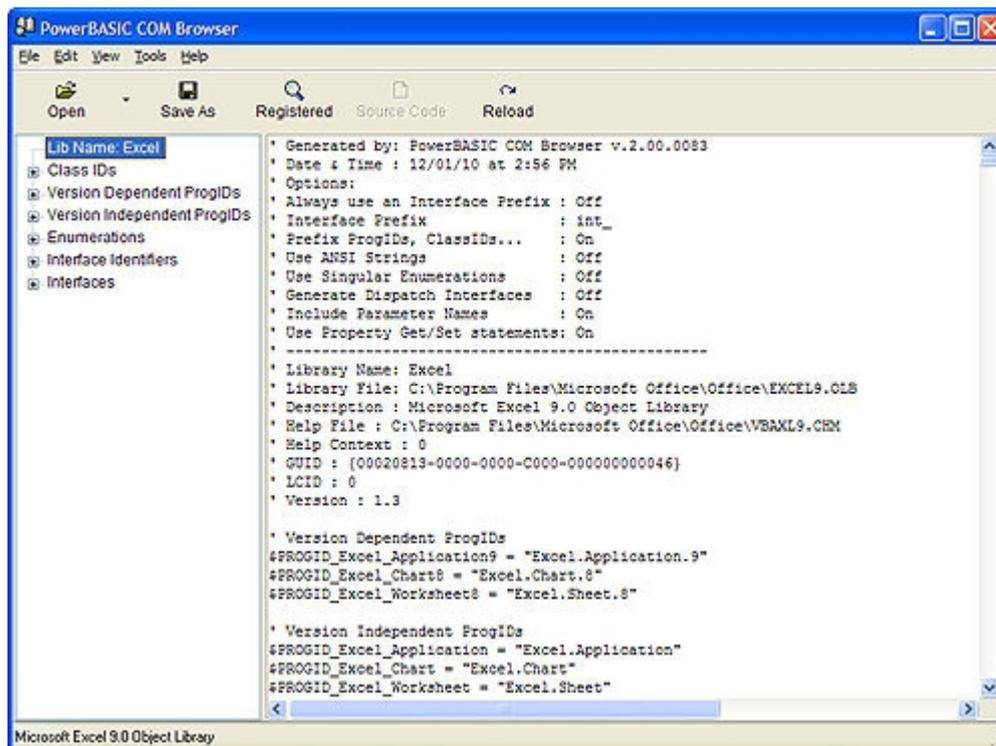
See Also[The PowerBASIC COM Browser User Interface](#)[Source Code View](#)

[Getting Help](#)[What is an object, anyway?](#)[Just what is COM?](#)[What are Type Libraries?](#)

Source Code View

Source Code View

The Source Code view displays a list of all the data included in the selected [type library](#) and the PowerBASIC compatible declarations for this data.



Clicking on a type library data item on the left hand side will display only the PowerBASIC compatible code for the item on the right hand side, clicking on the top level library name will display all the PowerBASIC compatible code for the selected type library.

See Also

[The PowerBASIC COM Browser User Interface](#)[Registered Type Library View](#)[Getting Help](#)[Saving the Source Code](#)[What is an object, anyway?](#)[Just what is COM?](#)[What are Type Libraries?](#)

Getting Help

Getting Help

If the type library has a help file installed on the system, you can press the F1 key while in the [Source Code view](#) to display the help file. If you have selected an item from the list of items available and press the [F1 key](#) the help topic for the selected item is displayed. If no help topic is available for the selected item the default topic for the [type libraries](#) help file is displayed. If there is no help file for the selected type library, then the PowerBASIC COM Browsers help file (this file) is displayed.

See Also

[The PowerBASIC COM Browser User Interface](#)

[Opening a type-library](#)

[What is an object, anyway?](#)

[Just what is COM?](#)

[What are Type Libraries?](#)

Opening a type-library

Opening a Type Library

The PowerBASIC COM Browser supports opening both registered and unregistered [Type Libraries](#). A registered type library can be opened from the [Registered Type Library view](#) or by clicking the [Open button](#) and browsing to and selecting the type library file. An unregistered type library can only be opened by using the Open button and browsing to and selecting the type library file.

See Also

[The PowerBASIC COM Browser User Interface](#)

[Saving the Source Code](#)

[What is an object, anyway?](#)

[Just what is COM?](#)

[What are Type Libraries?](#)

Saving the Source Code

Saving the Source Code

To save the PowerBASIC compatible source code, simply click the [Save As button](#) or select File -> Save As from the [menu](#) and the source code displayed in the [Source Code view](#) will be saved to disk. You may wish to save the entire Source Code for the [type library](#), in which case make sure you have selected the top level item on the right hand side, which is the type libraries name. If a type library item is selected on the left hand side of the Window, then only that portion of the displayed code will be saved to disk.

The selected text in the Source Code window can also be saved to the Windows clipboard, by selecting Edit -> Copy.

See Also

[The PowerBASIC COM Browser User Interface](#)

[Source Code View](#)

[Options Dialog](#)

[What is an object, anyway?](#)

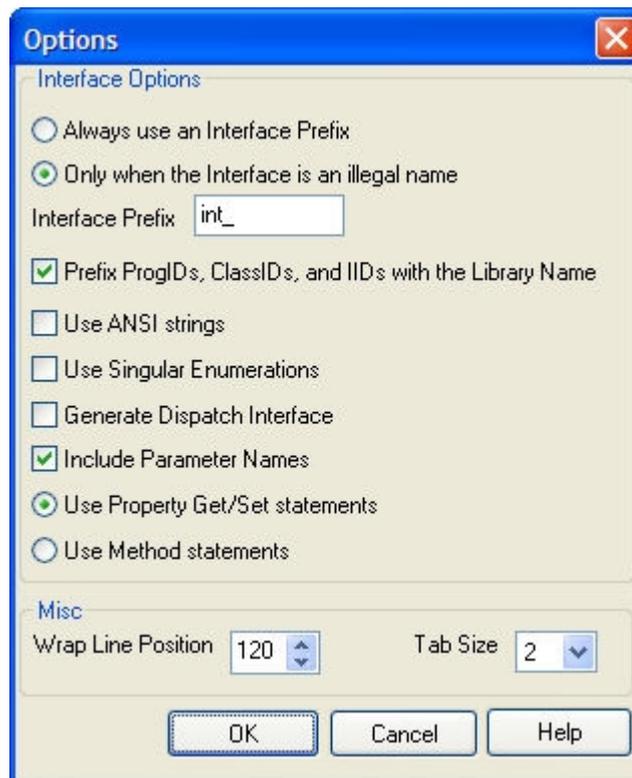
[Just what is COM?](#)

[What are Type Libraries?](#)

Options Dialog

Options

This topic describes the options available to customize the output of the source code generated by the PowerBASIC COM Browser.



Always use an Interface Prefix

This option prefixes all Interface names with the text specified in the Interface Prefix textbox. This is useful when using multiple [type libraries](#) in a project and there are conflicts with duplicate Interface names.

Only When the Interface contains an illegal name

This option prefixes Interface names, only when they contain illegal characters or conflict with a reserved keyword.

Interface Prefix

This is the prefix used for Interface names.

Prefix ProgIDs,ClassIDs, and IIDs with Library Name

This option will prefix ClassIDs, ProgIDs, and IIDs with the library name. This option is used when you have multiple type libraries with conflicting names in one application.

Use ANSI strings

This option will generate string parameters and return values using [ANSI](#) strings instead of the preferred [Unicode](#) strings. This option should be used when the COM server was written using only ANSI strings, such as COM servers created with PowerBASIC 9 For Windows.

Use Singular Enumerations

Allows [enumeration](#) member names to be referenced by just the member name with a percent (%) prepended. Without this option enumeration members would be referenced with a percent (%) , the ENUM name, and a period prepended.

Generate Dispatch Interfaces only

This option generates [Dispatch](#) Interface's only for the purposes of [IDBinding](#) to a Dispatch COM Interface. Custom only Interfaces will be skipped when this option is used.

Include Parameter Names

This option generates Method and Property statements without any parameters names. This is useful when the type libraries Method and Property parameter names conflict with code used in your program.

Use Property Get/Set statements

This option will generate Property Get/Set statements in the generated source code. A Property is a special type of Method, which is only used to set or retrieve data in an object. The use of Property Get/Set statements is the preferred syntax as it improved readability of the source code.

Use Method statements

This option will convert Property Get/Set statements to Method statements in the generated source code. This option is useful when the type library Property Get or Set definition contains an error and the use of a Method statement can usually resolve the type library error. This option is not available when you have the Generate Dispatch Interfaces only.

Wrap Line Position

When generating source code, The PowerBASIC COM Browser wraps long lines of code (using standard PowerBASIC line continuation characters) when they reach the wrap column indicated in this field.

Tab Size

The number of spaces that Tab characters are expanded to in the generated source code.

See Also

[The PowerBASIC COM Browser](#)

[The PowerBASIC COM Browser Tutorial](#)

[What is an object, anyway?](#)

[Just what is COM?](#)

[What is DISPATCH?](#)

[What are Type Libraries?](#)

The PowerBASIC COM Browser Tutorial

The PowerBASIC COM Browser Tutorial

As described in the [What is the PowerBASIC COM Browser](#) topic, the PowerBASIC COM Browser is a browser utility application that exposes the Interfaces, Methods, and Properties in a type-library. It is also used to generate PowerBASIC compatible source code to be used in your application.

We will walk through an example of using the PowerBASIC COM Browser to locate a registered type library,

generate the PowerBASIC compatible source code, and then use this source code in a PowerBASIC For Windows application.

1. Start the PowerBASIC COM Browser
2. Open the Options dialog by selecting Tools | Options and select the following options:
 - o Always use an Interface Prefix : Off
 - o Interface Prefix : Agent
 - o Prefix ProgIDs, ClassIDs... : Off
 - o Use ANSI Strings : Off
 - o Use Singular Enumerations : Off
 - o Generate Dispatch Interfaces : Off
 - o Include Parameter Names : On
 - o Use Property Get/Set statements : On
3. Click the OK button to save and close the Options dialog.
4. Locate the Microsoft Agent Control 2.0 type library. This will be listed under the "Registered Library" heading with the text of "Microsoft Agent Control 2.0" or under the "Filename" heading of "agentctl.dll". If you do not have this type library installed it can be downloaded for free from <http://www.microsoft.com/DOWNLOADS/en/default.aspx>. After installing the Microsoft Agent Control 2.0 type library click the Reload button to update the list of registered type libraries.
5. Double-click on the Microsoft Agent Control 2.0 type library listed in the list of Registered type libraries, to generate the PowerBASIC compatible source code for this object.
6. Click the "Save As..." button and save it with the name of "agent.inc"
7. Close the PowerBASIC COM Browser
8. Start the PowerBASIC For Windows IDE
9. Click the Create New File button in the IDE
10. Paste the following code into the new file created in the IDE

```
#COMPILER PBWIN 10
#COMPILE EXE
#DIM ALL
%ID_START      = 1000
%ID_STOP       = 1001
%ID_EVENTLIST  = 1003
GLOBAL hDlg AS LONG
' MS Agent Control include file generated by PBrow.exe
#include "agent.inc"
' Display an error message
MACRO DisplayError(TXT)
  IF ISTRUE(ISOBJECT(AgentEvents)) THEN
    ' Detach the events handler
    EVENTS END AgentEvents
  END IF
  ' Print the error and then exit the callback routine
  MSGBOX TXT, %MB_OK OR %MB_ICONERROR, "MS Agent Error"
  EXIT FUNCTION
END MACRO
CALLBACK FUNCTION DlgProc
  STATIC AgentCtrlEx AS IAgentCtlEx
  STATIC AgentChars AS IAgentCtlCharacters
  STATIC AgentCharsEx AS IAgentCtlCharacterEx
  STATIC AgentEvents AS Agent_AgentEvents
```

```

LOCAL StartX      AS LONG
LOCAL StartY      AS LONG
LOCAL CharW       AS LONG
LOCAL CharH       AS LONG
LOCAL SpeakTxt    AS WSTRING
SELECT CASE AS LONG CB.MSG
CASE %WM_INITDIALOG
    ' Create the Agent Control Object
    AgentCtrlEx = NEWCOM $PROGID_Agent
    IF ISFALSE(ISOBJECT(AgentCtrlEx)) THEN
        DisplayError("The Microsoft Agent Control 2.0 is not installed. This
control can be " + _
                    "downloaded from
http://www.microsoft.com/DOWNLOADS/en/default.aspx")
    END IF
    ' Create the Events handler interface
    AgentEvents = CLASS "Class_Agent_AgentEvents"
    IF ISFALSE(ISOBJECT(AgentEvents)) THEN
        DisplayError("Error creating the event interface.")
    END IF
    ' Attach the Events handler interface to the Agent Control
    EVENTS FROM AgentCtrlEx CALL AgentEvents
    ' Create the Characters interface
    AgentChars = AgentCtrlEx.Characters
    IF ISFALSE(ISOBJECT(AgentChars)) OR OBJRESULT <> %S_OK THEN
        DisplayError("Error creating the Microsoft Agent Control 2.0
Characters interface.")
    END IF
    ' Enable the Start button
    CONTROL ENABLE CBHNDL, %ID_START
CASE %WM_COMMAND
    SELECT CASE AS LONG CB.CTL
    CASE %ID_START
        IF CB.CTLMSG = %BN_CLICKED OR CB.CTLMSG = 1 THEN
            ' Load the Merlin agent into the Characters interface
            AgentChars.Load("Merlin"$$, "Merlin.acs"$$)
            IF OBJRESULT <> %S_OK THEN
                DisplayError("The Microsoft Agent Control 2.0 Merlin Character
is not installed. This character " + _
                            "can be downloaded from
http://www.microsoft.com/DOWNLOADS/en/default.aspx")
            END IF
            ' Load the Merlin character into the CharactersEx Interface
            AgentCharsEx = AgentChars.Character("Merlin"$$)
            IF ISTRUE(ISOBJECT(AgentCharsEx)) THEN
                ' Show the Merlin agent on the screen
                AgentCharsEx.Show(0)
                ' Get the Width and Height of the Merlin agent
                CharW = AgentCharsEx.Width
                CharH = AgentCharsEx.Height
                ' Get the Width and Height of the Desktop
                DESKTOP GET CLIENT TO StartX, StartY
                ' Find the center of the desktop for Merlin agent
                StartX = (StartX - CharW)\2
                StartY = (StartY - CharH)\2
                ' Move the Merlin agent to the center of the desktop
                AgentCharsEx.MoveTo(StartX, StartY)
                ' Have the Merlin agent play the trumpet
                AgentCharsEx.Play("Announce"$$)
            END IF
        END IF
    END CASE
END SELECT

```

```

        ' Make the Merlin agent speak
        SpeakTxt = "With \map="+$DQ+"Powur bay
sick!"+$DQ+"="+$DQ+"PowerBASIC"+$DQ+ _
                "\ \Pau=300\you can be a \map="+$DQ+ "wizurd
too!"+$DQ+"="+$DQ+"wizard too!"+$DQ
        AgentCharsEx.Speak(SpeakTxt)
        ' Disable the Start button and enable the Stop button
        CONTROL DISABLE CBHNDL, %ID_START
        CONTROL ENABLE CBHNDL, %ID_STOP
    END IF
END IF
CASE %ID_STOP
    IF CB.CTLMSG = %BN_CLICKED OR CB.CTLMSG = 1 THEN
        ' Stop all actions by the Merlin agent and unload it
        AgentCharsEx.Stop
        AgentChars.Unload("Merlin"$$)
        ' Enable the Start button and disable the Stop button
        CONTROL ENABLE CBHNDL, %ID_START
        CONTROL DISABLE CBHNDL, %ID_STOP
    END IF
END SELECT
CASE %WM_DESTROY
    IF ISTRUE(ISOBJECT(AgentEvents)) THEN
        ' Detach the event handler interface
        EVENTS END AgentEvents
    END IF
END SELECT
END FUNCTION
FUNCTION PBMAIN () AS LONG
    DIALOG NEW 0, "COM Browser Tutorial", 201, 122, 198, 115, %WS_POPUP OR %
WS_BORDER OR %WS_DLDFRAME OR %WS_CAPTION OR _
        %WS_SYSTEMMENU OR %WS_MINIMIZEBOX OR %WS_CLIPSIBLINGS OR %WS_VISIBLE OR %
DS_MODALFRAME OR %DS_3DLOOK OR _
        %DS_NOFAILCREATE OR %DS_SETFONT, %WS_EX_CONTROLPARENT OR %WS_EX_LEFT OR
%WS_EX_LTRREADING OR _
        %WS_EX_RIGHTSCROLLBAR, TO hDlg
    CONTROL ADD BUTTON, hDlg, %ID_START, "Start Agent", 5, 5, 50, 15, %
WS_CHILD OR %WS_VISIBLE OR %WS_DISABLED OR _
        %WS_TABSTOP OR %BS_TEXT OR %BS_PUSHBUTTON OR %BS_CENTER OR %BS_VCENTER,
%WS_EX_LEFT OR %WS_EX_LTRREADING
    CONTROL ADD BUTTON, hDlg, %ID_STOP, "Stop Agent", 5, 25, 50, 15, %
WS_CHILD OR %WS_VISIBLE OR %WS_DISABLED OR _
        %WS_TABSTOP OR %BS_TEXT OR %BS_PUSHBUTTON OR %BS_CENTER OR %BS_VCENTER,
%WS_EX_LEFT OR %WS_EX_LTRREADING
    CONTROL ADD LISTBOX, hDlg, %ID_EVENTLIST, , 70, 0, 125, 110, %WS_CHILD OR
%WS_VISIBLE OR %WS_TABSTOP OR %WS_VSCROLL, _
        %WS_EX_CLIENTEDGE OR %WS_EX_LEFT OR %WS_EX_LTRREADING OR %
WS_EX_RIGHTSCROLLBAR
    DIALOG SHOW MODAL hDlg, CALL DlgProc
END FUNCTION

```

11. Click the Save All button and save this file as "agent.bas" in the same directory that you save "agent.inc" to in step #4
12. Open the "agent.inc" file in the IDE
13. Search (CTRL+F) in the IDE for the text of "IAgentCtl event interface" (without the quotes). The methods of this interface are called when an event occurs in the Microsoft Agent Control. We will add code to these methods that will display the event that occurred in the dialogs listbox. Make the Class_Agent_AgentEvents, look like the following:

```

CLASS Class_Agent_AgentEvents $CLSID_Event__AgentEvents AS EVENT
INTERFACE Agent_AgentEvents $IID_Agent_AgentEvents
    INHERIT IDISPATCH
    METHOD ActivateInput <1> (BYREF CharacterID AS WSTRING)
        LISTBOX INSERT hDlg, %ID_EVENTLIST, 1, "Input Activated"
    END METHOD
    METHOD DeactivateInput <3> (BYREF CharacterID AS WSTRING)
        LISTBOX INSERT hDlg, %ID_EVENTLIST, 1, "Input Deactivated"
    END METHOD
    METHOD CLICK <2> (BYVAL CharacterID AS WSTRING, BYVAL BUTTON AS INTEGER,
BYVAL Param_Shift AS INTEGER, BYVAL x AS INTEGER, _
BYVAL y AS INTEGER)
        LISTBOX INSERT hDlg, %ID_EVENTLIST, 1, "Click at (" + FORMAT$(x)
+ ", " + FORMAT$(y) + ")"
    END METHOD
    METHOD DblClick <4> (BYVAL CharacterID AS WSTRING, BYVAL BUTTON AS
INTEGER, BYVAL Param_Shift AS INTEGER, BYVAL x AS INTEGER, _
BYVAL y AS INTEGER)
        LISTBOX INSERT hDlg, %ID_EVENTLIST, 1, "Double Click at (" + FORMAT$(x)
+ ", " + FORMAT$(y) + ")"
    END METHOD
    METHOD DragStart <5> (BYVAL CharacterID AS WSTRING, BYVAL BUTTON AS
INTEGER, BYVAL Param_Shift AS INTEGER, BYVAL x AS INTEGER, _
BYVAL y AS INTEGER)
        LISTBOX INSERT hDlg, %ID_EVENTLIST, 1, "Drag Start at (" + FORMAT$(x)
+ ", " + FORMAT$(y) + ")"
    END METHOD
    METHOD DragComplete <6> (BYVAL CharacterID AS WSTRING, BYVAL BUTTON AS
INTEGER, BYVAL Param_Shift AS INTEGER, BYVAL x AS INTEGER, _
BYVAL y AS INTEGER)
        LISTBOX INSERT hDlg, %ID_EVENTLIST, 1, "Drag Complete to (" + FORMAT$(x)
+ ", " + FORMAT$(y) + ")"
    END METHOD
    METHOD SHOW <15> (BYVAL CharacterID AS WSTRING, BYVAL Cause AS INTEGER)
        LISTBOX INSERT hDlg, %ID_EVENTLIST, 1, "Character is showing"
    END METHOD
    METHOD HIDE <7> (BYVAL CharacterID AS WSTRING, BYVAL Cause AS INTEGER)
        LISTBOX INSERT hDlg, %ID_EVENTLIST, 1, "Character is hidden"
    END METHOD
    METHOD RequestStart <9> (BYVAL Request AS IDISPATCH)
        LISTBOX INSERT hDlg, %ID_EVENTLIST, 1, "Request Start"
    END METHOD
    METHOD RequestComplete <11> (BYVAL Request AS IDISPATCH)
        LISTBOX INSERT hDlg, %ID_EVENTLIST, 1, "Request Complete"
    END METHOD
    METHOD Restart <21> ()
        ' Insert your code here
    END METHOD
    METHOD Shutdown <12> ()
        ' Insert your code here
    END METHOD
    METHOD Bookmark <16> (BYVAL BookmarkID AS LONG)
        ' Insert your code here
    END METHOD
    METHOD COMMAND <17> (BYVAL UserInput AS IDISPATCH)
        ' Insert your code here
    END METHOD
    METHOD IdleStart <19> (BYVAL CharacterID AS WSTRING)
        ' Insert your code here

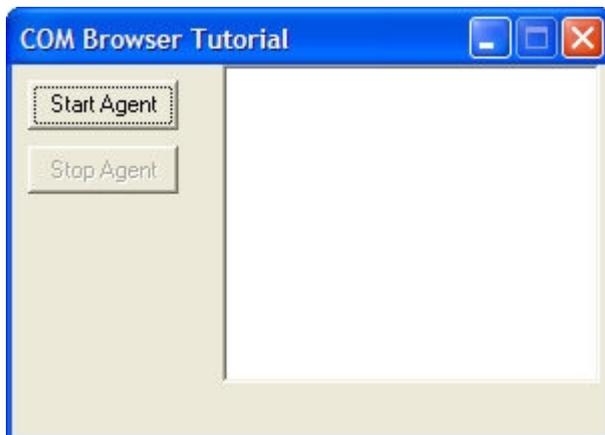
```

```

END METHOD
METHOD IdleComplete <20> (BYVAL CharacterID AS WSTRING)
    ' Insert your code here
END METHOD
METHOD MOVE <22> (BYVAL CharacterID AS WSTRING, BYVAL x AS INTEGER,
BYVAL y AS INTEGER, BYVAL Cause AS INTEGER)
    LISTBOX INSERT hDlg, %ID_EVENTLIST, 1, "Move to (" + FORMAT$(x)
+ ", " + FORMAT$(y) + ")"
END METHOD
METHOD SIZE <23> (BYVAL CharacterID AS WSTRING, BYVAL Param_Width AS
INTEGER, BYVAL Height AS INTEGER)
    ' Insert your code here
END METHOD
METHOD BalloonShow <24> (BYVAL CharacterID AS WSTRING)
    LISTBOX INSERT hDlg, %ID_EVENTLIST, 1, "Showing balloon text"
END METHOD
METHOD BalloonHide <25> (BYVAL CharacterID AS WSTRING)
    LISTBOX INSERT hDlg, %ID_EVENTLIST, 1, "Hiding balloon text"
END METHOD
METHOD HelpComplete <26> (BYVAL CharacterID AS WSTRING, BYVAL Param_Name
AS WSTRING, BYVAL Cause AS INTEGER)
    ' Insert your code here
END METHOD
METHOD ListenStart <27> (BYVAL CharacterID AS WSTRING)
    ' Insert your code here
END METHOD
METHOD ListenComplete <28> (BYVAL CharacterID AS WSTRING, BYVAL Cause AS
INTEGER)
    ' Insert your code here
END METHOD
METHOD DefaultCharacterChange <30> (BYREF Param_GUID AS WSTRING)
    ' Insert your code here
END METHOD
METHOD AgentPropertyChange <31> ( )
    ' Insert your code here
END METHOD
METHOD ActiveClientChange <32> (BYVAL CharacterID AS WSTRING, BYVAL
Active AS INTEGER)
    ' Insert your code here
END METHOD
END INTERFACE
END CLASS

```

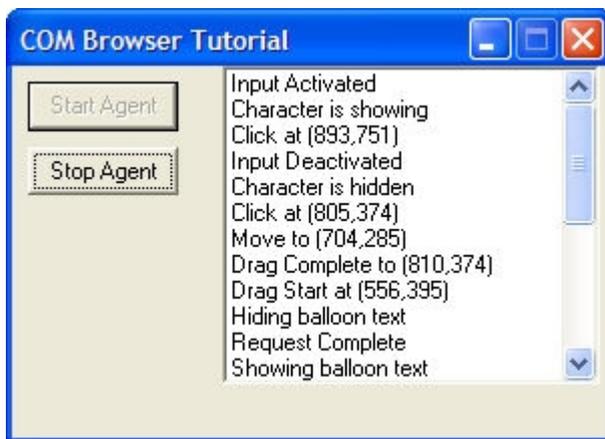
14. In the IDE, click the compile and run button. The application will be displayed as



15. Click the "Start Agent" button and the Merlin character will display in the top left corner of the screen then move to the center of the desktop and play a trumpet then speak. If you wish to hear the text shown in the balloon when Merlin is speaking, you will need to download and install the free SAPI 4.0 and a Text to Speech Engine from <http://www.microsoft.com/DOWNLOADS/en/default.aspx>.



16. You can click, double-click, drag and drop, hide (right-click on Merlin and select Hide), or show (right-click on Merlin in the systems tray and select Show) and see these events listed in the listview control on the dialog box.



17. Click the Stop Agent button to stop and unload the Merlin character.

See Also

[What is the PowerBASIC COM Browser](#)

[The PowerBASIC COM Browser User Interface](#)

The Inline Assembler

The Inline Assembler

The Inline Assembler

Occasionally, you may run into a situation where the syntax and structure of the BASIC language is not the most suitable for a task at hand. PowerBASIC addresses the need for optimal speed and flexibility with its built-in assembler. Inline assembly is the process of embedding assembly-language statements (opcodes) within the overall structure of your BASIC code. Those statements are compiled along with your BASIC code without the need for an external assembler.

This chapter discusses the different ways that PowerBASIC lets you use assembly-language code in your BASIC programs. It also discusses some design philosophies and considerations, which you should keep in mind if you decide to write your own assembly-language procedures or functions.

The technique of interfacing with assembly-language is, by its very nature, somewhat complex. You should be reasonably familiar with assembly-language concepts before tackling the information in this chapter.

See Also

[Using assembly-language in your code](#)
[Flat memory model](#)
[Inline Assembler code syntax](#)
[Protected mode programming](#)
[Mnemonics and Operands](#)
[Opcodes and Mnemonics](#)
[Registers](#)
[Data types in registers](#)
[MMX registers](#)
[The stack](#)
[Balancing the stack](#)
[Tricks of the stack](#)
[Stack Overhead Reduction](#)
[Saving registers](#)
[Saving Registers at the Procedure level](#)
[Intermixing ASM and BASIC code](#)
[Using ESP and EBP](#)
[Saving the FPU registers](#)
[Tricks in preserving registers](#)
[Addressing and pointers](#)
[Effective addressing](#)
[Passing parameters](#)
[Parameters passed by reference or by copy](#)
[Parameters passed by value](#)
[Passing dynamic strings](#)
[Passing arrays](#)
[Accessing PowerBASIC variables by name](#)
[Commenting Assembly code](#)

Using assembly-language in your code

Using assembly-language in your code

PowerBASIC provides a number of ways in which you can use assembly-language. You can write the whole program using the [Inline Assembler](#). You can write entire [Subs](#), [Functions](#), [Methods](#), and [Properties](#) in assembly-language, or, you can write individual lines of code in assembler, surrounded by BASIC statements. This ability to intermix BASIC and assembly-language, line by line, makes PowerBASIC's Inline Assembler a very powerful tool when optimal performance is an essential issue.

To write good assembler code, you must be aware of certain items:

- The types of [variables](#) supported by PowerBASIC

- How those variables are stored in memory
- How to use variable names in your Inline Assembler routines
- Which registers to save (and restore)
- How to pass arguments (to and from Inline Assembler routines)
- The need to pop everything you push
- The differences between near and far calls
- The rules to follow when writing assembly-language routines

See Also

[The Inline Assembler](#)

[Inline Assembler code syntax](#)

Inline Assembler code syntax

Inline Assembler code syntax

The [ASM](#) statement or, for a "shortcut", the exclamation point (!), is used to insert assembler instructions (or [opcodes](#)) into your BASIC program. They must appear at the beginning of each line that contains an assembler instruction. The [Inline Assembler](#) supports standard instructions and [registers](#), including 8086/8088, 80286, 80386, 80486, Pentium/MMX and 32-bit floating-point opcodes as defined in the Intel Reference Manuals, and can be downloaded from <http://developer.intel.com/>.

The machine code generated by ASM statements is placed directly in line with the code from your BASIC statements, so execution of your program will flow just as it appears in your source code. You should never, under any circumstances, attempt to exit a [Sub/Function/Method/Property](#) early by the use of a **RET** instruction, as that guarantees failure. If you need to terminate a routine at some point before the End Sub/Function/Method/Property statement, jump to a [label](#) at the end of the procedure instead.

See Also

[The Inline Assembler](#)

[Using assembly-language in your code](#)

[Flat memory model](#)

Flat memory model

Flat memory model

A program written in native 32 bit Windows format is created in what is called FLAT memory model that has a single segment, which contains both code and data. Such programs must be run on a 80386 or higher processor.

Differing from earlier 16-bit code that used combined segment and offset addressing with a 64 Kb segment limit, FLAT memory model works only in offsets and has a range of 4 Gigabytes. This makes [assembly code](#) easier to write and the compiled (assembled) code is generally a lot faster than the equivalent 16-bit code.

All segment [registers](#) are automatically set to the same value with the flat memory model. This means that

segment / offset [addressing](#) must NOT be used in 32-bit programs that run in 32-bit Windows operating systems.

For programmers who have written code in DOS, a 32-bit Windows PE (executable) file is similar in some respects to a DOS COM file - they have a single segment that can contain both code and data and they both work directly in offsets. That is, neither uses segment / offset addressing.

Flat-model assembler code defaults to NEAR code addressing and NEAR data addressing within the range of 4 gigabytes.

The FS and GS segment registers are rarely (if ever) used in application programs but may be used in some instances by the operating system itself.

See Also

[The Inline Assembler](#)

[Protected mode programming](#)

[Mnemonics and Operands](#)

Protected mode programming

Protected mode programming

DLLs and EXEs generated by the PowerBASIC 32-bit compilers require Microsoft Windows 95 or later, or Windows NT 3.10 or later. This includes Windows 98, Windows ME, Windows NT 4.0, Windows 2000, Windows XP, Windows Vista, Windows 7, and so on. All of these operating systems run your program in protected mode, using a 32-bit flat memory model.

In real-mode operating systems such as DOS, it was possible to overwrite sections of the operating system code if a program was not correctly written. This would crash the operating system and the computer would require a reboot before it would run again.

Protected-mode memory is designed to prevent this from happening. It uses a protected mode memory manager to control the address range that all applications can read and write to, and the memory manager terminates any application that tries to read or write to a memory address range that is outside of the allocated application memory space. The memory region assigned to an application is known as the *process address space*.

This style of memory management was available in 16-bit Windows but because of the method that 16-bit Windows used to simulate multitasking, it was possible to overwrite sections of memory that were owned by other applications or the operating system before the errant program crashed.

Depending on what portions of the operating system were overwritten, another (completely unrelated) program that had no errors in it could try to use a damaged operating system function, resulting in both a program and operating system crash.

The common symptom of this behavior was the infamous "blue screen of death" which told you something was wrong, but often reported misleading causes of the problem. If an application destroyed critical sections of the operating system, the result was often a "black screen of death" - an instant black screen accompanied by a solidly locked or frozen machine. This obviously gave no feedback as to the cause of the problem.

As improvements in hardware design occurred, the use of hardware based multitasking in 32-bit Windows made protected-mode memory managers increasingly reliable and resulted in new operating systems with ever increasing stability - more able to cope with preventing operating system crashes when an application crashes.

From this we can see that one of the fundamental "rules" of writing code for a protected mode operating system is to ensure the application code can read and write only within the process address space.

However, because [Inline Assembler](#) allows you to read and write to almost any memory address, this clearly

places the onus on the programmer to take suitable precautions with all referenced memory addresses.

For example, if you allocate a 10 Kb buffer and subsequently try to read 20 Kb, the protected mode memory manager will trigger a Page Read fault (GPF) the instant the address goes outside the process address space - typically this would occur when the memory address advances beyond the original 10 Kb buffer.

An application can also get into similar trouble if it incorrectly dereferences a [register](#) (i.e., if it incorrectly treats the register content as a [pointer](#) or address, rather than a value). If the address points outside of the allocated process address space, a GPF is virtually guaranteed.

Page read and write faults are exceptions (GPFs) that are passed from the operating system to the application that makes the error. If the exception is not handled by the application, the operating system closes the application. Current versions of PowerBASIC do not support native exception handling, but it is possible to configure an exception "trap" function using the Windows API.

Therefore, to create effective and stable assembler code, you should become familiar with protected mode programming concepts. As outlined above, you must never access memory not specifically assigned to your process, nor should you ever change the selector value in a segment register.

Likewise, all Calls, Jumps, and Returns should use "Near" addressing, as a full 32-bit offset is utilized. Should you violate any of the rules of protected mode programming, your code will likely fail catastrophically with a General Protection Fault (GPF).

See Also

[The Inline Assembler](#)

[Flat memory model](#)

Mnemonics and Operands

Mnemonics and Operands

An assembly code instruction (statement) consists of a mnemonic (pronounced "nih-MON-ick"), and between zero and three operands. For a logical or arithmetic mnemonic with two operands, the right operand is the *source* and the left operand is the *destination*. In general, 80x86 assembly code instructions takes the following form:

```
[ASM|!] mnemonic destination, source
```

For example:

```
! MOV EAX, 1
ASM ADD EAX, EBX
```

In the examples above, the keywords MOV and ADD are the mnemonics, EAX is the destination operand, and 1 and EBX are the source operands.

In the first line, the value 1 is "moved" into the EAX operand (register). In BASIC code, this works similarly to the statement $A = 1$. The second example adds the value in EBX to the value in EAX and stores the result in EAX. In BASIC code, this works similarly to $A = A + B$.

See Also

[The Inline Assembler](#)

[Using assembly-language in your code](#)

[Opcodes and Mnemonics](#)

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Opcodes and Mnemonics

Opcodes and Mnemonics

At the hardware level in an Intel or compatible processor, *instructions* are built directly into the CPU circuitry and these are represented by *opcodes*.

While [assembly code](#) can be written at the Byte level, it is a particularly complex method of writing code since it involves memorizing a very large number of opcodes. Additionally, such program code must use the Intel numeric (*little-endian*) data format. With little-endian, multi-byte numeric values are stored in reverse order to usual human representation.

For example, to copy the 32-bit value &H56A700FE into the EAX [register](#) (MOV EAX, &H56A700FE), you must first find the opcode for the MOV EAX mnemonic (&HA1) followed by the data in reverse order (&HFE, &H00, &HA7, and &H56).

In hex format, the whole instruction would look like this:

```
A1 FE 00 A7 56
```

Obviously this becomes a very tedious and error prone way to write assembly code. As a result, a system was developed (many years ago) where groups of similar opcodes were given verbose names that made them a lot more convenient to use than raw numeric opcodes. These names are referred to as *mnemonics*, and this is the system used in PowerBASIC's 32-bit [Inline Assembler](#).

Each mnemonic represents a reserved name that represents a family of opcodes that perform similar tasks in the processor. The actual numeric opcodes are different depending on the size and type of [operands](#) being used. For example, with the MOV mnemonic:

```
! MOV EAX, VAR1 ' opcode = &HA1
! MOV VAR1, EAX ' opcode = &HA3
```

The use of mnemonics provides a far more intuitive way of representing opcodes; however, there is no exact correlation between what you write using mnemonics and what you get as finished opcodes. This is because the opcode you actually get for a given mnemonic can depend on whether it is using near or far addressing, the operand data types (registers or pointers or constants), etc. However, PowerBASIC takes care of these details automatically and transparently for you, leaving you to get on with writing your actual program.

See Also

[The Inline Assembler](#)

[Using assembly-language in your code](#)

[Mnemonics and Operands](#)

[Registers](#)

Registers

Registers

Registers are a special working area within the processor. Registers are faster than memory [operands](#), and are designed to work with the processor's [opcodes](#).

Registers in an Intel or compatible processor are a very limited resource when writing assembler. In essence, there are eight general-purpose registers, EAX, EBX, ECX, EDX, ESI, EDI, [ESP, and EBP](#). In most instances, ESP and EBP should remain unused as PowerBASIC uses them for entry and exit of procedures.

This means that you have six 32-bit registers to use in your assembly code, plus any other memory locations that are useful in the procedure. ESI and EDI can be used in the normal manner in most

instances but neither can be accessed at a Byte level. You can read the low WORD of ESI as SI and the low WORD of EDI as DI.

Understanding the size of registers and the data that you can place in them is very important when using assembler. A 32-bit Intel or compatible processor has three native data sizes that can be used by the normal integral instructions, [BYTE](#), [WORD](#), and [DWORD](#) corresponding to 8-bit, 16-bit and 32-bit.

This can be shown in HEX notation.

```

BYTE      00
WORD     00 00
DWORD    00 00 00 00

```

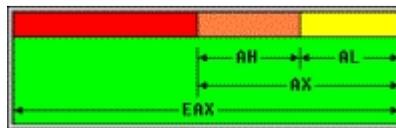
In terms of registers, this corresponds to the three sizes that can be addressed with the normal integral registers. Intel and compatible processors are backwards compatible with older code that uses 8 and 16-bit registers, and it is done by accessing any of the general purpose registers in three different ways. Using the EAX register as an example:

```

AL or AH  = 8 bit
AX        = 16 bit
EAX       = 32 bit

```

This is the schematic of a general purpose 32-bit register:



This schematic is easier to understand at a bit level. Reading from the right side, you have 32 bits in the register, bits 0 to 31. Because of the bit positions for each piece of data that can be accessed in a 32-bit register, AL is called the Low (low-order) byte, AH is called the High (high-order) byte and AX is called the Low word.

To read the first BYTE in the register (bits 0 to 7) you use:

```
! MOV byteval, AL ; Copy the low-order byte into variable
```

Likewise, to read the second byte in the register (bits 8 to 15) you use:

```
! MOV byteval, AH ; Copy the high-order byte into bytevar
```

If you want to read the first WORD in the register (bits 0 to 15) you use:

```
! MOV wordval, AX ; Copy the low-order Word into a variable.
```

To get at bits 16 to 31, you must rotate the bits in the register so they can be accessed by the previous instructions. Rotating a 32-bit register in either direction by 16 bits move the low-order 16-bits into the high-order 16-bit positions, and the high-order 16 bits into the low-order 16-bit positions of the register.

```
! ROL EAX, 16 ; Rotate EAX left by 16-bits
```

...or:

```
! ROR EAX, 16 ; Rotate EAX right by 16-bits
```

You cannot put a different size piece of data into a register than its correct size and you cannot mix different register sizes:

```
! MOV EAX, CL ; This fails as EAX is 32-bit, CL 8-bit
```

If you need to put the value in CL into a 32-bit register, you must first convert it using one of a number of different techniques:

```
! MOVZX EAX, CL ; Zero extend unsigned Integer
```

```
! MOVSX EAX, CL ; Sign extend signed Integer
```

In some instances you can use:

```
! XOR EAX, EAX ; Clear EAX
```

```
! MOV AL, CL ; Copy CL into AL
```

In addition, there are also some "older" mnemonics that will do the conversions too:

```
! MOV AL, CL ; Copy CL into AL
```

```
! CBW ; Convert Byte in AL to Word in AX
```

```
! CWDE ; Convert Word in AX to DWORD in EAX
```

See Also

[The Inline Assembler](#)
[Data types in registers](#)
[MMX registers](#)
[Saving registers](#)
[Saving Registers at the Procedure level](#)
[Tricks in preserving registers](#)
[Saving the FPU registers](#)
[Using ESP and EBP](#)

Data types in Registers**Data types in registers**

There are three basic types of operands that can be placed in a [register](#): immediate, memory or another register.

An *immediate* operand is usually a [numeric literal](#) (number) but it can also be a [string literal](#) in the form "a" which is converted by PowerBASIC to its ASCII equivalent code.

```
! MOV AL, "a"      ; String literal
! MOV EDX, 0      ; Numeric immediate/literal
```

A *memory operand* is an [address](#) in memory of some form of data:

```
! MOV AL, [ESI]   ; Copy byte at address in ESI into AL
! MOV EDX, lpMemvar ; Copy variable address into EDX
```

A *register* operand is a register with a value in it:

```
! MOV ECX, EDX   ; Copy EDX into ECX
```

The actions that can be performed are determined by the available [opcodes](#). For example, trying to move one memory operand directly into another does not work because there is no opcode in the 80x86 processor to do it.

```
! MOV mVar, lpMem ; This fails as there is no opcode
```

However, if you have a "spare" register, you make an indirect copy through that register:

```
! MOV EAX, lpMem ; Copy memory value into register
! MOV mVar, EAX  ; Copy register into memory variable
```

If you don't have a "spare" register, it can be done another way but it is slightly slower:

```
! PUSH lpMem     ; Push memory value onto the stack
! POP mVar       ; Pop it off as another memory value
```

See Also

[The Inline Assembler](#)
[Registers](#)
[MMX registers](#)
[Saving registers](#)
[Saving Registers at the Procedure level](#)
[Using ESP and EBP](#)
[Saving the FPU registers](#)

MMX registers

MMX registers

According to the Intel documentation, all MMX registers require parentheses around the register number. These were compulsory in early versions of PowerBASIC, but the parentheses are now optional.

```
!  PXOR  mm(7), mm(7)  ' PB/DLL 5.0, PB/CC 1.0 format
!  PXOR  mm7, mm7     ' PB/DLL/WIN 6.0+, PB/CC 2.0+ format
```

See Also

[The Inline Assembler](#)

[Registers](#)

[Data types in registers](#)

[Saving registers](#)

[Saving Registers at the Procedure level](#)

[Tricks in preserving registers](#)

The Stack

The stack

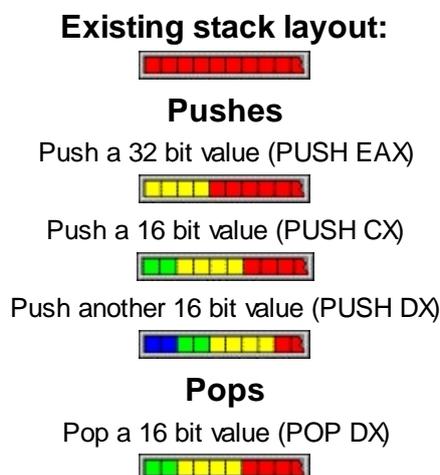
The stack is a range of memory addresses that can be used for temporary storage of data from either within a procedure or as the normal method of passing parameters to a procedure.

The stack is normally accessed in code by the [mnemonics](#) PUSH and POP. The stack is accessed on a last on, first off basis which means that the last value pushed onto the stack is the first one to be popped back off the stack.

The next position that can be written on the stack is called the top of the stack. When a piece of data is pushed onto the stack, the processor decrements the stack pointer ESP then writes the data to the top of the stack. When a piece of data is popped back off the stack, the processor reads the data from the top of the stack then increments the stack pointer. Therefore, the stack address decreases as more data is pushed onto it, and the address increases as data is popped back off the stack.

In the following images, each square represents 1 byte on the stack, and the different colors are intended to demonstrate the different data sizes being pushed and popped. The *top* of the stack is the left side of each image.

The following sequence demonstrates the stack layout as one 32-bit and two 16-bit values are pushed and popped from the stack.



Pop second 16 bit value (POP CX)



Pop the 32-bit value (POP EAX)



If you wrote the following code:

```
! MOV EDX, 100
! MOV ECX, 500

' push the 2 values onto the stack
! PUSH EDX ; EDX has the value 100
! PUSH ECX ; ECX has the value 500

' pop the 2 values off the stack
! POP EAX ; EAX has the value 500
! POP ECX ; ECX has the value 100
```

PowerBASIC conforms to the 32-bit Windows convention that specifies that certain registers must be preserved around blocks of assembly code, namely EBX, ESI, and EDI. While EAX, ECX, and EDX can be modified freely within a procedure, some conditions apply to their use too. See [Saving registers](#) for more detailed information.

See Also

- [The Inline Assembler](#)
- [Balancing the stack](#)
- [Tricks of the stack](#)
- [Stack Overhead Reduction](#)
- [Saving registers](#)
- [Saving Registers at the Procedure level](#)

Balancing the stack

Balancing the stack

An important consideration when using the stack is to be symmetrical in the byte count of what is pushed and what is popped.

If the stack is not balanced on exit from an assembly code block (i.e., you POP too few or too many [registers](#)), your routine will return to the wrong location in your code. This is because PowerBASIC must assume that the last item on the stack is the address to which it should return.

In other words, if the stack is not *balanced* on exit from an assembly code block, program execution is likely to resume at the wrong address and instantly crash the program. In most instances, if you PUSH a given data size onto the stack, you must POP the same data size.

See Also

- [The Inline Assembler](#)
- [The stack](#)
- [Tricks of the stack](#)

Tricks of the stack

Tricks of the stack

The [stack](#) is very flexible in what can be pushed and popped. There are a few tricks that are very useful when using the stack, you can push a 32-bit value and then pop two 16-bit values.

```
' Push a 32 bit value onto the stack
! PUSH EDX

' Now pop two 16 bit values off the stack
! POP AX
! POP CX
```

Even though the pushed data size is different to the popped data size, four bytes have been pushed onto the stack and four bytes have been popped back off the stack so the [stack is balanced](#).

The stack can be used for many different things, you can push a [register](#) and pop it later when you need it so that you do not need to allocate a memory [variable](#) to put it in. You can use the stack to move a piece of data between memory [operands](#) and registers.

```
! PUSH ECX
! POP memVar
```

...Or:

```
! PUSH memVar
! POP EDX
```

...or between two memory variables:

```
! PUSH memVar1
! POP memVar2
```

...instead of using a register:

```
! MOV EDX, memvar1
! MOV memvar2, EDX
```

A collection of small tricks of this type free up the number of registers that you can use in your , provided the stack is managed carefully.

Before the end of your routine, you should make sure that all the registers you have pushed onto the stack have also been popped from the stack. It is easy to make a mistake in this area, especially if the routine conditionally PUSHes and POPs any registers.

See Also

[The Inline Assembler](#)

[The stack](#)

[Balancing the stack](#)

[Stack Overhead Reduction](#)

Stack Overhead Reduction

Stack Overhead Reduction

There may be some instances where you wish to repeatedly call a very small [SUB](#) and this may produce a situation where the normally modest [stack](#) overhead may actually become a factor in the speed of the entire algorithm.

To help boost performance in such cases, PowerBASIC offers the often-overlooked [GOSUB/RETURN](#) statements, which can be used in place of a call to a [SUB/END SUB block](#). Where stack overhead

reduction is critical, you can create a [Label](#) in the code below the end of your normal code (but still within the current Sub/Function/Method/Property block).

You may then take the [Inline Assembler](#) code from the target SUB, and place it right after the Label. Finally, a RETURN statement is added so that execution resumes at the next instruction after the GOSUB. Such code would look something like this:

```
FUNCTION MyFunc() AS LONG
  ' Inline Assembler code
  GOSUB LABEL
  ' More Inline Assembler code
  EXIT FUNCTION ' or EXIT SUB

LABEL:
  ' Your Inline Assembler code
  RETURN
END FUNCTION ' or END SUB
```

This technique is very efficient because the variables used in the Inline Assembler Sub/Function/Method/Property (that have been moved from a SUB, back into the calling code) are maintained within the same scope as the calling code, and can therefore be used without having to pass them on the stack. The result is that we have eliminated virtually all the stack overhead involved in repeatedly calling a SUB.

Finally, you can even use the standard Intel assembler notation !CALL and !RET within the Sub/Function/Method/Property, to jump to the Label and return from it to the next instruction. For example:

```
FUNCTION MyFunc() AS LONG
  ' Inline Assembler code
  ! CALL LABEL
  ' More Inline Assembler code
  EXIT FUNCTION ' or EXIT SUB

LABEL:
  ' Your Inline Assembler code
  ! RET
END FUNCTION ' or END SUB
```

Finally, it is very important to note that you must **NEVER** exit a PowerBASIC procedure with the RET instruction. PowerBASIC procedures automatically perform their own stack cleanup (of local variables, etc) when an END SUB/FUNCTION/METHOD/PROPERTY or EXIT SUB/FUNCTION/METHOD/PROPERTY statement is executed, whereas a RET instruction would try to force a procedure exit without the internal stack cleanup being performed. A RET instruction cannot ever be used as a substitute for these BASIC statements.

In summary, your program will fail with a spectacular Stack Fault (GPF) if you attempt to terminate a PowerBASIC procedure with RET mnemonic.

See Also

[The Inline Assembler](#)

[The stack](#)

[Balancing the stack](#)

[Tricks of the stack](#)

[Saving registers](#)

Saving registers

Saving registers

When writing assembler code in 32-bit Windows, there is a convention that governs the use of [registers](#) so programmers can interact with the Windows API functions in a predictable and completely reliable way.

However, the registers available with an 80x86 processor are a very limited resource, and they are used by every application (process) running and also by the operating system itself. Therefore, a reliable method of using registers is very important to the process of writing reliable assembler code.

An 80x86 processor has eight general-purpose integral registers, EAX, EBX, ECX, EDX, ESI, EDI, [ESP](#), and [EBP](#). Of these, ESP and EBP are almost exclusively used to manage the entry and exit to a procedure, so there are effectively just six general-purpose registers available for application level programming.

Following on, the Windows convention splits the remaining registers so that 3 can be freely modified (EAX, ECX, and EDX) within the [Sub/Function/Method/Property](#) that uses them, while the other 3 must be preserved (EBX, ESI, and EDI) by the procedure. For the sake of this discussion, we'll refer to these two sets as *scratch* and *volatile* registers respectively.

In summary, PowerBASIC automatically preserves EBX, ESI, and EDI at the procedure level, but the programmer is responsible for preserving both the scratch and volatile registers within the procedure.

"Preserving the registers" does not necessarily mean that you must push all the registers on the stack, though that is the usual way of ensuring their safety. Simple routines might not modify any of the registers; in which case, you may not need to take any precautions. We use may because it's best to avoid making assumptions, especially with assembler programming. It is better to be safe than sorry. When in doubt, preserve (save and restore) all of the registers.

See Also

[The Inline Assembler](#)

[Registers](#)

[Saving Registers at the procedure level](#)

[Saving the FPU registers](#)

[Tricks in preserving registers](#)

Saving Registers at the Procedure level

Saving Registers at the Procedure level

To conform to the Windows programming conventions, PowerBASIC must provide a "safe" environment for the range of functions that are available. This is achieved by transparently preserving the three volatile [registers](#) at the start of each [Sub/Function/Method/Property](#), and restoring these same registers before exit from the procedure. The following example shows approximately how PowerBASIC constructs the entry and exit of a procedure to preserve these registers:

```
SUB MySub(Params)
    ! PUSH EBX ' Automatically added by PowerBASIC
    ! PUSH ESI ' ---"----
    ! PUSH EDI ' ---"----

    ' the actual SUB code is placed here

    ! POP  EDI ' Automatically added by PowerBASIC
    ! POP  ESI ' ---"----
    ! POP  EBX ' ---"----
END SUB
```

When writing a procedure in PowerBASIC, we can safely predict that the EBX, ESI, and EDI registers will be *automatically saved upon entry and restored upon exit from a procedure.*

The virtue of code that observes these conventions is that it allows the programmer to safely assume that a

call to any other procedure or API function is certain to follow the same register preservation rules for the EBX, ESI, and EDI registers. This helps ensure that writing Inline Assembler code in PowerBASIC will result in reliable and completely predictable code execution in terms of register use when calling PowerBASIC and API procedures.

The PowerBASIC compiler is also very efficient in the way it calls API system functions. For example, the following BASIC statement which calls the *SendMessage* API:

```
CALL SendMessage(hWnd&, %WM_COMMAND, 50, 100)
```

...is translated into assembly code in the compiled program, to resemble something like this:

```
PUSH 100
PUSH 50
PUSH %WM_COMMAND
PUSH hWnd&
CALL SendMessage
```

This direct low level translation is one of the main reasons why PowerBASIC programmers can easily mix API code and assembler code. However, when it comes to intermixing assembler and BASIC code within a procedure, the programmer must take additional care.

See Also

[The Inline Assembler](#)

[Saving registers](#)

[Using ESP and EBP](#)

[Saving the FPU registers](#)

[Tricks in preserving registers](#)

Intermixing ASM and BASIC code

Intermixing ASM and BASIC code

There are special conditions with [register](#) preservation that apply when writing mixed assembler and BASIC code. PowerBASIC is a highly optimized compiler and among its optimizations are reductions in the [stack](#) overhead between BASIC code statements. Therefore, compiled PowerBASIC code is designed to expect that the EBX, ESI, and EDI registers will remain unchanged between lines of BASIC code.

This means that if your assembler algorithm uses any of the EBX, ESI, or EDI registers, you must preserve their original state from the last line of BASIC code that precedes the [Inline Assembler](#) code. This is, you must PUSH them before your ASM code, and POP them again right before the BASIC code commences.

This may appear to be more code than is necessary but it must be remembered that the internal structure of PowerBASIC does not duplicate the stack preservation that the application programmer must apply, so in terms of the stack overhead, the code is actually very efficient.

It should be noted that if your ASM code uses the EAX, ECX, or EDX registers, you should also preserve these as the internal execution of BASIC statements can also freely modify any of these three registers too.

The overall approach to preserving the registers around intermixed ASM and BASIC code is demonstrated in the following listing:

```
SUB TestProc(var1&, var2&)
  #REGISTER NONE      ' Ensure there is no conflict with
                      ' PowerBASIC Register variables

  ' Code that uses EAX ECX and EDX goes here
  [statements]
  ! PUSH EAX          ' Save the scratch registers
  ! PUSH ECX
```

```

! PUSH EDX
[statements]
' Call an API function here
[statements]
! POP EDX      ' Restore the scratch registers
! POP ECX
! POP EAX
[statements]
' Other ASM code that uses EAX ECX and EDX goes here
[statements]
! PUSH EBX      ' Save the volatile registers
! PUSH ESI
! PUSH EDI
[statements]
' Other BASIC statements here, for example:
var1 = var2 + 2^8 - COS(var2)
[statements]
! POP EDI      ' Restore from the stack
! POP ESI
! POP EBX
[statements]
' More ASM code that relies on EBX, etc

```

```
END SUB
```

Using this format ensures that you are writing "safe" code and that all of the utilized registers are preserved, because:

- The EBX, ESI, and EDI registers are preserved by the PowerBASIC compiler at the [Sub/Function/Method/Property](#) level.
- The EAX, ECX, and EDX registers are preserved by the application programmer around the API function call and the BASIC statements. This strategy ensures that EAX, ECX, and EDX registers are not overwritten (destroyed) by the function that is called.

With those points in mind, if there are no BASIC statements or API calls *after* the assembler code, preserving these registers is of no consequence. In this case, the automatic preservation code will take care of EBX, ESI, and EDI registers before the procedure terminates, and we can be sure that the calling code will also preserve the EAX, ECX, and EDX registers using the same conventions.

PROGRAMMING TIP: As described above, the EBX, ESI, and EDI registers are automatically preserved at the start and exit of a procedure. Therefore, if you need to use registers for counters or to store other values in your Inline Assembler code, you may use any of the EBX, ESI, or EDI registers for this purpose as they are restored when the procedure terminates. This helps ensure efficiency and can result in even slightly faster code since we do not have to preserve extra registers each time the procedure is executed.

See Also

[The Inline Assembler](#)

[Registers](#)

[Data types in registers](#)

[MMX registers](#)

[Using ESP and EBP](#)

[Saving registers](#)

[Saving Registers at the Procedure level](#)

[Saving the FPU registers](#)

[Tricks in preserving registers](#)

Using ESP and EBP

Using ESP and EBP

It is possible in PowerBASIC to write your own procedure within an existing [Sub](#), [Function](#), [Method](#), or [Property](#) by manually coding the [stack](#) entry and exit. This is a complicated area of [assembler](#) coding where it is very easy to crash the entire operating system if the code is not written correctly. For example:

```
! CALL procname
! Other PowerBASIC code here
! JMP label          ; Jump over the procedure

procname:

! PUSH EBP          ; Preserve base pointer
! MOV EBP, ESP      ; Stack pointer into EBP

! Write your assembler code here

! MOV ESP, EBP      ; Restore stack pointer
! POP EBP           ; Restore base pointer
! RET

label:
! Other PowerBASIC code here
```

There are other methods of preserving both ESP and EBP depending on personal taste and calling conventions, but you must save and restore the states of both [registers](#) if you choose to use a procedure of this type. It is very important to note that ESP and EBP must always be preserved if they are to be altered, regardless of relative position of Inline Assembler code to BASIC statements.

See Also

[Registers](#)

[MMX registers](#)

[Saving registers](#)

[Saving Registers at the Procedure level](#)

[Data types in registers](#)

Saving the FPU registers

Saving the FPU registers

Whereas the CPU has [registers](#) with fixed names (EAX, etc), the FPU (Floating-Point Unit or co-processor) has [stack](#)-like registers which are numbered according to their position in the stack: ST(0) {top}, ST(1), ST(2), ..., ST(7) {bottom}. You deal with the FPU by loading a value onto the top of the FPU stack, or by storing the value held at the top of the stack. The latter operation may or may not involve removing the value from the stack.

Note the term loading is used to describe placing a value on the FPU stack, yet it operates more like a PUSH operation. In PowerBASIC, it is not a question of which FPU registers are available, but that four registers (or stack slots) are usually available for use by the programmer. If more are required, the stack should be saved and restored accordingly.

FSAVE/FRSTOR

To preserve the entire FPU stack, the mnemonics FSAVE and FRSTOR take care of preserving, and restoring, the FPU stack (respectively). These work in a similar way to the PUSHFD and POPFD CPU, but are notoriously slow to execute and FPU programmers often avoid their use unless necessary. However, they can be useful when starting to write FPU code since they guarantee the preservation and restoration of the FPU stack.

See Also

- [The Inline Assembler](#)
- [Saving registers](#)
- [Saving Registers at the Procedure level](#)
- [Using ESP and EBP](#)
- [Tricks in preserving registers](#)

Tricks in preserving registers

Tricks in preserving registers

When you are developing mixed [assembler](#)/API code, and you do not know what registers are used in the API functions, you can draw upon two pairs of assembler instructions that preserve *all* of the usual [registers](#) and the CPU flags as well: PUSHAD, POPAD, PUSHFD, and POPFD.

PUSHAD/POPAD

The first pair of mnemonics, PUSHAD and POPAD, save and restore the registers in a block. These [mnemonics](#) allow you to do things like display the value of a register in the middle of assembler code with a *MessageBox* API call.

```
' ...Assembler code
! PUSHAD
var& = 0
! MOV var&, EAX
MessageBox hWnd&,BYCOPY STR$(var&),"Test Value",%MB_OK
! POPAD
' ...More assembler code
```

It should be noted that the use of PUSHAD and POPAD in release code is less-than-optimal code design. That is, it does more work than is usually needed, but in the development stage, these two instructions can be very convenient.

PUSHFD/POPFD

If the code being tested has certain instructions, such as conditional jumps that depend on *flag* states within the processor, the other pair of block instructions to utilize is likely to be PUSHFD and POPFD. These preserve the state of the processor flags while code that may modify the flags is executed.

PROGRAMMING TIP: If the STD instruction is used to set the CPU direction flag, a CLD instruction must be executed before releasing control to a Windows API function or a BASIC statement.

See Also

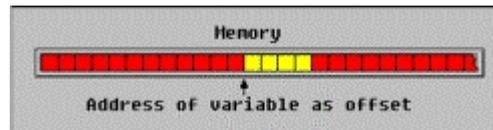
- [ASM statement](#)
- [The stack](#)

Addressing and pointers

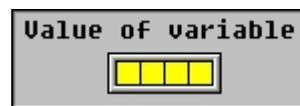
Addressing and pointers

An important distinction in assembler is the difference between the *address* of a variable and the *value* of a variable. The *address* of a variable is where it is located in memory; the *value* of a variable is what is stored at that address.

This is the ADDRESS of the variable in memory:



This is the VALUE at that address:



The method used in assembler to get the value at an address is a technique called *dereferencing*.

```
! MOV EAX, lpvar ; Copy address into EAX
! MOV EAX, [EAX] ; Dereference it
! MOV nuvar, EAX ; Copy EAX into new variable
```

Using square brackets around EAX gives access to the information at the *address* in EAX. This is the case with any 32-bit [register](#). A register enclosed in square brackets is effectively a memory operand. The size of the data accessed at the address is determined by the size of the register used to receive it. In the above example, it would be a 32-bit value since it uses a 32 bit register for the destination operand. Naturally, it can be done with 8 and 16-bit values as well using the correct size register.

Pointers

Pointers are a useful high-level language abstraction for passing addresses between procedures and performing other types of complex data manipulation.

In assembler, when you use an instruction like:

```
! LEA EAX, MyVar
```

...you have put the address of a variable into the EAX register. When you take the next step and put that address into a variable of its own, you will have a POINTER to the address:

```
! LEA EAX, MyVar
! MOV lpMyVar, EAX
```

The mechanics of this process are worth understanding as it can generate errors that are hard to track down when the technique is used incorrectly.

You can pass a pointer to another procedure either by its value:

```
! MOV EAX, lpMyVar ; Copy the value into EAX
! PUSH EAX ; Push it as a parameter
! CALL MyProcedure ; Call the procedure
```

...or you can pass it by reference:

```
! LEA EAX, lpMyVar ; Load the address into EAX
! PUSH EAX ; Push it as a parameter
! CALL MyProcedure ; Call the procedure
```

When you pass an address in this manner, you have added an extra level of indirection so at the procedure end, you have a reference to a reference to an address. To get the address in the procedure, you need to dereference the variable to get back the original address:

```
! MOV EAX, lpMyVar
```

```
! MOV EAX, [EAX]
```

The original address is now stored in EAX.

See Also

[The Inline Assembler](#)

[Effective addressing](#)

Effective Addressing

Effective addressing

The notation to calculate the effective address of data in memory can look complicated but it is in fact very clear and precise notation. In the range of allowable notation for Intel 80x86 assembler, an address in memory can be placed in a [register](#) and treated directly as a memory operand by enclosing it in square brackets.

```
! MOV EAX, lpArray ; Copy address into EAX
! MOV ECX, [EAX]   ; Copy 1st item in array into ECX
! ADD EAX, 4       ; Increment the array location by 4 bytes
! MOV ECX, [EAX]   ; Copy 2nd item in array into ECX
```

This works fine in simple situations where the register that has the address is manually incremented or decremented by the data size each time it is accessed, but there is a much more powerful and flexible technique available by using the standard Intel notation that is available.

The Intel 80x86 allows the following format to calculate the effective address of a value in memory:

```
[ Base Address + Index * Scale + Displacement ]
```

Base Address The register that has the starting address or *base address* of the array (or buffer) in memory.

Index The register used to determine the offset from the base address.

Scale The data size based multiplier for the index.

Displacement The additional offset adjustment from the base address.

For example:

```
[EBX + ECX * 4 + 8]
```

EBX is the *Base Address*

ECX is the *Index*

4 is the *Scale* based on the data size

8 is the *Displacement* in BYTES

Not all of the additional notation has to be used. For example, in a [Byte array](#), you can just use the *base address* and the *index*:

```
! MOV AL, [EBX + ECX]
```

The advantage of this technique is that you set the base address once and vary the index. In the case above, ECX is the index. In terms of flexibility, you have the choice of varying the base address, the index, and the displacement so that you can access data in memory by a number of different methods that best suit your code.

The only difference when using data sizes larger than Byte is that you multiply the "index" by the "scale" of the data size:

```
! MOV EAX, [EBX + ECX * 4]
```

To make a practical example let us assume we have an array of 64 items that were each 32-bits in size, and we wanted to read the 16th member of that 32-bit array. In this case, we would copy the 16th member of the zero-based index into the register that we are using as the *index*. Next, copy the address of the array into the register that you are using as the *base address*, and finally read the value of the array member into

another register.

```
! MOV ESI, lpArray      ; Base address register
! MOV ECX, 15           ; Zero-based index register
! MOV EAX, [ESI + ECX * 4] ; Copy the value into EAX
```

These three lines of code read the target value from the array into the EAX register.

If we wanted to compare the 16th and 17th members of the array and not have to use an additional register, we can add the required displacement so that we only have an extra line of code:

```
! MOV EAX, [ESI + ECX * 4]
! CMP EAX, [ESI + ECX * 4 + 4]
```

To compare the 17th and 18th members of the array, all we need to do is increment the index:

```
! INC ECX
```

Writing to the array is simply the reverse of reading it. With the same code as above:

```
! MOV ESI, lpArray      ; Base address register
! MOV ECX, 15           ; Zero-based index register
! MOV EAX, 1234
! MOV [ESI + ECX * 4], EAX
```

We can also write an *immediate* (literal) number to the array but it takes a slightly different notation:

```
! MOV DWORD PTR [ESI + ECX * 4], 1234
```

The extra notation "DWORD PTR" is because there is no way for the assembler to determine the data size from either the memory operand for the array or the immediate number. Specifying the size tells PowerBASIC what data size should be written to the address contained in the memory operand.

A very similar notation is used when an array is placed on the stack by creating a [LOCAL](#) variable. With a [stack](#) variable *MyArray*, PowerBASIC resolves this variable to an address on the stack, which will be something like this:

```
x& = VARPTR(Myarray(0)) ' first element
! mov edx, x&
! mov ecx, 3
! mov eax, [edx][ecx*4] ' assuming 32-bit integer

' eax = MyArray(3) ' 4th element of MyArray
```

See Also

- [The Inline Assembler](#)
- [Addressing and pointers](#)
- [Registers](#)
- [Passing parameters](#)

Passing parameters

Passing parameters

PowerBASIC 32-bit compilers pass all parameters to

by pushing them in sequence from right to left. This is always the case when a procedure uses the default calling conventions of (and its synonym STDCALL), or the C calling conventions of .

However, if the optional calling conventions are specified, parameters are pushed from left to right, and the called code is responsible for cleaning up the [stack](#) frame before returning. PowerBASIC [Subs](#) and [Functions](#) that use the BDECL convention automatically clean up the stack before returning execution to the calling code.

By default, PowerBASIC passes parameters by reference: a 32-bit

to the data. You can also pass most [parameters by value](#), by declaring with the optional keyword.

When a parameter is passed by value, the actual value of the parameter is pushed on the stack.

Fixed-length strings, nul-terminated strings, and User-Defined Types/Unions may also be passed as BYVAL or OPTIONAL parameters, now. Try to avoid passing large items BYVAL, as it is terribly inefficient, and there is a maximum size limit of 64 Kb for a given parameter list. Arrays cannot be passed BYVAL.

PowerBASIC automatically sets up a local "stack frame" at the beginning of each procedure in your program. As per standard conventions, the [EBP register](#) is used to address the parameters. The lowest parameter can be found at EBP+8, and subsequent parameters will be found in adjacent locations on the stack.

In [assembler](#) routines, it is easier and safer to access parameters by name rather than calculating their locations on the stack. However, it is important to remember the difference in accessing parameters passed by value and [parameters passed by reference](#).

See Also

[The Inline Assembler](#)

[Parameters passed by reference or by copy](#)

[Parameters passed by value](#)

[Passing arrays](#)

[Passing dynamic strings](#)

[Accessing PowerBASIC variables by name](#)

Parameters passed by reference or by copy

Parameters passed by reference or by copy

When a parameter is passed by reference (the default method), PowerBASIC passes a 32-bit [pointer](#) on the [stack](#). That pointer is the actual 32-bit offset, or memory location, of the variable to be utilized as a parameter. A 32-bit pointer occupies exactly four bytes of stack space. A parameter passed by reference is typically accessed in this way:

```
SUB MyProc(xyz&)    ' This will increment the
                   ' parameter variable by one
! PUSH EBX
! MOV  EBX, xyz&
! INC  DWORD PTR [EBX]
! POP  EBX
END SUB
```

Parameters passed by copy (such as expressions or constants) also take precisely 4 bytes on the stack. In this case, just as in parameters by reference, the item on the stack is not the value of the parameter. Rather, it is the address of a temporary location in memory where the value is stored. This may seem roundabout, but it has two distinct advantages. First, assembler routines can handle parameters

and in precisely the same way. Second, routines can modify the value of a parameter without altering the original [variable](#) in the main program.

Suppose the first and only parameter is a [Long-integer](#). In that case, you can put the integral value into the ECX [register](#) by writing:

```
SUB MySub(xyz&)
! PUSH EBX
! MOV  EBX, xyz&    ; EBX is a pointer to xyz&
! MOV  ECX, [EBX]  ; ECX now contains xyz&
' ...more code would go in here
! POP  EBX
END SUB
```

In these cases, you must use the correct and complete address to access the value. But regardless of whether the parameter represents a variable, an expression, or a [literal constant](#), or whether it was passed by reference or by copy, the routine will always work correctly.

See Also

- [The Inline Assembler](#)
- [Passing parameters](#)
- [Parameters passed by value](#)
- [Passing arrays](#)
- [Passing dynamic strings](#)

Parameters passed by value

Passing arrays

Passing arrays

Each [array](#) in your program has an associated array *descriptor*. This descriptor is saved in a proprietary format, which may change from version to version of PowerBASIC. Since most of the information in the descriptor is not relevant to assembler code, it is usually best to simply pass a [pointer](#) to the first element of the array instead. You can use the [VARPTR](#) function to retrieve that address. Subsequent elements of the array will immediately follow the first in memory, while multi-dimensional arrays are stored in column-major order.

In addition to the [LBOUND](#) and [UBOUND](#) functions, the [ARRAYATTR](#) function can be used to obtain array attributes and information on a given array.

See Also

- [The Inline Assembler](#)
- [Passing parameters](#)
- [Parameters passed by reference or by copy](#)
- [Parameters passed by value](#)
- [Passing dynamic strings](#)
- [Accessing PowerBASIC variables by name](#)

Passing dynamic strings

Passing dynamic strings

A [dynamic string](#) variable is defined as a 32-bit data item, which contains a [pointer](#) (or offset) to the string characters. When [passed by value](#), the parameter is actually a 32-bit offset of the data. When [passed by reference or by copy](#), the parameter is a pointer to another pointer that contains the offset of the actual string data. A dynamic string passed by reference is usually accessed in this way:

```
SUB MyProc(abc$)
! PUSH EBX
! MOV EBX, abc$ ; EBX is a pointer to the string handle
! MOV EBX, [EBX] ; EBX is now a pointer to string data
! MOV AL, [EBX] ; AL contains the 1st char of the string
```

```
' more code could go here
! POP EBX
END SUB
```

If you need to determine the current length of a dynamic string, there are two ways to do so. The end of string is always followed by a nul, [CHR\\$\(0\)](#), so it is possible to scan the string for the first occurrence. Of course, this will only work if there are no embedded nul bytes in the string data. An alternative method is to read the 32-bit [Long-integer](#) that immediately precedes the start of the string data, as the current length is always stored there.

PowerBASIC also calculates [string literals](#) in reverse order, in keeping with standard [assembler](#) operation. For example:

```
FUNCTION ab(x???) AS DWORD
! PUSH EBX
! MOV EBX, x???
! MOV DWORD PTR [EBX], "ABCD"
! POP EBX
END FUNCTION
```

The above code stores the value &H41424344 in the [DWORD](#) variable *x*, passed from the calling code. However, since the Intel platform uses *little-endian* numeric data format, the actual bytes are written to memory in the reverse order. For example, if we were to call the code above, and examine the actual memory locations of the passed parameter after the function call, we can see the effect of the reverse memory storage:

```
DIM a AS STRING, x AS DWORD
CALL ab(x)
a = HEX$(x,8) ' a = "41424344"
a = PEEK$(VARPTR(x),4) ' a = "DCBA"
```

See Also

- [The Inline Assembler](#)
- [Passing parameters](#)
- [Parameters passed by reference or by copy](#)
- [Parameters passed by value](#)
- [Passing dynamic strings](#)
- [Accessing PowerBASIC variables by name](#)

Accessing PowerBASIC variables by name

Accessing PowerBASIC variables by name

Most variables in a PowerBASIC module are visible to Inline Assembler code created with the [ASM](#) statement. You can reference [LOCAL](#), [STATIC](#), and [GLOBAL](#) variables by name by simply using the name as an operand of the assembler opcode. That isn't possible with [INSTANCE](#), [THREADED](#), [array](#), and [pointer](#) variables, as their access requires multiple operations best handled by higher level PowerBASIC code. You can also reference procedure parameters by name, though you must differentiate between parameters passed by reference (

), and those passed by value (). Any variable referenced in an assembly-language statement must be defined prior to use.

```
SUB DoStuff (BYVAL c&)
LOCAL a%, b$
a% = 7 ' Local variable a%
! PUSH EBX
! MOV AX, a% ; Move value to AX
```

```

! ADD  a%, AX      ; Add value back to a%
b$ = "LINDA"      ' Local variable b$
! MOV  EBX, b$    ; Address of b$
! MOV  [EBX], "l" ; Put lowercase "l" in first position
! MOV  EAX, c&    ; Put c& into EAX
! INC  EAX        ; Increment its value
! MOV  c&, EAX    ; Put it back
! POP  EBX
END SUB

```

See Also

[The Inline Assembler](#)

Commenting Assembly code

Commenting Assembly code

On assembly code lines, a semi-colon (;) is typically used for comments, although an apostrophe (') is still valid. For example:

```

SUB KerPlunk
  ASM PUSH EBX      ; Save EBX
  ASM MOV  EAX, 5    ; Put 5 into EAX
  ! MOV  EBX, &HFF   ; Put FFh into EBX
  ! ADD  EAX, EBX    ' EAX = EAX + EBX
  ! POP  EBX        ' Restore EBX
END SUB

```

See Also

[The Inline Assembler](#)

Resource Files

What is a Resource File?

What is a Resource File?

A resource file may contain a collection of icons, menus, dialog boxes, strings tables, user-defined binary data and other types of items.

Once compiled into a suitable format, a resource file can be embedded directly into an executable or [DLL](#) file, **producing a single EXE or DLL containing both code and resources**. At run-time, the application can use the resource items in the embedded file. The process of creating a resource is straightforward, and is similar to compiling a PowerBASIC program.

While resource files are still supported, usage of the [#RESOURCE](#) metastatement simplifies adding resources to your program or DLL. With the [#RESOURCE](#) metastatement you can add resource data inline, right in your basic source code. There is no need to create a resource file, compile it, and then link it into your source. All this done automatically when you use the [#RESOURCE](#) metastatement.

The following sections describe the (manual) techniques involved in compiling resource scripts into a usable format, and describe the Resource Script.

See Also

[Resource Editors](#)[Resource Compiling](#)[Resource Scripts](#)[Converting a .RC to a .RES](#)[#RESOURCE metastatement](#)[RESOURCE\\$ function](#)

Resource Editors

Resource Editors

The most popular technique is to use a Resource Editor. A Resource Editor is a tool that lets you design and test dialog boxes visually, instead of defining individual dialog statements in a resource script by hand. Using a Resource Editor, you can add, modify, rearrange, and delete controls and resources in a [resource script](#) file.

Resource Editors such as Microsoft's "Visual Studio" and Borland's "Resource Workshop" also make it easy to place string tables, version info tables, bitmaps, icons, and other types of resources into a resource script.

See Also

[What is a Resource File?](#)[Resource Compiling](#)[Resource Scripts](#)[#RESOURCE metastatement](#)

Resource File Compiling

Resource File Compiling

We begin with a plain text file and compile it into a binary format that can be utilized by PowerBASIC. The plain text file is termed a [Resource Script](#) and these are stored with a .RC file extension. A Resource Compiler is then used to create a binary (.RES) file.

The [PowerBASIC IDE](#) can be loaded with a Resource Script (.RC file) and compile the script into PowerBASIC resource file format. This is performed using the regular Compile Current File button or the RUN | Compile File menu item.

Once a .RES file has been created, it can be embedded into an application EXE or DLL simply by using a [#RESOURCE](#) metastatement. During compilation, PowerBASIC automatically embeds the resource file to create a single file that contains compiled code and resources.

```
#RESOURCE RES, "DIALOGS.RES"
```

Previous version of PowerBASIC also generated a .PBR (PowerBASIC resource file) when compiling an .RC file. The #RESOURCE metastatement still supports this format. You can enable .PBR generation for backward compatibility when compiling an .RC file by selecting the "Create a .PBR when compiling .RC files" option on the [compiler options](#) tab.

See Also

[What is a Resource File?](#)

[Resource Editors](#)[Resource Scripts](#)[#RESOURCE metastatement](#)

Resource Scripts

Resource Scripts

A resource script (.RC) file contains statements that define all of the items that will be included in the compiled binary resource file. Each statement describes a resource item, along with an identifier (*ID*) and any additional parameters (which vary according to the type of resource). A resource script can even reference a resource item that is stored in a separate file, such as a bitmap or icon.

A resource identifier can be numeric in the range 0 to 65535, or alphanumeric. When a PowerBASIC application needs to use a resource from the embedded resource file, it uses the resource's ID to identify it.

Hand-written scripts

There are several ways to create a resource script (.RC) file. The first technique is to write the file by hand, using a text editor like Notepad. This method is quite suitable for creating small resource scripts containing only a handful of statements.

Here is an example of a small handwritten resource script containing an icon and a version information block:

```
#include "resource.h"
ICON1 ICON "MYICON.ICO"
VS_VERSION_INFO VERSIONINFO
FILEVERSION 1, 5, 0, 0
PRODUCTVERSION 1, 5, 0, 0
FILEOS VOS_WINDOWS32
FILETYPE VFT_APP
BEGIN
  BLOCK "StringFileInfo"
  BEGIN
    BLOCK "040904E4"
    BEGIN
      VALUE "CompanyName",      "PowerBASIC, Inc.\000"
      VALUE "FileDescription",   "Program description\000"
      VALUE "FileVersion",       "01.50.0000\000"
      VALUE "InternalName",     "MYPROG\000"
      VALUE "OriginalFilename",  "MYPROG.EXE\000"
      VALUE "LegalCopyright",    "Copyright (c) 2008 PowerBASIC, Inc.\000"
      VALUE "LegalTrademarks",   "PowerBASIC is a trademark of PowerBASIC, _
      Inc.\000"
      VALUE "ProductName",      "MYPROG\000"
      VALUE "ProductVersion",    "01.50.0000\000"
      VALUE "Comments",         "Example for Windows 95/98/NT/XP/Vista.\000"
    END
  END
END
END
END
```

This script defines two resource items, whose alphanumeric IDs are ICON1 and VS_VERSION_INFO respectively. In this case, the actual icon binary data is stored in a separate file (MYICON.ICO). During compilation, the resource compiler takes the necessary information from the ICO file and includes it in the binary resource file it creates.

Complete details of the resource script language syntax and features can be found at
<http://msdn.microsoft.com/en-us/library/aa381042.aspx>

See Also

[What is a Resource File?](#)
[Resource Editors](#)
[Resource Compiling](#)
[#RESOURCE metastatement](#)

Converting a .RC to a .RES**Converting a .RC to a .RES****Using the IDE**

Firstly, ensure that the PowerBASIC IDE's [OPTIONS dialog](#) is configured to correctly point to the RC.EXE and PBRES.EXE files. Once configured, the [IDE](#) can automatically compile a .RC into a .RES file. When the "Create a .PBR when compiling .RC files" option on the [compiler options](#) tab is selected the IDE will also produce a .PBR file from the .RES file. This is achieved in one simple step: simply load the .RC file into the IDE and select Compile.

Using the command-line Resource Compiler

To compile the .RC file, we need to run the Resource Compiler from a DOS box (command-line) to create the binary (.RES) resource file.

The resource compiler takes the filename of your modified (.RC) resource script file as a parameter, and produces a new 32-bit .RES file. For example:

```
C:\PB\BIN\RC.EXE MYAPP.RC
```

Note that you may need to change the path name to suit your individual settings. At this point, you should have a compiled binary resource file (i.e., MYAPP.RES), ready to be used with the #RESOURCE metastatement.

See Also

[What is a Resource File?](#)
[Resource Editors](#)
[Resource Compiling](#)
[Resource Scripts](#)
[#RESOURCE metastatement](#)

Working with Visual Basic

Visual Basic Data Types**Visual BASIC Data Types**

Both Visual Basic and PowerBASIC support the following data types: [Byte](#), [Integer](#), [Long-integer](#), [Single-precision float](#), [Double-precision float](#), [Currency](#), [User-Defined Type](#), [Fixed-length string](#), [Dynamic string](#), and [Variant](#). Both products also support [arrays](#) of all data types.

PowerBASIC also supports the following data types, which Visual Basic does not: [Word](#), [Double-word](#),

[Quad-integer](#), [Extended-currency](#), [STRINGZ string](#), [Unions](#), and [Pointers](#).

- [Currency](#)
- [Strings](#)
- [User-Defined Types](#)
- [Variants](#)
- [Arrays](#)
- [SafeArrays](#)

See Also

[Comparative Data Types To Visual Basic 6](#)

VB Run-time errors when calling a PowerBASIC DLL

VB Run-time errors when calling a PowerBASIC DLL

There is one common and avoidable error that may be encountered when first attempting to use a PowerBASIC [DLL](#) with a Visual Basic application: Error 48 "Error in loading DLL" or "DLL not found".

In almost all circumstances involving this VB error, the problem is not that VB cannot find the DLL, rather, that VB is not able to locate the specified [Sub/Function](#) inside the DLL. When this occurs, the problem is

very likely to be due to mismatching capitalization of the Sub/Function and the VB Declare statement, or the Sub/Function has not been

from the DLL.

To remedy these situations, either add an explicit

clause to the Exported PowerBASIC Subs and Functions to ensure that the exported name matches the VB Declare, or capitalize the VB Declare Sub/Function name. The latter solution works because PowerBASIC capitalizes all exported procedure (Sub, Function, Method, and Property) names that do not have an explicit ALIAS clause. For more information, please refer to the [FUNCTION](#), [SUB](#), [METHOD](#), and [PROPERTY](#) topics.

In addition, VB Errors 53 and 453 may sometimes be resolved by the addition of an ALIAS clause.

In the design environment, it is common practice to provide an explicit path to the DLL in the LIB clause of the VB Declare statement. In the final "distribution" version, such explicit paths should be removed from the VB Declare statements. When the paths are omitted, Visual Basic use the following strategy to try to locate the DLL:

1. Directory containing the calling EXE
2. Current directory
3. Windows 32-bit system directory
4. Windows 16-bit system directory
5. Windows directory
6. Folders specified in the PATH environmental variable

Therefore, it is also possible that certain VB run-time errors (especially in the design environment) may be attributed to VB failing to locate the DLL, or that VB may be loading the wrong version/copy of the DLL. When debugging such issues, place the DLL in the appropriate VB project directory, and all rename or delete any other copies.

Problems calling DLLs, or General Protection Faults (GPFs) when the application runs/closes can often be attributable to errors in the Visual Basic declarations. Visual basic declarations should generally be placed in the declarations section of a Visual Basic module, rather than elsewhere in the project to avoid scoping issues. Declarations in a module should not use the Private Declare syntax.

General Protection Faults (GPFs) may also occur when incorrect parameters or passing methods are used with the DLL. Another source of GPF problems can occur if passed arrays are referenced beyond their boundaries from within the DLL code.

See Also

[Visual Basic Data Types](#)

Optimizing your code

Optimizing your code

Internally, the DOS and 32-bit Windows operating systems are very different. DOS applications run in 16-bit "Real Mode", which means that the largest single data object is 64 Kilobytes (the largest 16-bit value is 65535). And because of the way "memory segmentation" works, the total [addressing](#) space available in "Real Mode" is a little over 1 Megabyte. Since the CPU is running in 16-bit mode (Real mode), numeric operations are fastest when variables are 16-bits (Integers and Words).

In contrast, 32-bit Windows runs in "[Protected Mode](#)", and the largest single data object is two Gigabytes (the largest 32-bit value is actually four Gigabytes, but the operating system reserves half of that for itself). Because the CPU is running in 32-bit mode (Protected mode), numeric operations are fastest when variables are 32-bits (Long-integers and Double-words).

Use 32-bit Variables

As you move your DOS code into PowerBASIC, you should replace all "Integer" and "Word" variable types with [Long-integers](#) and [Double-words](#) respectively - particularly in [FOR/NEXT](#) loops and integral-class math calculations. It actually takes the CPU longer to perform a calculation on a 2-byte Integer than it does with a 4-byte Long-integer, and it takes even longer with single byte variables.

Use Register Variables

[Register](#) variables are variables that are stored directly in specific CPU registers, rather than in application memory. Since data in a CPU register can be accessed much faster, and with less code, Register variables are valuable optimization tools.

Register variables are always local to the [Sub](#), [Function](#), [Method](#), or [Property](#) where they appear. In the current version of PowerBASIC, there may be up to two integral-class Register variables (Word/Dword/Integer/Long), and up to four Extended-precision floats. It is possible that future versions of the compiler will change these limits, so you may declare an unlimited number of them. Any "extra" Register variables are automatically reclassified as locals.

The [REGISTER](#) statement allows you to choose which variables will be classified as Register variables. If you do not make the choice in a particular procedure, the compiler will attempt to choose for you. By default, the compiler will always assign the first two integral-class local variables available. Extended-precision float variables will be automatically assigned only in functions that contain no external function calls.

integral class Register variables are most efficient for variables that are updated or used often, such as For/Next loop counter variables, and variables that are used repeatedly as array indexes. Floating-point Register variables should generally be chosen with a bit more caution, since the compiler must generate code to save and restore them to conventional memory around each call to a procedure. In some rather rare cases, it is possible that floating-point Register variables could actually reduce execution speed. However, they are extremely valuable with intensive floating-point calculations and in functions that have few references to other procedures.

Due to the design of FPUs (floating point units), and the instruction sets available, the first float register variable declared in your program has far more optimization possibilities than the others do. Use care in choosing the variable which is used most within floating-point expressions (that is, on the right side of the '=' assignment operator), in order to gain the greatest advantage in execution speed. Also, remember it is typically valuable to assign floating-point numeric constants to Register variables when they are used in repetitive or intensive calculations.

You must use care with [Inline Assembler](#) floating-point [opcodes](#) in procedures that enable Register variables. Floating-point Register variables may occupy up to four of the FPU registers, so you must limit your use of the x87 registers to the remaining four. Further, floating-point Register variables may never be referenced by name from Inline Assembler code, as the compiler cannot always track the register locations with absolute certainty.

Register variables are preserved when a call to an external DLL or API function is made. Register variables are automatically thread-safe too.

Because Register variables are stored within the CPU, it is not possible to use [VARPTR](#) on a register variable. When passing a register variable to a procedure BYREF, the compiler temporarily converts the register variable into a memory variable, and reloads the register variable upon return from the procedure call. The overhead that this adds is insignificant.

See Also

[The Inline Assembler](#)

Keyword Reference

Keyword Quick Finder

Keyword Quick Finder

[%](#)
<#>
[A](#)
[B](#)
[C](#)
[D](#)
[E](#)
[F](#)
[G](#)
[H](#)
[I](#)
[J](#)
[K](#)
[L](#)
[M](#)
[N](#)
[O](#)
[P](#)
[R](#)
[S](#)
[T](#)
[U](#)
[V](#)
[W](#)
[X](#)

%

[%DEF operator](#)

[%PB_COMPILETIME numeric equate](#)

#

[#ALIGN metastatement](#)

[#BLOAT metastatement](#)

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Keyword Reference

Keyword Reference

This section contains an alphabetical listing of all of the PowerBASIC keywords. Each entry goes into specific detail about each command, and is cross-references to other relevant commands. The

Programming Reference topics in this help file describe theory and example usage of a selection of essential commands.

The commands can be classified into four primary categories, according to their syntactic class: functions, statements, system variables, and metastatements:

Functions

These are predefined PowerBASIC functions, as opposed to user-defined functions. Functions generally return either a

or a value, and these can be used within a more complex expression. Most functions require the program pass one or more arguments to them; these arguments being numeric or string, or combinations thereof, depending on the function. For example:

```
T = COS(3.14)
sResult = FORMAT$(T)
A$ = CHR$(123, "hello", 65, 66, 67, 65 TO 97)
```

Statements

Statements are building blocks that make up programs. They instruct the compiler to perform specific actions, such as opening a file, setting the date, sending data to a device, etc. Statements do not return a value, but often take one or more arguments. Each statement must appear on a line by itself; or be separated from other program elements with a delimiting colon (:) character. For example:

```
A& = A& + 10& : B$ = "PowerBASIC"
OPEN "A Long Filename.txt" FOR BINARY AS #1
Count& = 100
```

System variables

System variables allow a program to interact with the system (in this sense, "system" means the computer, the operating system, the internal run-time code, etc). System variables are predefined by PowerBASIC, and can be used to access and control certain information maintained by the system. For example:

```
A$ = DATE$
DATE$ = "03-03-2003"
ErrVal = ERRCLEAR
B$ = TIME$
TIME$ = "03:00"
```

Metastatements

Metastatements are instructions that control the action of the PowerBASIC compiler. Strictly speaking, metastatements are not part of the BASIC language because they do not operate at run-time (when the program is executing). Like compiler option-switches, metastatements can be used to determine how the compiler will operate during the compilation of program code (compile-time).

Metastatements are prefixed with a number (#) symbol to differentiate them from normal statements. Metastatements may take one or more arguments. For example:

```
#COMPILE EXE "The target filename.exe"
#OPTION VERSION4
#DIM ALL
#INCLUDE "WIN32API.INC"
```

Please note that PowerBASIC supports both the dollar (\$) symbol and a the pound (#) symbol as a metastatement prefixes.

See Also[Format and typefaces](#)[Command Summary](#)**Format and typefaces****Format and typefaces**

Every PowerBASIC command is listed alphabetically, as a separate topic. Each entry contains a brief explanation of what the command does, a description of its syntax, clarifying remarks and restrictions, plus examples of use. The examples are designed to be indicative of syntax and usage only.

The *syntax* section of each entry describes the available options and format each command may use, as follows:

| | |
|----------------------------------|---|
| <i>Italic</i> | Indicates areas within commands that you need to fill in with application-specific information, such as variable names, procedure names, numeric or string values, etc. For example: <code>y = VAL(string_expression)</code> |
| UPPERCASE | Indicates part of the command must be entered exactly as shown. For example: <code>OPTION EXPLICIT</code> |
| Brackets [] | Indicates the information they enclose is optional. For example: <code>SEEK [#] filename, position</code> If the brackets enclose multiple items, any number of them may be omitted. When one is omitted, all following items in that group must also be omitted. For example: <code>CONTROL ADD GRAPHIC, hDlg, id, "", x, y, nWide, nHigh[, [style] [, [exstyle]]] [,] CALL CtrlCallback</code> |
| Brackets with vertical bar [] | Indicates a choice of two or more options. You may choose one or none. <code>DIALOG NEW [PIXELS, UNITS,] ...</code> |
| Braces with vertical bar { } | Indicates a choice of two or more options, one of which MUST be used. For example: <code>#DIM {ALL NONE}</code> |
| Ellipses ... | Indicates that part of the command can be repeated as many times as required. For example: <code>MACRO macroname [(prm1, prm2, ...)] = replacementtext</code> |

See Also[Keyword Reference](#)[Command Summary](#)**Command Summary****Command Summary****Command Summary**

The following is a list of the commands built into the compiler and separated into 18 groups of related commands, which can assist with identifying the best command for the task at hand. Some commands may appear in more than one group.

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Array Operations

Array Operations

The following functions can be used to manipulate and manage arrays:

| | |
|------------------------------|--|
| #DEBUG ERROR | Control generation of error checking code |
| #DIM | Specify if variables must be declared before use |
| ARRAY ASSIGN | Assign a number of values to successive elements of an array |
| ARRAY DELETE | Delete a single item from a given array |
| ARRAY INSERT | Insert a single item into a given array |
| ARRAY SCAN | Scan all or part of an array for a given value |
| ARRAY SORT | Sort all or part of a given array |
| ARRAYATTR | Return descriptive attributes of a given array |
| BIT CALC | Set or reset a bit in an implied bit-array |
| BIT | Return the value of a particular bit in an implied bit-array |
| BIT | Manipulate individual bits of an implied bit-array |
| DATA | Declare an array of constants to be read by READ\$ |
| DATACOUNT | Return the total count of the number of local data items |

| | |
|--|--|
| DIM | Declare and dimension arrays, scalar variables, and pointers |
| ERASE | Deallocate array memory |
| FILESCAN | Rapidly scan an open file , before loading into an array with GET |
| GET | Read a complete array from a binary file |
| IPowerArray.ARRAYBASE | Returns the address of the first element of the array. |
| IPowerArray.ARRAYDESC | Returns the address of the SAFEARRAY descriptor. |
| IPowerArray.ARRAYINFO | Retrieves the info string, if one is present. |
| <Get> | |
| IPowerArray.ARRAYINFO | Assigns the info string. |
| <Set> | |
| IPowerArray.CLONE | An exact duplicate of the SafeArray is created, and stored in the specified PowerArray object. |
| IPowerArray.COPYFROM | An exact copy is made of the specified SafeArray and stored in this PowerArray object. |
| IPowerArray.COPYTOVAR | An exact copy is made of the SafeArray in this object and stored in the specified Variant. |
| IANT | |
| IPowerArray.DIM | Dimensions (creates) a new array. |
| IPowerArray.ELEMENTPT | Retrieves the address of the specified data element. |
| R | |
| IPowerArray.ELEMENTSIZ | Retrieves the storage size (in bytes) of each data element of the array. |
| E | |
| IPowerArray.ERASE | Destroys the contained array and empties the object. |
| IPowerArray.LBOUND | Retrieves the lower bound number for the dimension specified. |
| IPowerArray.LOCK | Increments the lock count of the SAFEARRAY. |
| IPowerArray.MOVEFROM | Transfers ownership of the specified SafeArray to the PowerArray object. |
| VARIANT | |
| IPowerArray.MOVETOVAR | Transfers ownership of the SafeArray contained in this PowerArray object to a variant parameter. |
| IANT | |
| IPowerArray.REDIM | Allows the SafeArray to be erased and re-dimensioned to a new size. |
| IPowerArray.REDIMPRES | Allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. |
| ERVE | |
| IPowerArray.RESET | All elements in the SafeArray are set back to their initial, default value. |
| IPowerArray.SUBSCRIPTS | Retrieves the number of dimensions (subscripts) for this array. |
| IPowerArray.UBOUND | Retrieves the upper bound number for the dimension specified. |
| IPowerArray.UNLOCK | Decrements the lock count of the SAFEARRAY. |
| IPowerArray.VALUEGET | Retrieves the value of the specified array element. |
| IPowerArray.VALUESET | Assigns the specified value to the specified array element. |
| IPowerArray.VALUETYPE | Retrieves the %VT code which describes the data contained in this array. |
| JOINS | Return a consisting of all of the strings in a string array |
| LBOUND | Return the lowest subscript of an array's specific dimension |
| LET | Assign a Variant to an array or an array to a Variant |
| LINE INPUT# | Read line(s) from a sequential file into a string variable or array |
| MAT | Matrix calculations on arrays |
| PARSE | Parse a string and extract all delimited fields into an array |
| PRINT# | Write a complete array to a sequential file |
| PUT | Write a complete array to a binary file |
| READ\$ | Retrieve string data from a local DATA list |
| REDIM | Declare dynamic arrays, allocate, reallocate, deallocate memory |
| RESET | Set an array subscript or an entire array to zero or null/empty |
| UBOUND | Return the highest subscript of an array's specific dimension |

Collection Objects

Collection Objects

The following operations provides a convenient way to refer to a related group of items:

| | |
|--|--|
| ILinkedListCollection.ADD | An item is added to the end of the ILinkedListCollection. |
| ILinkedListCollection.CLEAR | All items are removed from the ILinkedListCollection. |
| ILinkedListCollection.COUNT | Returns the number of data items currently contained in the ILinkedListCollection. |
| ILinkedListCollection.FIRST | Sets the index to the first item and returns the previous value. |
| ILinkedListCollection.INDEX | Sets the index value and returns the previous value. |
| ILinkedListCollection.INSERT | An item is added to the ILinkedListCollection at the specified position. |
| ILinkedListCollection.ITEM | Returns the item at the position specified in the ILinkedListCollection. |
| ILinkedListCollection.LAST | Sets the index value to the last item and returns the previous value. |
| ILinkedListCollection.NEXT | Returns the next item in the ILinkedListCollection. |
| ILinkedListCollection.PREVIOUS | Returns the previous item in the ILinkedListCollection. |
| ILinkedListCollection.REMOVE | Removes the item at the specified position from the ILinkedListCollection. |
| ILinkedListCollection.REPLACE | Replaces the item at the specified position with a new item in the ILinkedListCollection. |
| IPowerCollection.ADD | An item and key is added to the end of the PowerCollection. |
| IPowerCollection.CLEAR | Removes all items and keys from the PowerCollection. |
| IPowerCollection.CONTAINS | Scans the PowerCollection for the specified key. |
| IPowerCollection.COUNT | Returns the number of data items currently contained in the PowerCollection. |
| IPowerCollection.ENTRY | Returns the PowerCollection item specified by the Index number. |
| IPowerCollection.FIRST | Sets the index to the first item and returns the previous value. |
| IPowerCollection.INDEX | Sets the index value and returns the previous value. |
| IPowerCollection.ITEM | Returns the item associated with the specified key in the PowerCollection. |
| IPowerCollection.LAST | Sets the index to the last item and returns the previous value. |
| IPowerCollection.NEXT | Returns the next item in the PowerCollection. |
| IPowerCollection.PREVIOUS | Returns the previous item in the PowerCollection. |
| IPowerCollection.REMOVE | Removes the item associated with the specified key from the PowerCollection. |
| IPowerCollection.REPLACE | Replaces the item associated with the specified key with a new item. |
| IPowerCollection.SORT | The data items in the PowerCollection are sorted based upon the text in the associated keys. |
| IQueueCollection.CLEAR | All items are removed from the QueueCollection. |
| IQueueCollection.COUNT | Returns the number of data items currently contained in the QueueCollection. |
| IQueueCollection.DEQUEUE | The item at the "oldest" position in the QueueCollection is returned. |
| IQueueCollection.ENQUEUE | The specified item is added to the QueueCollection at the "newest" position. |
| IStackCollection.CLEAR | All items are removed from the StackCollection. |
| IStackCollection.COUNT | Returns the number of data items currently contained in the StackCollection. |
| IStackCollection.POP | The item at the "Stack-Top" (the item most recently added) is returned. |
| IStackCollection.PUSH | The specified item is added to the StackCollection at the "Stack-Top" position. |

COM Commands

COM Operations

The following functions can be used to create and manage COM clients:

| | |
|---------------------------|---|
| #COM_DOC | Specifies a help string which usually provides a general description of the COM server. |
| #COM_HELP | Specifies the name of the associated help file and the help context code. |
| #COM_NAME | Specifies the name of the server and the version number. |

| | |
|--|--|
| #COM GUID | Specifies the GUID which identifies the entire application or library (APPID or LIBID). |
| ACODE\$ | Translate a Unicode into an ANSI string. |
| CLASS/END CLASS | Create the code and data for an object. |
| CLSID\$ | Return a 16-byte (128-bit) GUID string containing a CLSID. |
| ENUM/END ENUM | Creates a group of logically related numeric equates. |
| EVENT SOURCE | Declare an event interface within a Class definition. |
| EVENTS | Attach or detach an event handler to/from an event source. |
| FOR EACH/NEXT | Define a loop of program statements which can sequentially examine and act upon each member of a PowerCollection or LinkListCollection . |
| GUID\$ | Return a 16-byte (128-bit) Globally Unique Identifier GUID. |
| GUIDTXT\$ | Return a 38-byte human-readable GUID/UUID string. |
| IDISINFO | Sets and returns additional information about certain Dispatch Status Codes for the OBJRESULT function. |
| INSTANCE | Declare INSTANCE variables which are unique to each object. |
| INTERFACE / END | |
| INTERFACE Block (Direct) | Declare a direct object interface and its member Methods/Properties. |
| INTERFACE/END | |
| INTERFACE_block (IDBind) | Declare a dispatch interface and its member Methods/Properties for the purposes of IDBinding to a Dispatch COM interface. |
| ISINTERFACE | Determine whether an object supports a particular interface. |
| ISNOTHING | Determine the current status of a given object variable . |
| ISOBJECT | Determine the current status of a given object variable. |
| LET (with Objects) | Assign an object reference to an object variable. |
| LET (with Variants) | Assign a value to a variable or Variant . |
| ME | A pseudo object variable to reference the current object. |
| METHOD / END | |
| METHOD | Define a METHOD procedure within a class. |
| MYBASE | A pseudo object variable to reference the inherited parent object. |
| OBJECTIVE | Return True/False of the running state of a COM EXE object. |
| OBJECT GET | Retrieve or read the value of an Dispatch Interface member Property. |
| OBJECT LET | Assign or write a value to an Dispatch Interface member Property. |
| OBJECT SET | Assign or write a value to an Dispatch Interface member Property that contains a reference to an object. |
| OBJECT CALL | Call or execute a member Method of an Dispatch Interface. |
| OBJECT RAISEEVENT | Call or execute a member Method of an event Dispatch Interface. |
| OBJEQUAL | Check if object variables refer to the same object. |
| OBJPTR | Return an object pointer of a specified object variable. |
| OBJRESULT | Return the execution result of the most recent OBJECT statement. |
| OBJRESULT\$ | Returns a string which describes an OBJRESULT (hResult) code. |
| PROGID\$ | Return the alphanumeric PROGID string (text) of a given CLSID. |
| PROPERTY GET | Retrieve a data value from the object. |
| PROPERTY SET | Assign a data value to an object. |
| RAISEEVENT | Call Event Handler code. |
| RESET | Clear a Variant to empty (%VT_EMPTY). |
| UCODE\$ | Translate an ANSI string into a Unicode string. |
| VARIANT# | Return the numeric value contained in a Variant variable. |
| VARIANT\$ | Return the ANSI dynamic string value contained in a Variant variable. |
| VARIANT\$\$ | Returns the Unicode string value contained in a Variant variable. |
| VARIANTVT | Determine the internal data type of the data stored in a Variant. |

Communication Control

Communications Control

The following functions can be used for external communications:

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| COMM | Retrieve the value or status of a communications parameter |
| COMM_CLOSE | Close an open serial port |
| COMM_LINE | Receive a CR/LF terminated "line" of data from a serial port |
| COMM_OPEN | Open a serial port |
| COMM_PRINT | Send a "line" of binary data through a serial port |
| COMM_RECV | Receive binary data from a serial port |
| COMM_RESET | Disable flow control for a given serial port |
| COMM_SEND | Send a of binary data through a serial port |
| COMM_SET | Set communication options for a serial port |
| COMM_TIMEOUT | Places a limit on the time to complete a COMM operation. |
| EOF | Return end-of-file status of a file, serial or TCP/UDP transmission |
| FREEFILE | Return the next available PowerBASIC file number |
| HOST_ADDR | Translate a host name into a corresponding IP address |
| HOST_NAME | Translate an IP address into a corresponding host name |
| OPEN | Prepare a file or device for reading or writing |
| TCP_ACCEPT | Accept an incoming request for TCP communication |
| TCP_CLOSE | Close a previously opened TCP/IP port |
| TCP_LINE_INPUT | Receive a line of text from a specified TCP/IP port |
| TCP_NOTIFY | Designate which TCP/IP events generate notification messages |
| TCP_OPEN | Enable an app to communicate with a TCP/IP server or client |
| TCP_PRINT | Write a string to a nominated TCP/IP |
| TCP_RECV | Receive data from a specified TCP/IP port |
| TCP_SEND | Write a string to a nominated TCP/IP port |
| UDP_CLOSE | Close a previously opened UDP socket |
| UDP_NOTIFY | Designate which TCP/IP events generate notification messages |
| UDP_OPEN | Create a socket to communicate with a UDP server or client |
| UDP_RECV | Receive data from a previously opened UDP port |
| UDP_SEND | Send a string of data through a previously opened UDP socket |

Compiler Operations

Compiler Operations

The following functions manipulate the compiler's operation:

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| #ALIGN | Align the next instruction to a boundary. |
| %DEF | Determine if an equate has been previously defined |
| % | Contains the date and time of compilation. |
| PB_COMPILETIME | |
| #BLOAT | Artificially inflate the disk image size of a compiled program |
| #COMPILE | Determine which type of file will be created by the compiler |
| #DEBUG_CODE | Compiler directive to suppress generation of debugging code |
| #DEBUG_DISPLAY | Display a message when an untrapped run-time error occurs. |
| #DIM | Specify if variables must be declared before use |

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| #EXPORT | Declare a Sub/Function to have the EXPORT attribute. |
| #IF | Define sections of source code to be compiled or ignored |
| #LINK | Link a pre-compiled Static Link Library (SLL) into your host program. |
| #MESSAGES | Specify which messages should be sent to a Control Callback Function |
| #OPTIMIZE | Choose the optimization which should be applied to your program. |
| #OPTION | Establish various compiler options. |
| #REGISTER | Control automatic allocation of Register variables |
| #STACK | Set the maximum potential stack size |
| #TOOLS | Enable/disable integrated development tools in compiled code |
| #UNIQUE | Specify whether unique variable names are required. |
| DECLARE | Explicitly declare a Sub or Function |
| DEFBYT | Declare the default variable type to be Byte |
| DEFCUR | Declare the default variable type to be Currency |
| DEFMUX | Declare the default variable type to be Extended Currency |
| DEFDBL | Declare the default variable type to be Double-precision |
| DEFDWD | Declare the default variable type to be Double-word |
| DEFEXT | Declare the default variable type to be Extended-precision |
| DEFINT | Declare the default variable type to be Integer |
| DEFNG | Declare the default variable type to be Long-integer |
| DEFQUD | Declare the default variable type to be Quad-integer |
| DEFNG | Declare the default variable type to be Single-precision |
| DEFSTR | Declare the default variable type to be String |
| DEFWRD | Declare the default variable type to be Word |
| DIM | Declare and dimension arrays , scalar variables, and pointers |
| DLLMAIN | Function called by Windows each time a DLL is loaded into, and unloaded from, memory |
| ERASE | Deallocate array memory |
| GLOBAL | Declare global (shared) variables between Subs, Functions, Classes , Methods , and Properties |
| INSTANCE | Declare Instance variables which are unique to each object |
| LIBMAIN | Function called by Windows each time a DLL is loaded into, and unloaded from, memory |
| LOCAL | Declare local variables in a Sub, Function, Method or Property |
| MACRO | Define a single or multi-line text substitution block |
| OPTION | Force explicit declaration of all variables |
| EXPLICIT | |
| PBLIBMAIN | Function called by Windows each time a DLL is loaded into, and unloaded from, memory |
| PBMAIN | Define the initial entry-point Function for an application |
| PREFIX/END | Executes a series of statements, each of which utilizes pre-defined source code. |
| PREFIX | |
| PROFILE | Capture an execution time profile of the Subs, Functions, Methods, and Properties |
| REDIM | Declare dynamic arrays, allocate, reallocate, deallocate memory |
| REGISTER | Define local Register variables within a Sub, Function, Method, or Property |
| STATIC | Declare static variables inside of a Sub, Function, Method, or Property |
| STRPTR | Return the address of the data held by a variable length string |
| VARPTR | Return the 32-bit address of a variable or handle |
| WINMAIN | Define the initial entry-point Function for an application |

Debugging and Error Control

Debugging and Error Control

The following functions can be used to trap and manage [error](#) conditions:

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| #DEBUG CODE | Compiler directive to suppress generation of debugging code. |
| #DEBUG DISPLAY | Display a message when an untrapped run-time error occurs. |
| #DEBUG ERROR | Control generation of error checking code. |
| #DEBUG PRINT | Display information in the JDE's Debug Window . |
| #DIM | Specify if variables must be declared before use. |
| #STACK | Set the maximum potential stack size. |
| #TOOLS | Enable/disable integrated development tools in compiled code. |
| CALLSTK | Capture a representation of the stack frames in the call stack. |
| CALLSTK\$ | Retrieve the details of a specific stack frame. |
| CALLSTKCOUNT | Retrieve the number of stack frames in the call stack. |
| ERL | Return the line number of the most recent run-time error. |
| ERL\$ | Return the last label, line number, or procedure name executed prior to the most recent error. |
| ERR | Return the error code of the most recent run-time error. |
| ERRCLEAR | Return and clear the error code of the most recent run-time error. |
| ERROR | Cause a specific run-time error to be generated and set ERR. |
| ERROR\$ | Return a containing the descriptive name of an error. |
| FILENAME\$ | Return the file-system name of an open file. |
| FUNCNAME\$ | Return the name of the current Sub/Function/Method/Property . |
| ON ERROR | Specify an error handling routine; enable/disable trapping . |
| OPTION EXPLICIT | Force explicit declaration of all variables . |
| PROFILE | Capture an execution time profile of the Subs, Functions, Methods, and Properties. |
| RESUME | Continue execution after error handling with ON ERROR GOTO . |
| RESUME FLUSH | Execution continues on the line immediately following the RESUME FLUSH. |
| RESUME NEXT | Execution continues on the line immediately following the one which generated the error. |
| RESUME <Label> | Execution continues at the specified label location. |
| TRACE | Capture the precise flow of execution in a module. |
| TRY/END TRY | A structured method of trapping and responding to errors. |

Dynamic Dialog Tools

Dynamic Dialog Tools Commands

The following functions can be used to create GUI application interfaces:

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| ACCEL ATTACH | Attach a table of keyboard accelerators to a DDT dialog. |
| CALLBACK FUNCTION | Define a Dialog/Control Callback Function block. |
| CB.CTL | Return the numeric ID of the control sending a callback message . |
| CB.CTLMSG | Return the numeric notification message parameter. |
| CB.HNDL | Return the window handle of the parent dialog receiving the message. |
| CB.LPARAM | Return the numeric value of the lParam& parameter of the message. |
| CB.MSG | Return the numeric value of the message sent by the caller. |
| CB.WPARAM | Return the numeric value of the wParam& parameter of the message. |
| CB.NMCODE | Return the numeric value of the notification message describing the event which occurred. |
| CB.NMHDR | Returns the address (a) to the NMHDR UDT for this notification message. |
| CB.NMHDR\$ | Returns the contents of the NMHDR UDT as a dynamic string . |
| CB.NMHWND | Returns the handle of the control which sent this message. |

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| CB.NMID | Returns the ID number assigned to the control. |
| CLIPBOARD.GET.BITMAP | A bitmap is copied from the CLIPBOARD and stored in a newly created GRAPHIC BITMAP. |
| CLIPBOARD.GET.OEMTEXT | A text string is retrieved from the CLIPBOARD. If necessary, it is converted to OEM Text format. |
| CLIPBOARD.GET.TEXT | A text string is retrieved from the CLIPBOARD. If necessary, it is converted to ASCII Text format. |
| CLIPBOARD.GET.UNICODE | A text string is retrieved from the CLIPBOARD. If necessary, it is converted to Unicode Text format. |
| CLIPBOARD.RESET | The contents of the CLIPBOARD are deleted. |
| CLIPBOARD.SET.BITMAP | Copies a GRAPHIC BITMAP to the CLIPBOARD. |
| CLIPBOARD.SET.OEMTEXT | Copies a OEM text string to the CLIPBOARD. |
| CLIPBOARD.SET.TEXT | Copies a ASCII text string to the CLIPBOARD. |
| CLIPBOARD.SET.UNICODE | Copies a Unicode text string to the CLIPBOARD. |
| COMBOBOX.ADD | Add a value to a combo box control. |
| COMBOBOX.DELETE | Remove a string from a combo box control. |
| COMBOBOX.FIND | Strings in the COMBOBOX are searched to find the first string which begins with the specified characters. |
| COMBOBOX.FIND.EXACT | Strings in the COMBOBOX are searched to find the first string which exactly matches the specified characters. |
| COMBOBOX.GET.COUNT | The number of items in the list box of the COMBOBOX is retrieved. |
| COMBOBOX.GET.SELCOUNT | The number of selected items in the list box of the COMBOBOX is retrieved. |
| COMBOBOX.GET.SELECT | The index of the currently selected item in the list box of the COMBOBOX is retrieved. |
| COMBOBOX.GET.STATE | A data item is checked to see if it is currently selected. |
| COMBOBOX.GET.TEXT | Retrieve the default text from a combo box. |
| COMBOBOX.GET.USER | Retrieve the value in the user data area of the COMBOBOX. |
| COMBOBOX.INSERT | Insert a new data item at a specified location. |
| COMBOBOX.RESET | Remove all strings from a combo box. |
| COMBOBOX.SELECT | Select a string in a combo box and make it the default selection. |
| COMBOBOX.SET.TEXT | Replace the string for a specific data item with a new string. |
| COMBOBOX.SET.USER | Set a value in the user data area of the COMBOBOX. |
| COMBOBOX.UNSELECT | All items in a COMBOBOX control are set to an unselected state. |
| CONTROL.ADD | Add a custom control to a DDT dialog. |
| CONTROL.ADD.BUTTON | Add a command button to a dialog. |
| CONTROL.ADD.CHECK3STATE | Add an auto 3-state checkbox to a dialog. |
| CONTROL.ADD.CHECKBOX | Add an checkbox to a dialog. |
| CONTROL.ADD.COMBOBOX | Add a combo box to a dialog. |
| CONTROL.ADD.FRAME | Add a frame control to a dialog. |
| CONTROL.ADD.GRAPHIC | Add a graphic control to a dialog. |
| CONTROL.ADD.HEADER | Add a header control to a dialog. |
| CONTROL.ADD.IMAGE | Add a non-resizing image control to a dialog. |
| CONTROL.ADD.IMAGEX | Add an image control to a dialog. |
| CONTROL.ADD.IMGBUTTON | Add a non-resizing image button to a dialog. |
| CONTROL.ADD.IMGBUTTONX | Add an image button to a dialog. |
| CONTROL.ADD.LABEL | Add a text label to a dialog. |
| CONTROL.ADD.LINE | Add a line control to a dialog. |
| CONTROL.ADD.LISTBOX | Add a list box control to a dialog. |
| CONTROL.ADD.LISTVIEW | Add a ListView control to a dialog. |
| CONTROL.ADD.OPTION | Add an option button to a dialog. |
| CONTROL.ADD.PROGRESSBAR | Add a ProgressBar control to a dialog. |
| CONTROL.ADD.SCROLLBAR | Add a scroll bar control to a dialog. |
| CONTROL.ADD.STATUSBAR | Add a StatusBar control to a dialog. |

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| CONTROL_ADD_TAB | Add a Tab Control to a dialog. |
| CONTROL_ADD_TEXTBOX | Add a text box control to a dialog. |
| CONTROL_ADD_TOOLBAR | Add a ToolBar control to a dialog. |
| CONTROL_ADD_TREEVIEW | Add a TreeView control to a dialog. |
| CONTROL_DISABLE | Disable a control so that it no longer accepts user interaction. |
| CONTROL_ENABLE | Enable a control so that it can receive user interaction. |
| CONTROL_GET_CHECK | Get the Check State of a 3-state, checkbox, or option button. |
| CONTROL_GET_CLIENT | Get the client area dimensions of a control. |
| CONTROL_GET_LOC | Get the location of the specified control in a dialog. |
| CONTROL_GET_SIZE | Get the size of a control in the specified dialog. |
| CONTROL_GET_TEXT | Get the text from a control. |
| CONTROL_GET_USER | Retrieve a value from the user data area of a DDT control. |
| CONTROL_HANDLE | Return a window handle for a given control ID. |
| CONTROL_HIDE | Make a Control invisible. |
| CONTROL_KILL | Remove a control from a dialog. |
| CONTROL_NORMALIZE | Make a Control visible. |
| CONTROL_POST | Place a message into the message queue of a control (non-blocking). |
| CONTROL_REDRAW | Schedule a control to be redrawn. |
| CONTROL_SEND | Send a message to a control and wait for it to be processed. |
| CONTROL_SET_CHECK | Set the Check State for a 3-state or checkbox control. |
| CONTROL_SET_CLIENT | Change the size of a control to a specific client area size. |
| CONTROL_SET_COLOR | Set the foreground and background color of a control. |
| CONTROL_SET_FOCUS | Set the keyboard focus to the specified control. |
| CONTROL_SET_FONT | Select a to be used for a particular Windows Control. |
| CONTROL_SET_IMAGE | Change the icon or bitmap displayed in an IMAGE control. |
| CONTROL_SET_IMAGEX | Change the icon or bitmap displayed in an IMAGEX control. |
| CONTROL_SET_IMGBUTTON | Change the icon or bitmap displayed in an IMGBUTTON control. |
| CONTROL_SET_IMGBUTTONX | Change the icon or bitmap displayed in an IMGBUTTONX control. |
| CONTROL_SET_LOC | Move the control to a new location in the dialog. |
| CONTROL_SET_OPTION | Set the Check State for an option (radio) control. |
| CONTROL_SET_SIZE | Change the size of a control. |
| CONTROL_SET_TEXT | Change the text in a control. |
| CONTROL_SET_USER | Set a value in the user data area of a DDT control. |
| CONTROL_SHOW_STATE | Change the visible state of a control. |
| DESKTOP_GET_CLIENT | Retrieve the size of the client area of the desktop, in pixels. |
| DESKTOP_GET_LOC | Retrieve the location of the top, left corner of the client area of the desktop, in pixels. |
| DESKTOP_GET_SIZE | Return the size of the specified dialog. |
| DIALOG_DISABLE | Disable a dialog so that it no longer responds to user interaction. |
| DIALOG_DOEVENTS | Process pending window or dialog messages for modeless dialogs. |
| DIALOG_ENABLE | Enable a dialog so that it responds to user interaction. |
| DIALOG_END | Close and destroy the specified dialog. |
| DIALOG_DEFAULT_FONT | Specify the default DDT font and point size. |
| DIALOG_GET_CLIENT | Return the client size of the specified dialog. |
| DIALOG_GET_LOC | Return the location of the specified dialog. |
| DIALOG_GET_SIZE | Return the size of the specified dialog. |
| DIALOG_GET_TEXT | Retrieve the text in a dialog or window caption . |
| DIALOG_GET_USER | Retrieve a value from the user data area of a DDT dialog. |
| DIALOG_HIDE | Make a Dialog invisible. |
| DIALOG_MAXIMIZE | Maximize a Dialog. |
| DIALOG_MINIMIZE | Minimize a Dialog. |
| DIALOG_NEW | Create a new dialog in memory, ready for display. |
| DIALOG_NONSTABLE | Make a Dialog non-stable (closeable). |
| DIALOG_NORMALIZE | Make a Dialog visible. |
| DIALOG_PIXELS | Convert pixels (device units) into dialog units . |

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| DIALOG POST | Place a message in the dialog message queue (non-blocking). |
| DIALOG REDRAW | Force a dialog and all child controls to be redrawn immediately. |
| DIALOG SEND | Send a message to a dialog and wait for it to be processed. |
| DIALOG SET CLIENT | Change the size of a dialog to a specific client area size. |
| DIALOG SET COLOR | Set the background color of a dialog to a specific RGB color. |
| DIALOG SET ICON | Change both the dialog icon in the caption, and the icon shown in the ALT+TAB task list. |
| DIALOG SET LOC | Change the position of a dialog. |
| DIALOG SET SIZE | Change the size of a dialog. |
| DIALOG SET TEXT | Set the text in a dialog or window caption. |
| DIALOG SET USER | Set a value in the user data area of a DDT dialog. |
| DIALOG SHOW MODAL | Display and activate a modal dialog. |
| DIALOG SHOW MODELESS | Display and activate a modeless dialog. |
| DIALOG SHOW STATE | Change the visible state of a dialog. |
| DIALOG STABILIZE | Make a Dialog stabilized (non-closeable). |
| DIALOG UNITS | Convert dialog units into pixels . |
| DISPLAY BROWSE | Display a folder selection dialog to return the user's choice. |
| DISPLAY COLOR | Display a color selection dialog to return the user's choice. |
| DISPLAY FONT | Display a selection dialog to return user choices. |
| DISPLAY OPENFILE | Display an OpenFile selection dialog to return user choices. |
| DISPLAY SAVEFILE | Display a SaveFile selection dialog to return user choices. |
| FONT END | Destroy a font when it is no longer needed. |
| FONT NEW | Create a new font for use with GRAPHIC PRINT , XPRINT , etc. |
| HEADER GET COUNT | Retrieves the count of the items in a Header control. |
| HEADER GET ITEM | Retrieves an HD_Item structure which describes an item in a Header control. |
| HEADER SEND | Sends a message to a Header control. |
| HEADER SET ITEM | Sets the attributes of the specified item in a Header Control. |
| IMAGELIST ADD BITMAP | An bitmap image is added to the IMAGELIST. |
| IMAGELIST ADD ICON | An icon image is added to the IMAGELIST. |
| IMAGELIST ADD MASKED | A bitmap is added to the icon IMAGELIST. |
| IMAGELIST GET COUNT | The number of images in the IMAGELIST is retrieved. |
| IMAGELIST KILL | The specified IMAGELIST is destroyed. |
| IMAGELIST NEW BITMAP | A new bitmap IMAGELIST structure is created. |
| IMAGELIST NEW ICON | A new icon IMAGELIST structure is created. |
| IMAGELIST SET OVERLAY | Specify an image to be used as an overlay. |
| INPUTBOX\$ | Displays a dialog box containing a prompt. |
| ISMISSING | Determine whether an was passed by the calling code. |
| ISWIN | Determine whether a Control/Dialog/Window currently exists. |
| LISTBOX ADD | Add a string value to a LISTBOX control. |
| LISTBOX DELETE | Remove a string from a LISTBOX control. |
| LISTBOX FIND | Strings in the LISTBOX are searched to find the first string which begins with the specified characters. |
| LISTBOX FIND EXACT | Strings in the LISTBOX are searched to find the first string which exactly matches the specified characters. |
| LISTBOX GET COUNT | The number of items in the LISTBOX is retrieved. |
| LISTBOX GET SELCOUNT | The number of selected items in the LISTBOX is retrieved. |
| LISTBOX GET SELECT | The LISTBOX is searched to find the first selected item. |
| LISTBOX GET STATE | A data item is checked to see if it is currently selected. |
| LISTBOX GET TEXT | Retrieve the default text from a LISTBOX control. |
| LISTBOX GET USER | Retrieve the value in the user data area of the LISTBOX. |
| LISTBOX INSERT | Insert a new data item at a specified location. |
| LISTBOX RESET | Remove all strings from a list box. |
| LISTBOX SELECT | Select a string in a list box and make it the default selection. |
| LISTBOX SET TEXT | Replace the string for a specific data item with a new string. |
| LISTBOX SET USER | Set a value in the user data area of the LISTBOX. |

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| LISTBOX UNSELECT | A specified data item in the LISTBOX control is set to an unselected state. |
| LISTVIEW_DELETE_COLUMN | Delete a column, including its associated header text (if any) from the LISTVIEW control. |
| LISTVIEW_DELETE_ITEM | The specified data item is deleted from the LISTVIEW control. |
| LISTVIEW_FIND | Strings in the LISTVIEW are searched to find the first string which begins with the specified characters. |
| LISTVIEW_FIND_EXACT | Strings in the LISTVIEW are searched to find the first string which exactly matches the specified characters. |
| LISTVIEW_FIT_CONTENT | The width of the specified column is adjusted to fit the width of the data items displayed in that column. |
| LISTVIEW_FIT_HEADER | The width of the specified column is adjusted to fit the width of the data items displayed in that column, and the header text at the top of that column. |
| LISTVIEW_GET_COLUMN | The width of the designated column is retrieved from the LISTVIEW. |
| LISTVIEW_GET_COUNT | The number of data items in the LISTVIEW is retrieved. |
| LISTVIEW_GET_HEADER | Column header text is retrieved from the LISTVIEW. |
| LISTVIEW_GET_HEADERID | Retrieves the Listview handle and header control id. |
| LISTVIEW_GET_MODE | The display mode of the specified LISTVIEW control is retrieved. |
| LISTVIEW_GET_SELCOUNT | The number of selected items in the LISTVIEW is retrieved. |
| LISTVIEW_GET_STATE | A data item is tested to see if it is currently selected. |
| LISTVIEW_GET_STYLEXX | Retrieves the current setting of the LISTVIEW controls extended style. |
| LISTVIEW_GET_TEXT | A string data item is retrieved from the LISTVIEW control. |
| LISTVIEW_GET_USER | Retrieve the value in the user data area of the LISTVIEW. |
| LISTVIEW_INSERT_COLUMN | A new vertical column is defined for Report Mode of the LISTVIEW. |
| LISTVIEW_INSERT_ITEM | A new data item is added to this LISTVIEW control. |
| LISTVIEW_RESET | All data items are deleted from the specified LISTVIEW control. |
| LISTVIEW_SELECT | The specified string data item is chosen as selected text for the LISTVIEW. |
| LISTVIEW_SET_COLUMN | Change the width of a LISTVIEW column. |
| LISTVIEW_SET_HEADER | New column header text is displayed above the specified column on the LISTVIEW control. |
| LISTVIEW_SET_IMAGE | The specified image is displayed next to the item specified. |
| LISTVIEW_SET_IMAGE2 | The specified image is displayed as a secondary "status" image next to the primary image. |
| LISTVIEW_SET_IMAGELIST | Attach an IMAGELIST to the LISTVIEW control. |
| LISTVIEW_SET_MODE | Change the display mode of the specified LISTVIEW control. |
| LISTVIEW_SET_OVERLAY | The specified overlay image is displayed on top of the image specified. |
| LISTVIEW_SET_STYLE | Alter the current settings of the LISTVIEW controls extended style. |
| LISTVIEW_SET_TEXT | The text, if any, for the specified data item is replaced with new text. |
| LISTVIEW_SET_USER | Set a value in the user data area of the LISTVIEW. |
| LISTVIEW_SORT | All of the items in a LISTVIEW are sorted. |
| LISTVIEW_UNSELECT | The specified data item is set to an unselected state. |
| LISTVIEW_VISIBLE | The specified data item is scrolled, if necessary, to ensure that the data item is visible. |
| PROGRESSBAR_GET_POS | The current position of the PROGRESSBAR is retrieved. |
| PROGRESSBAR_GET_RANGE | The current range of the PROGRESSBAR is retrieved. |
| PROGRESSBAR_SET_POS | Set the current position of the PROGRESSBAR . |
| PROGRESSBAR_SET_RANGE | Set the minimum and maximum ranges of the PROGRESSBAR . |
| PROGRESSBAR_SET_STEP | Specify the default increment value to be used by PROGRESSBAR STEP. |
| PROGRESSBAR_STEP | Advance the current position of the PROGRESSBAR by the default increment value. |
| MENU_ADD_POPUP | Add a popup child menu to an existing menu. |
| MENU_ADD_STRING | Add a string or separator to an existing menu. |
| MENU_ATTACH | Attach a menu to a given dialog. |
| MENU_CONTEXT | Create a floating context menu. |
| MENU_DELETE | Delete a menu item from an existing menu. |

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| MENU DRAW BAR | Redraw the menu bar for a given dialog. |
| MENU GET STATE | Return the state of a specified menu item. |
| MENU GET TEXT | Return the text associated with a given menu item. |
| MENU NEW BAR | Create a new menu bar. |
| MENU NEW POPUP | Create a new popup menu. |
| MENU SET STATE | Set the state of a specified menu item. |
| MENU SET TEXT | Set the text of a given menu item. |
| MOUSEPTR | Change the mouse pointer (cursor) to a new shape. |
| SCROLLBAR GET PAGESIZE | Retrieve the current page size. |
| SCROLLBAR GET POS | Returns the current position of the SCROLLBAR . |
| SCROLLBAR GET RANGE | Returns the current range of the SCROLLBAR. |
| SCROLLBAR GET TRACKPOS | Retrieve the current position of the scroll box. |
| SCROLLBAR SET PAGESIZE | Set the current page size. |
| SCROLLBAR SET POS | Set the current position of the SCROLLBAR. |
| SCROLLBAR SET RANGE | Set the range of the SCROLLBAR. |
| STATUSBAR SET PARTS | Set the number of parts to be displayed in the STATUSBAR . |
| STATUSBAR SET TEXT | Assign the text to be displayed in the specified part of the STATUSBAR. |
| TAB DELETE | Delete a page from the TAB control. |
| TAB GET COUNT | Return the number of pages in a TAB control. |
| TAB GET DIALOG | Retrieve the handle of the dialog for a specific page in a TAB control. |
| TAB GET IMAGE | Retrieves the index of the image displayed on the specified TAB page. |
| TAB GET PAGE | Retrieves the page number of the specified TAB page dialog handle. |
| TAB GET SELECT | Returns the currently selected page in a TAB control. |
| TAB GET TEXT | The text displayed on the specified page tab is retrieved. |
| TAB INSERT PAGE | Add a new page to a TAB control. |
| TAB RESET | Delete all pages in a TAB control. |
| TAB SELECT | Select a specific page in a TAB control to be the active page. |
| TAB SET IMAGE | The specified image is displayed on the specified page tab. |
| TAB SET IMAGELIST | Assign an IMAGELIST to be used in a TAB control. |
| TAB SET TEXT | Displays the specified text on the tab of the page. |
| TOOLBAR ADD BUTTON | Add a button to a TOOLBAR control. |
| TOOLBAR ADD SEPARATOR | Add a separator to a TOOLBAR control. |
| TOOLBAR DELETE BUTTON | Delete a button from a TOOLBAR control. |
| TOOLBAR GET STATE | Get the state of a button on a TOOLBAR control. |
| TOOLBAR GET COUNT | Retrieve the number of buttons on a TOOLBAR control. |
| TOOLBAR SET IMAGELIST | Attach an IMAGELIST to a TOOLBAR control. |
| TOOLBAR SET STATE | Set the state of a button on a TOOLBAR control. |
| TREEVIEW DELETE | Delete a data item from a TREEVIEW control. |
| TREEVIEW GET BOLD | The bold attribute for a data item is retrieved. |
| TREEVIEW GET CHECK | The checkmark attribute for a data item is retrieved. |
| TREEVIEW GET CHILD | Return the handle of the first child item of a specified data item. |
| TREEVIEW GET COUNT | The number of data items in the TREEVIEW is retrieved. |
| TREEVIEW GET EXPANDED | The expanded attribute for the data item is retrieved. |
| TREEVIEW GET NEXT | Return the handle of the next sibling data item. |
| TREEVIEW GET PARENT | The handle of the parent for a specified data item is returned. |
| TREEVIEW GET PREVIOUS | Return the handle of the previous sibling data item. |
| TREEVIEW GET ROOT | The handle of the very first data item (topmost) in the TREEVIEW is retrieved. |
| TREEVIEW GET SELECT | The handle of the currently selected data item is retrieved. |
| TREEVIEW GET TEXT | The text of a specific data item is retrieved. |
| TREEVIEW GET USER | Retrieve the value in the user data area for a specific data item of the TREEVIEW. |
| TREEVIEW INSERT ITEM | Add a new data item to a TREEVIEW control. |
| TREEVIEW RESET | All data items are deleted from the specified TREEVIEW control. |
| TREEVIEW SELECT | Select a specific data item in the TREEVIEW control. |

| | |
|--|---|
| TREEVIEW SET BOLD | Set the bold attribute for specific data item. |
| TREEVIEW SET CHECK | Set the checkmark attribute for a specific data item. |
| TREEVIEW SET EXPANDED | Set the expanded attribute for a specific data item. |
| TREEVIEW SET IMAGELIST | Attach an IMAGELIST to a TREEVIEW control. |
| TREEVIEW SET TEXT | The text, if any, for the specified data item is replaced with new text. |
| TREEVIEW SET USER | Set the value in the user data area for a specific data item in the TREEVIEW control. |
| TREEVIEW UNSELECT | All items in the TREEVIEW control are set to an unselected state. |
| WINDOW GET HANDLE | Retrieves the handle of a Window. |
| WINDOW GET ID | The integral ID of the window is retrieved. |
| WINDOW GET PARENT | The handle of the parent is retrieved. |
| WINDOW GET STYLE | Retrieves the style of the Window. |
| WINDOW GET STYLEX | Retrieves the extended-style of the Window. |
| WINDOW GET USER | Retrieves the 32-bit user data value associated with the window. |
| WINDOW SET ID | Changes the integral ID of the window. |
| WINDOW SET STYLE | Changes the style of the Window. |
| WINDOW SET STYLEX | Changes the extended-style of the Window. |
| WINDOW SET USER | Changes the 32-bit user data value associated with the window. |

File Commands

File Commands

The following functions can be used to manipulate [files](#), standard I/O and disk services:

| | |
|------------------------------|--|
| CHDIR | Change the current (default) directory on a given drive. |
| CHDRIVE | Change the current default drive. |
| CLOSE | Conclude I/O (input/output) to/from a file or device. |
| CURDIR\$ | Return the current directory for a given drive. |
| DIR\$ | Return a filename that matches the given mask. |
| DIR\$ CLOSE | Force the release the operating system FindNext handle. |
| DISKFREE | Return the amount of available space of a disk, in bytes. |
| DISKSIZE | Return the total amount of space on a disk, in bytes. |
| EOF | Return end-of-file status of a file, serial or TCP/UDP transmission. |
| EXE | Return the path and/or name of the executing program. |
| FIELD | Bind a field string variable to a particular sub-section of a random file buffer or a dynamic string variable. |
| FIELD RESET | Reset the FIELD string to a nul (zero-length) dynamic string. |
| FIELD STRING | Change the FILED string to a dynamic string, but first assigns the current sub-section data to it. |
| FILEATTR | Return information about an open file . |
| FILECOPY | Copy a file. |
| FILENAME\$ | Return the file-system name of an open file. |
| FILESCAN | Rapidly scan a INPUT or BINARY file to obtain size info. |
| FLUSH | Flush file buffers to disk to ensure the disk information is current. |
| FREEFILE | Return the next available PowerBASIC file number. |
| GET | Read a record from a random-access file . |
| GET\$ | Reads an ANSI string from a file opened in binary mode . |
| GET\$\$ | Reads WIDE string data from a file opened in binary mode. |
| GETATTR | Return the file-system attribute(s) of a disk file or directory. |
| INPUT# | Load variables with data from a sequential file . |
| ISFILE | Determine whether or not a file exists. |
| ISFOLDER | Determine whether or not a folder exists. |
| KILL | Delete a disk file. |
| LINE INPUT# | Read line(s) from a sequential file into a string variable or array . |

| | |
|-----------------------------|--|
| LOC | Determine the current seek position in an open disk file. |
| LOCK | Lock part or all of an open file for exclusive access. |
| LOF | Return the length of an open disk file. |
| MKDIR | Create a subdirectory/folder (like the DOS MKDIR command). |
| NAME | Rename a file or a directory (like the DOS REN command). |
| OPEN | Prepare a file or device for reading or writing. |
| PATHNAME\$ | Parse a path/file name to extract component parts. |
| PATHSCANS\$ | Find a file on disk and return the path and/or file name parts. |
| PRINT# | Write data to a device or sequential file . |
| PROFILE | Create a file containing the time profile of Subs , Functions , Methods , and Properties . |
| PUT | Write a record to a random-access file or variable to a binary file . |
| PUT\$ | Writes an ANSI string to a file opened in binary mode. |
| PUT\$\$ | Writes a WIDE Unicode string to a file opened in binary mode. |
| RMDIR | Delete a disk directory (like the DOS RMDIR command). |
| SEEK | File location where the next I/O operation will take place. |
| SEEK | Set the position in a file for the next input or output operation. |
| SETATTR | Set the file system attribute(s) of a disk file or directory. |
| SETEOF | Truncate/extend a file to its current file pointer position. |
| SHELL | Run an executable program asynchronously. |
| SHELL | Run an executable program synchronously. |
| UNLOCK | Remove exclusive-access locks placed on a file. |
| WRITE# | Output data to a sequential file in a delimited format. |

Flow Control

Flow Control

The following functions can be used to manage program execution/flow:

| | |
|-------------------------------|--|
| %DEF | Determine if an equate has been previously defined. |
| #IF | Define sections of source code to be compiled or ignored. |
| #TOOLS | Enable/disable integrated development tools in compiled code. |
| CALL | Invoke a procedure (Sub , Function , Method , Property , or FastProc). |
| CALL DWORD | Invoke a procedure (Sub, Function, Method, Property, or FastProc) indirectly. |
| CALLSTK | Capture a representation of the stack frames in the call stack. |
| CALLSTK\$ | Retrieve the details of a specific stack frame. |
| CALLSTKCOUNT | Retrieve the number of stack frames in the call stack. |
| CHOOSE | Return one of several values, based upon the value of an index. |
| CODEPTR | Obtain a 32-bit address of a label or procedure.. |
| DLLMAIN | User-defined function called when a DLL the DLL is loaded/unloaded. |
| DO/LOOP | Define a group of statements that are executed repetitively. |
| END | Terminate the program immediately. |
| EXIT | Transfer program execution out of a block structure. |
| FASTPROC/END | |
| FASTPROC | Define a FastProc code section. |
| FOR/NEXT | Define a loop of program statements controlled by a counter. |
| FOR EACH/NEXT | Define a loop of program statements which can sequentially examine and act upon each member of a PowerCollection or LinkListCollection . |
| FUNCNAME\$ | Return the name of the current Sub, Function, Method, or Property. |
| FUNCTION/END | |
| FUNCTION | Define a Function block. |
| GOSUB | Invoke a local subroutine. |
| GOSUB DWORD | Invoke a local subroutine indirectly. |
| GOTO | Transfer program execution to the statement identified by a label. |
| GOTO DWORD | Transfer execution indirectly to a local label or line number. |
| IF | Test a condition and execute one or more program statements. |

| | |
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| IF/END IF | Create a IF/THEN/ELSE block with multiple lines and conditions. |
| IIF | Return one of two values based upon a True/False evaluation. |
| ISFALSE | Return the logical falsity of a given expression. |
| ISSMISSING | Determine whether an optional parameter was passed by the calling code. |
| ISNOTHING | Determine the current status of a given object variable . |
| ISOBJECT | Determine the current status of a given object variable. |
| ISTRUE | Return the logical truth of a given expression. |
| ITERATE | Start an immediate iteration of a structure. |
| LIBMAIN | User-defined function called when a DLL the DLL is loaded/unloaded. |
| MACRO | Define a single or multi-line text substitution block. |
| METHOD/END METHOD | Define a METHOD procedure within a class . |
| ON ERROR | Specify an error handling routine; enable/disable trapping. |
| ON GOSUB | Call one of several subroutines based on a numeric expression. |
| ON GOTO | Send program flow to one of several labels based on a value. |
| PBLIBMAIN | User-defined function called when a DLL the DLL is loaded/unloaded. |
| PBMAIN | Define the initial entry-point Function for an application. |
| PREFIX/END PREFIX | Executes a series of statements, each of which utilizes pre-defined source code. |
| PROFILE | Capture an execution time profile of the Subs, Functions, Methods, and Properties. |
| PROPERTY/END PROPERTY | Define a PROPERTY procedure within a class. |
| RESUME | Continue execution after error handling with ON ERROR GOTO . |
| RESUME FLUSH | Execution continues on the line immediately following the RESUME FLUSH. |
| RESUME NEXT | Execution continues on the line immediately following the one which generated the error. |
| RESUME <Label> | Execution continues at the specified label location. |
| RETURN | Return from a (GOSUB) subroutine to its caller. |
| RETURN FLUSH | Removes the most recent return address from the system stack. |
| SELECT CASE | Control program flow based on the value of an expression. |
| SLEEP | Pause the current thread for a specified number of milliseconds. |
| SUB/END SUB | Define a Sub (procedure) block. |
| TRY/END TRY | A structured method of trapping and responding to errors . |
| WHILE/WEND | Define a block of statements that are executed repeatedly. |
| WINMAIN | Define the initial entry-point Function for an application. |

Graphic Commands

Graphic Commands

The followings can be used to display graphics:

| | |
|--|--|
| CONTROL ADD IMAGE | Add a (non-resizing) image control to a dialog . |
| CONTROL ADD IMAGEX | Add a stretched image control to a dialog. |
| CONTROL ADD IMGBUTTON | Add an image button to a dialog. |
| CONTROL ADD IMGBUTTONX | Add a stretched image button to a dialog. |
| CONTROL ADD GRAPHIC | Add a graphic control to a dialog . |
| BGR | Convert an RGB color value to BGR format. |
| GRAPHIC(CANVAS.X) | Retrieves the writable width of the attached graphic target . |
| GRAPHIC(CANVAS.Y) | Retrieves the writable height of the attached graphic target. |
| GRAPHIC(Cell.Size.X) | Retrieves the character cell width including external leading. |
| GRAPHIC(Cell.Size.Y) | Retrieves the character cell height including external leading. |
| GRAPHIC(Chr.Size.X) | Retrieves the character width on the graphic target. |

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| GRAPHIC(Chr.Size.Y) | Retrieves the character height on the graphic target. |
| GRAPHIC(Client.X) | Retrieves the client width of the attached graphic target. |
| GRAPHIC(Client.Y) | Retrieves the client height of the attached graphic target. |
| GRAPHIC(Clip.X) | Retrieves the width of the clip_area . |
| GRAPHIC(Clip.Y) | Retrieves the height of the clip area. |
| GRAPHIC(COL) | Retrieves the next column print position, based upon the row and column position of a text cell . |
| GRAPHIC(DC) | Retrieves the handle of the DC (device context) for the selected graphic target. |
| GRAPHIC(INSTAT) | determines whether a keyboard character is ready. |
| GRAPHIC(LINES) | Retrieves the number of text lines which will fit on the graphic target. |
| GRAPHIC(LOC.X) | Retrieves the horizontal location of the graphic target on the desktop. |
| GRAPHIC(LOC.Y) | Retrieves the vertical location of the graphic target on the desktop |
| GRAPHIC(MIX) | Retrieves the color mix_mode for the selected graphic target. |
| GRAPHIC(OVERLAP) | Retrieves the status of Graphic Overlap Mode . |
| GRAPHIC(PIXEL...) | Retrieves the color of the pixel at the specified point. |
| GRAPHIC(POS.X) | Retrieves the horizontal POS (last point referenced) by a GRAPHIC statement. |
| GRAPHIC(POS.Y) | Retrieves the vertical POS (last point referenced) by a GRAPHIC statement. |
| GRAPHIC(PPL.X) | Retrieves the horizontal resolution of the display device, in points per inch. |
| GRAPHIC(PPL.Y) | Retrieves the vertical resolution of the display device, in points per inch. |
| GRAPHIC(ROW) | Retrieves the next row print position, based upon the row and column position of a text cell. |
| GRAPHIC(SCROLLTEXT) | Retrieves the status of Graphic ScrollText Mode . |
| GRAPHIC(SIZE.X) | Retrieves the overall width of the selected graphic target. |
| GRAPHIC(SIZE.Y) | Retrieves the overall height of the selected graphic target. |
| GRAPHIC(STRETCHMODE) | Retrieves the default bitmap stretching mode for the attached DC. |
| GRAPHIC(TEXT.SIZE.X...) | calculates the width of text to be printed. |
| GRAPHIC(TEXT.SIZE.Y...) | calculates the height of text to be printed. |
| GRAPHIC(View.X) | Retrieves the horizontal position of the virtual graphic viewport . |
| GRAPHIC(View.Y) | Retrieves the vertical position of the virtual graphic viewport. |
| GRAPHIC(WORDWRAP) | Retrieves the status of Graphic WordWrap Mode . |
| GRAPHIC(WRAP) | Retrieves the status of Graphic Wrap Mode . |
| GRAPHIC\$(CAPTION) | Retrieves the caption from a Graphic Window . |
| GRAPHIC\$(INKEY\$) | reads a keyboard character if one is ready. |
| GRAPHIC\$(WAITKEY\$) | reads a keyboard character or extended key, waiting until one is ready. |
| GRAPHIC\$(WAITKEY\$...) | reads a limited set of keyboard characters or extended keys, with an optional timeout value. |
| GRAPHIC ARC | Draw an arc in the selected graphic window. |
| GRAPHIC ATTACH | Select the graphic target (window , control , or) on which future drawing operations will take place. |
| GRAPHIC BITMAP END | Close the selected graphic bitmap. |
| GRAPHIC BITMAP LOAD | Create a memory bitmap and load an image into it. |
| GRAPHIC BITMAP NEW | Create a new memory bitmap. |
| GRAPHIC BOX | Draw a box with square or rounded corners in the selected graphic window. |
| GRAPHIC CELL | Sets or Retrieves the next print position of a text cell. |
| GRAPHIC CELL SIZE | Retrieve the character cell size including external leading. |
| GRAPHIC CHR SIZE | Retrieve the character size for the current font in the selected graphic window. |
| GRAPHIC CLEAR | Clear the entire selected graphic window, optionally using a specified color and fill style. |
| GRAPHIC COLOR | Set the foreground color and optionally the background color for various graphic statements. |
| GRAPHIC COPY | Copy a bitmap to the selected graphic target. |
| GRAPHIC DETACH | Detaches a graphic target. |
| GRAPHIC ELLIPSE | Draw an ellipse or a circle in the selected graphic target. |
| GRAPHIC GET BITS | Retrieve a copy of a bitmap, storing it as a device-independent bitmap in a dynamic string variable. |
| GRAPHIC GET CANVAS | Retrieves the buffer size of the attached graphic target. |

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| GRAPHIC GET CAPTION | Retrieves the caption from a Graphic Window. |
| GRAPHIC GET CLIENT | Retrieve the client size of the selected graphic target. |
| GRAPHIC GET CLIP | Retrieves the size of the clip area. |
| GRAPHIC GET DC | Retrieve the handle of the DC (device context) for the selected graphic target. |
| GRAPHIC GET LINES | Retrieve the number of lines that can be printed on the graphic target. |
| GRAPHIC GET LOC | Retrieve the location of the selected graphic target on the screen. |
| GRAPHIC GET MIX | Retrieve the color mix mode for the selected graphic target. |
| GRAPHIC GET OVERLAP | Retrieves the status of Graphic Overlap Mode. |
| GRAPHIC GET PIXEL | Retrieve the color of the pixel at the specified point in the selected graphic target. |
| GRAPHIC GET POS | Retrieve the POS (last point referenced) by a graphic statement. |
| GRAPHIC GET PPI | Retrieve the resolution of the display device, in points per inch. |
| GRAPHIC GET SCALE | Retrieve the current coordinate limits for the graphic target. |
| GRAPHIC GET SCROLLTEXT | Retrieves the status of Graphic ScrollText Mode. |
| GRAPHIC GET SIZE | Retrieves the overall size of the selected graphic target. |
| GRAPHIC GET STRETCHMODE | Retrieves the default bitmap stretching mode for the attached DC. |
| GRAPHIC GET VIEW | Retrieves the position of the virtual graphic viewport. |
| GRAPHIC GET WORDWRAP | Retrieves the status of Graphic WordWrap Mode. |
| GRAPHIC GET WRAP | Retrieves the status of Graphic Wrap Mode. |
| GRAPHIC IMAGELIST | Display an image from an IMAGELIST . |
| GRAPHIC INKEY\$ | Read a keyboard character if one is ready from the graphic target. |
| GRAPHIC INPUT | Read data from the keyboard from within a graphic window. |
| GRAPHIC INSTAT | Determine whether a keyboard character is ready. |
| GRAPHIC INPUT FLUSH | Remove all buffered keyboard data. |
| GRAPHIC LINE | Draw a line in the selected graphic target. |
| GRAPHIC LINE INPUT | Read an entire line from the keyboard from graphic window. |
| GRAPHIC PAINT | Fill an area with a solid color or a hatch pattern. |
| GRAPHIC PIE | Draw a pie section on the selected graphic target. |
| GRAPHIC POLYGON | Draw a polygon in the selected graphic target. |
| GRAPHIC POLYLINE | Draw a series of connected line segments. |
| GRAPHIC PRINT | Output text to the selected graphic target. |
| GRAPHIC REDRAW | Update buffered graphical statements, drawing them to the selected graphic target. |
| GRAPHIC RENDER | Render an image on the selected graphic target. |
| GRAPHIC SAVE | Save an image to a bitmap (.BMP) file. |
| GRAPHIC SCALE | Define a custom coordinate system for the graphic target. |
| GRAPHIC SET AUTOSIZE | Expands a graphic target into autosize mode. |
| GRAPHIC SET BITS | Replace a copy of a bitmap that was retrieved as a device-independent bitmap. |
| GRAPHIC SET CAPTION | Change the caption on a Graphic Window. |
| GRAPHIC SET CLIENT | Change the size of a graphic control or graphic window to a specific client area size. |
| GRAPHIC SET CLIP | Establishes margins around the outer edges of the graphic target. |
| GRAPHIC SET FIXED | Restores a graphic target to standard fixed mode. |
| GRAPHIC SET FOCUS | Bring the selected graphic window to the foreground and direct focus to it. |
| GRAPHIC SET FONT | Select a font for the GRAPHIC PRINT, GRAPHIC INPUT , and GRAPHIC LINE INPUT statements. |
| GRAPHIC SET LOC | Change the location of the selected graphic window on the screen. |
| GRAPHIC SET MIX | Set the color mix mode for the selected graphic target. |
| GRAPHIC SET OVERLAP | Enables or disables Graphic Overlap Mode. |
| GRAPHIC SET PIXEL | Draw a single pixel to the selected graphic window. |
| GRAPHIC SET POS | Set the last point referenced (POS) for the selected graphic target. |
| GRAPHIC SET SCROLLTEXT | Enables or disables Graphic ScrollText Mode. |
| GRAPHIC SET SIZE | Change the overall size of a graphic control or graphic window. |

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| GRAPHIC SET STRETCHMODE | Sets the default bitmap stretching mode for the current DC. |
| GRAPHIC SET VIEW | Changes the position of the viewport on a virtual graphic target. |
| GRAPHIC SET VIRTUAL | Expands a graphic target into virtual mode. |
| GRAPHIC SET WORDWRAP | Enables or disables Graphic WordWrap Mode. |
| GRAPHIC SET WRAP | Enables or disables Graphic Wrap Mode. |
| GRAPHIC SPLIT | Splits a string into two parts for display on a graphic target. |
| GRAPHIC STRETCH | Copy and resize a bitmap to the selected graphic target. |
| GRAPHIC STYLE | Set the line style to be used by various graphical statements in the selected graphic target. |
| GRAPHIC TEXT SIZE | Calculate the size of text to be printed. |
| GRAPHIC WAITKEY\$ | Read a keyboard character from the graphic window, waiting until one is ready. |
| GRAPHIC WIDTH | Set the line width to be used by various graphical statements in the selected graphic target. |
| GRAPHIC WINDOW | Create a new graphic window. |
| GRAPHIC WINDOW CLICK | Check whether a GRAPHIC WINDOW has been clicked with the mouse. |
| GRAPHIC WINDOW END | Close and destroy the selected graphic window. |
| GRAPHIC WINDOW HIDE | Make a graphic window invisible. |
| GRAPHIC WINDOW MINIMIZE | Minimize a graphic window. |
| GRAPHIC WINDOW NONSTABLE | Make a graphic window non-stable (closeable). |
| GRAPHIC WINDOW NORMALIZE | Make a graphic window visible. |
| GRAPHIC WINDOW STABILIZE | Make a graphic window stable (non-closeable). |
| GRAPHIC WINDOW TEXT | Create a new graphic window oriented more towards the display of text. |
| IMAGELIST ADD BITMAP | An bitmap image is added to the IMAGELIST. |
| IMAGELIST ADD ICON | An icon image is added to the IMAGELIST. |
| IMAGELIST ADD MASKED | A bitmap is added to the icon IMAGELIST. |
| IMAGELIST GET COUNT | The number of images in the IMAGELIST is retrieved. |
| IMAGELIST KILL | The specified IMAGELIST is destroyed. |
| IMAGELIST NEW BITMAP | A new bitmap IMAGELIST structure is created. |
| IMAGELIST NEW ICON | A new icon IMAGELIST structure is created. |
| IMAGELIST SET OVERLAY | Specify an image to be used as an overlay. |
| RGB | Return an RGB color value for use with the Windows API palette and GDIs. |

Input Commands

Input Commands

The following functions can be used to gather input data:

| | |
|----------------------------|--|
| COMM | Retrieve the value or status of a communications parameter |
| COMM LINE | Receive a CR/LF terminated "line" of data from a serial port |
| COMM REC V | Receive binary data from a serial port |
| COMMAND\$ | Return the command-line used to start the program |
| ENVIRON | Modify the current program's environment table. |
| ENVIRON\$ | Retrieve from the operating system's environment table |
| EOF | Return end-of-file status of a file , serial or TCP/UDP transmission |
| FIELD | Bind a field string to a file buffer or dynamic string variable |
| FILESCAN | Rapidly scan a INPUT or BINARY file to obtain string size info |
| FREEFILE | Return the next available PowerBASIC file number |

| | |
|--------------------------------------|---|
| GET | Read a record from a random-access file |
| GETS | Read a string from a file opened in binary mode |
| GRAPHIC.INKEY\$ | Read a keyboard character if one is ready from the graphic window |
| GRAPHIC.INPUT | Read data from the keyboard from within a graphic window |
| GRAPHIC.INPUT.FLUSH | Remove all buffered keyboard data. |
| GRAPHIC.INSTAT | Determine whether a keyboard character is ready. |
| GRAPHIC.LINE.INPUT | Read an entire line from the keyboard from graphic window |
| GRAPHIC.WAITKEY\$ | Read a keyboard character from the graphic window, waiting until one is ready. |
| GRAPHIC.WINDOW.CLICK | Check whether a graphic window has been clicked with the mouse |
| INPUT# | Load variables with data from a sequential file |
| INPUTBOX\$ | INPUTBOX\$ displays a dialog box containing a prompt |
| LINE.INPUT# | Read line(s) from a sequential file into a string variable or array |
| LOC | Determine the current seek position in an open disk file |
| LOF | Return the length of an open disk file |
| MSGBOX | Display a message box and get the users Ok/Cancel selection |
| MSGBOX | Display an informational message box and discard the users selection |
| PEEK | Return the byte at a specific memory location |
| PEEK\$ | Return a sequence of bytes starting at a specific memory location |

Memory Management

Metastatements

Metastatements

The following functions control compiler and [debugger](#) behavior:

| | |
|--------------------------------|---|
| #ALIGN | Align the next instruction to a boundary. |
| %DEF | Determine if an equate has been previously defined. |
| #COM.DOC | Specifies a help string which usually provides a general description of the COM server. |
| #COM.HELP | Specifies the name of the associated help file and the help context code. |
| #COM.NAME | Specifies the name of the server and the version number. |
| #COM.GUID | Specifies the GUID which identifies the entire application or library (APPID or LIBID). |
| #BLOAT | Artificially inflate the disk image size of a compiled program. |
| #COMPILE | Determine which type of file will be created by the compiler. |
| #COMPILER | Define the compiler for this program. |
| #DEBUG.CODE | Compiler directive to suppress generation of debugging code. |
| #DEBUG.DISPLAY | Display a message when an untrapped run-time error occurs. |
| #DEBUG.ERROR | Control generation of error checking code. |
| #DEBUG.PRINT | Display information in the IDE's Debug Window. |
| #DIM | Specify if variables must be declared before use. |
| #EXPORT | Declare a Sub/Function to have the EXPORT attribute. |

| | |
|---------------------------|---|
| #IF | Define sections of source code to be compiled or ignored. |
| #INCLUDE | Instruct the compiler to read an additional source file from disk. |
| #LINK | Link a pre-compiled Static Link Library (SLL) into your host program. |
| #MESSAGES | Specify which messages should be sent to a Control Callback Function. |
| #OPTIMIZE | Choose the optimization which should be applied to your program. |
| #OPTION | Establish various compiler options. |
| #PAGE | Sets a page boundary for the PowerBASIC IDE . |
| #PBFORMS | PowerBASIC Forms visual designer directives. |
| #REGISTER | Control automatic allocation of Register variables. |
| #RESOURCE | Embed a PowerBASIC Resource file into the executable file. |
| #STACK | Set the maximum potential stack size. |
| #TOOLS | Enable/disable integrated development tools in compiled code. |
| #UNIQUE | Specify whether unique variable names are required. |
| #UTILITY | Compiler directive to allow external utility programs to read text inserted on the #UTILITY line. |

Numeric Operations

Numeric Operations

The following functions manipulate and manage

data:

| | |
|------------------------------|---|
| ABS | Return the absolute value of a numeric expression |
| AND | AND works as both a logical and a bitwise arithmetic operator |
| ARRAY ASSIGN | Assign a number of values to successive elements of an array |
| ARRAY DELETE | Delete a single item from a given array |
| ARRAY INSERT | Insert a single item into a given array |
| ARRAY SCAN | Scan all or part of an array for a given value |
| ARRAY SORT | Sort all or part of a given array |
| ASC | Return the ASCII code of the specified character in a |
| ASC | Place an ASCII byte at the specified position in a string |
| ATN | Return the arctangent of its argument |
| BIN\$ | Return a string with the binary (base 2) representation of a value |
| BIT CALC | Set or reset a bit in an variable |
| BIT | Return the value of a particular bit in an integral-class variable |
| BIT | Manipulate individual bits of an integral-class variable |
| BITS | Return the least significant portion of an integral-class value |
| BITS | Return the least significant 8, 16, or 32 bits of an argument |
| BITSE | Compare integral-class values for equivalent bits regardless of sign |
| CBYT | Convert a value to a Byte data type |
| CCUR | Convert a value to a Currency data type |
| CCUX | Convert a value to a Extended Currency data type |
| CDBL | Convert a value to a Double-precision data type |
| CDWD | Convert a value to a Double-word data type |
| CEIL | Return an that is greater than or equal to an argument |

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| CEXT | Convert a value to a Extended-precision data type |
| CHOOSE | Return one of several values, based upon the value of an index |
| CINT | Convert a value to a integral data type |
| CLNG | Convert a value to a Long-integer data type |
| COS | Return the cosine of an argument |
| CQUD | Convert a value to a Quad-integer data type |
| CSNG | Convert a value to a Single-precision data type |
| CVBYT | Convert binary encoded string data to a byte value |
| CVCUR | Convert binary encoded string data to a Currency value |
| CVCUX | Convert binary encoded string data to Extended Currency |
| CVD | Convert binary encoded string data to a Double-precision value |
| CVDWD | Convert binary encoded string data to a Double-word value |
| CVE | Convert binary encoded string data to Extended-precision |
| CVI | Convert binary encoded string data to an integral value |
| CVL | Convert binary encoded string data to a Long-integer value |
| CVQ | Convert binary encoded string data to a Quad-integer value |
| CVS | Convert binary encoded string data to a Single-precision value |
| CVWRD | Convert binary encoded string data to a Word value |
| CWRD | Convert a value to a Word data type |
| DECS | Convert an integral value to a decimal string. |
| DECR | Decrement a variable , , or pointer target |
| DEFBYT | Declare the default variable type to be Byte |
| DEFCUR | Declare the default variable type to be Currency |
| DEFMUX | Declare the default variable type to be Extended Currency |
| DEFDBL | Declare the default variable type to be Double-precision |
| DEFDWD | Declare the default variable type to be Double-word |
| DEFEXT | Declare the default variable type to be Extended-precision |
| DEFINT | Declare the default variable type to be integral value |
| DEFNG | Declare the default variable type to be Long-integer |
| DEFQUD | Declare the default variable type to be Quad-integer |
| DEFSNG | Declare the default variable type to be Single-precision |
| DEFSTR | Declare the default variable type to be String |
| DEFWRD | Declare the default variable type to be Word |
| ENUM/END ENUM | Creates a group of logically related numeric equates. |
| EQV | Perform a logical or a bitwise Equivalence operation |
| EXP | Return a base number raised to a power, with a base of e |
| EXP2 | Return a base number raised to a power, with a base of 2 |
| EXP10 | Return a base number raised to a power, with a base of 10 |
| FIX | Truncate a number to an integral value |
| FORMAT\$ | Format numeric data according to a string mask expression |
| FRAC | Return the fractional part of a floating-point number |
| HEX\$ | Hexadecimal (base 16) string representation of an argument |
| HI | Extract the most significant (high-order) portion of an argument |
| IIF | Return one of two values based upon a True/False evaluation |
| IMP | Perform a logical or a bitwise Implication operation |
| INCR | Increment a variable, pointer, or pointer target |
| INT | Convert a numeric expression to an integral-class value |
| ISFALSE | Return the logical falsity of a given expression |
| ISNOTHING | Determine the current status of a given object variable |
| ISOBJECT | Determine the current status of a given object variable |
| ISTRUE | Return the logical truth of a given expression |
| LBOUND | Return the lowest subscript of an array's specific dimension |
| LEN | Return the logical length of a variable, UDT , or Union |
| LET | Assign a value to a variable |

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| LET (with Variants) | Assign a value or an object reference to a variant variable |
| LO | Extract the least significant (low-order) portion of an argument |
| LOG | Return the natural (base e) logarithm of an argument |
| LOG2 | Return the base 2 logarithm of an argument |
| LOG10 | Return the base 10 logarithm of an argument |
| MAT | Matrix calculations on numeric arrays |
| MAX | Return the argument with the largest (maximum) value |
| MIN | Return the argument with the smallest (minimum) value |
| MOD | Return the remainder of the division between two numbers |
| NOT | The NOT operator works as a bitwise arithmetic operator |
| OCT\$ | Return a string that is a octal (base 8) representation of a value |
| OR | Perform a logical or a bitwise OR arithmetic operation |
| PEEK | Return the byte at a specific memory location |
| POKE | Store a byte at a specific memory location |
| RANDOMIZE | Seed the random number generator |
| RESET | Set a variable, array subscript, or an entire array to zero |
| RGB | Return a composite RGB color value |
| RND | Return a random number |
| ROTATE | Rotate the bits in an integral-class variable |
| ROUND | Round a numeric value to a specified number of decimal places |
| SGN | Return the sign of a numeric expression |
| SHIFT | Shift the bits in an integral-class variable |
| SIN | Return the sine of an argument |
| SQR | Return the square root of an argument |
| SWAP | Exchange the values of two variables, pointers, or pointer targets |
| SWITCH | Return one item of a series based upon a True/False evaluation |
| TAN | Return the tangent of an argument |
| UBOUND | Return the highest subscript of an array's specific dimension |
| USINGS\$ | Format string/numeric expressions using a mask string |
| VAL function | Returns the numeric equivalent of a string argument |
| VAL statement | Converts a text string to a numeric value with additional information. |
| VARIANT# | Return the numeric value contained in a Variant variable |
| XOR | Perform a logical or a bitwise Exclusive-OR operation |

Operating System

Operating System

The following functions manipulate file and operating system features:

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| CHDIR | Change the current (default) directory on a given drive. |
| CHDRIVE | Change the current default drive. |
| CLIPBOARD.GET.BITMAP | A bitmap is copied from the CLIPBOARD and stored in a newly created GRAPHIC.BITMAP . |
| CLIPBOARD.GET.OEMTEXT | A text string is retrieved from the CLIPBOARD. If necessary, it is converted to OEM Text format. |
| CLIPBOARD.GET.TEXT | A text string is retrieved from the CLIPBOARD. If necessary, it is converted to ASCII Text format. |
| CLIPBOARD.GET.UNICODE | A text string is retrieved from the CLIPBOARD. If necessary, it is converted to Unicode Text format. |
| CLIPBOARD.RESET | The contents of the CLIPBOARD are deleted. |
| CLIPBOARD.SET.BITMAP | Copies a GRAPHIC BITMAP to the CLIPBOARD. |
| CLIPBOARD.SET.OEMTEXT | Copies a OEM text string to the CLIPBOARD. |
| CLIPBOARD.SET.TEXT | Copies a ASCII text string to the CLIPBOARD. |
| CLIPBOARD.SET.UNICODE | Copies a Unicode text string to the CLIPBOARD. |
| COMMAND\$ | Return the command-line used to start the program. |

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| CURDIR\$ | Return the current directory for a given drive. |
| DATE\$ | Set and retrieve the system date. |
| DESKTOP_GET_CLIENT | Retrieve the size of the client area of the desktop, in pixels . |
| DESKTOP_GET_LOC | Retrieve the location of the top, left corner of the client area of the desktop, in pixels. |
| DESKTOP_GET_SIZE | Retrieve the size of the entire desktop, in pixels. |
| DIR\$ | Return a filename that matches the given mask. |
| DIR\$ CLOSE | Force the release the operating system FindNext handle. |
| DISKFREE | Return the amount of available space of a disk, in bytes. |
| DISKSIZE | Return the total amount of space on a disk, in bytes. |
| DISPLAY_BROWSE | Display a folder selection dialog to return the user's choice. |
| DISPLAY_COLOR | Display a color selection dialog to return the user's choice. |
| DISPLAY_FONT | Display a selection dialog to return user choices. |
| DISPLAY_OPENFILE | Display an OpenFile selection dialog to return user choices. |
| DISPLAY_SAVEFILE | Display a SaveFile selection dialog to return user choices. |
| ENVIRON | Modify the current program's environment table. |
| ENVIRON\$ | Retrieve from the operating system's environment table. |
| EXE.Inst | Returns the instance handle of the programming which is currently executing. |
| EXE.Extn\$ | Returns the extension of the program which is currently executing. |
| EXE.Full\$ | Returns the complete drive, path, and file name of the program which is currently executing. |
| EXE.Name\$ | Returns just the file name of the program which is currently executing. |
| EXE.Namex\$ | Returns the file name and the extension of the program which is currently executing. |
| EXE.Path\$ | Returns the complete drive and path of the program which is currently executing. |
| FILEATTR | Return information about an open file . |
| FILECOPY | Copy a file. |
| FILENAME\$ | Return the file-system name of an open file. |
| FLUSH | Flush file buffers to disk to ensure the disk information is current. |
| GETATTR | Return the file-system attribute(s) of a disk file or directory. |
| HOSTADDR | Translate a host name into a corresponding IP address. |
| HOSTNAME | Translate an IP address into a corresponding host name. |
| ISFILE | Determine whether or not a file exists. |
| KILL | Delete a disk file. |
| METRICS | Retrieves information or dimensions of system elements. |
| MKDIR | Create a subdirectory/folder (like the DOS MKDIR command). |
| NAME | Rename a file or a directory (like the DOS REN command). |
| OPEN | Prepare a file or device for reading or writing. |
| PATHNAME\$ | Parse a path/file name to extract component parts. |
| PATHSCAN\$ | Find a file on disk and return the path and/or file name parts. |
| RGB | Return a composite RGB color value. |
| RMDIR | Delete a disk directory (like the DOS RMDIR command). |
| SETATTR | Set the file system attribute(s) of a disk file or directory. |
| SETEOF | Truncate/extend a file to its current file pointer position. |
| SHELL | Launch an executable program asynchronously. |
| SHELL | Launch an executable program synchronously. |
| SLEEP | Pause the current thread for a specified number of milliseconds. |

Printing Commands

Printing Commands

The followings are used to send data to a printer:

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| LPRINT | Output text and data to a printer device. |
| LPRINT ATTACH | Connect directly to a line printer device. |
| LPRINT CLOSE | Disconnect the current printer device. |
| LPRINT FLUSH | Flush any remaining print data to the printer device. |
| LPRINT FORMFEED | Send a formfeed (page eject) character to the printer. |
| LPRINT\$ | Return the current printer device used for LPRINT operations. |
| PRINTER\$ | Retrieve printer names and printer port names. |
| PRINTERCOUNT | Retrieves the number of available (installed) printers. |
| XPRINT(CANVAS.X) | Retrieves the writable width of the host printer page. |
| XPRINT(CANVAS.Y) | Retrieves the writable height of the host printer page. |
| XPRINT(Cell.Size.X) | Retrieves the character cell width including external leading. |
| XPRINT(Cell.Size.Y) | Retrieves the character cell height including external leading. |
| XPRINT(Chr.Size.X) | Retrieves the character width on the host printer page. |
| XPRINT(Chr.Size.Y) | Retrieves the character height on the host printer page. |
| XPRINT(Client.X) | Retrieves the width of the client area (printable area) on the host printer page. |
| XPRINT(Client.Y) | Retrieves the height of the client area (printable area) on the host printer page. |
| XPRINT(Clip.X) | Retrieves the width of the clip area on the selected printer. |
| XPRINT(Clip.Y) | Retrieves the height of the clip area on the selected printer. |
| XPRINT(COL) | Retrieves the next column print position, based upon the row and column position of a text cell . |
| XPRINT(COLLATE) | Retrieves the XPRINT collate status. |
| XPRINT(COLORMODE) | Retrieves the XPRINT colormode status. |
| XPRINT(COPIES) | Retrieves the XPRINT copy count . |
| XPRINT(DC) | Retrieves the handle of the device context (DC) for the host printer page. |
| XPRINT(DUPLEX) | Retrieves the XPRINT duplex status. |
| XPRINT(LINES) | Retrieves the number of lines that can be printed. |
| XPRINT(MIX) | Retrieves the color mix mode for a host printer page. |
| XPRINT(ORIENTATION) | Retrieves the paper orientation for a host printer page. |
| XPRINT(OVERLAP) | Retrieves the status of XPrint Overlap Mode . |
| XPRINT(PAPER) | Retrieves the current paper size/type. |
| XPRINT(PIXEL...) | Retrieves the color of a pixel on a host printer page. |
| XPRINT(POS.X) | Retrieves the last horizontal point referenced (POS) by an XPRINT statement. |
| XPRINT(POS.Y) | Retrieves the last vertical point referenced (POS) by an XPRINT statement. |
| XPRINT(PPI.X) | Retrieves the horizontal resolution of the host printer page. |
| XPRINT(PPI.Y) | Retrieves the vertical resolution of the host printer page. |
| XPRINT(QUALITY) | Retrieves the print quality setting for the host printer. |
| XPRINT(ROW) | Retrieves the next row print position, based upon the row and column position of a text cell. |
| XPRINT(SELECTION) | Retrieves the status of the SELECTION flag. |
| XPRINT(SIZE.X) | Retrieves the width of the host printer page. |
| XPRINT(SIZE.Y) | Retrieves the height of the host printer page. |
| XPRINT(STRETCHMODE) | Retrieves the default bitmap stretching mode for the attached DC. |
| XPRINT(TEXT.SIZE.X...) | Calculates the width of text to be printed on a host printer. |
| XPRINT(TEXT.SIZE.Y...) | Calculates the height of text to be printed on a host printer. |
| XPRINT(TRAY) | Retrieves the active printer tray . |
| XPRINT(WORDWRAP) | Retrieves the status of XPRINT WordWrap Mode. |
| XPRINT(WRAP) | Retrieves the status of XPRINT Wrap Mode. |
| XPRINT\$ | Returns the name of the attached host printer. |
| XPRINT\$(ATTACH) | Returns the name of the attached host printer. |
| XPRINT\$(PAPERS) | Retrieves a list of supported paper types. |

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| XPRINT\$(TRAYS) | Retrieves a list of supported paper trays. |
| XPRINT | Output text to a host-printer device. |
| XPRINT ARC | Draw an arc on a host printer page. |
| XPRINT ATTACH | Connect a host-based (GDI) printer for use with XPRINT. |
| XPRINT BOX | Draw a box with square or rounded corners on a host printer page. |
| XPRINT CANCEL | Cancel a print job on the host printer. |
| XPRINT CELL | Sets or Retrieves the next print position for a text cell. |
| XPRINT CELL SIZE | Retrieve the character cell size including external leading. |
| XPRINT CHR SIZE | Retrieve the character size for the current font on a host printer page. |
| XPRINT CLOSE | Detach a host printer so printing may begin. |
| XPRINT COLOR | Set the foreground color (and, optionally, the background color) for various XPRINT statements. |
| XPRINT COPY | Copy a bitmap to a host printer page. |
| XPRINT ELLIPSE | Draw an ellipse or a circle on a host printer page. |
| XPRINT FORMFEED | Start a new page for the host printer. |
| XPRINT GET ATTACH | Retrieve the name of the attached host printer. |
| XPRINT GET CANVAS | Retrieves the buffer size of the attached host printer. |
| XPRINT GET CLIENT | Retrieve the size of the client area (printable area) on the host printer page. |
| XPRINT GET CLIP | Retrieves the size of the clip area on the selected printer. |
| XPRINT GET COLLATE | Retrieve the XPRINT collate status. |
| XPRINT GET COLORMODE | Retrieve the XPRINT colormode status. |
| XPRINT GET COPIES | Retrieve the XPRINT copy count. |
| XPRINT GET DC | Retrieve the handle of the device context (DC) for the host printer page. |
| XPRINT GET DUPLEX | Retrieve the XPRINT duplex status. |
| XPRINT GET LINES | Retrieve the number of lines that can be printed. |
| XPRINT GET MARGIN | Retrieve the margin sizes for the host printer. |
| XPRINT GET MIX | Retrieve the color mix mode for a host printer page. |
| XPRINT GET ORIENTATION | Retrieve the paper orientation for a host printer page. |
| XPRINT GET OVERLAP | Retrieves the status of XPrint Overlap Mode. |
| XPRINT GET PAGES | Retrieves the XPRINT page number limits for this print job. |
| XPRINT GET PAPER | Retrieve the current paper size/type. |
| XPRINT GET PAPERS | Retrieve a list of supported paper types. |
| XPRINT GET PIXEL | Retrieve the color of a pixel on a host printer page. |
| XPRINT GET POS | Retrieve the last point referenced (POS) by an XPRINT statement. |
| XPRINT GET PPI | Retrieve the resolution of the host printer page. |
| XPRINT GET QUALITY | Retrieve the print quality setting for the host printer. |
| XPRINT GET SCALE | Retrieve the current coordinate limits for the host printer page. |
| XPRINT GET SELECTION | Retrieves the status of the SELECTION flag. |
| XPRINT GET SIZE | Retrieve the total size of the host printer page. |
| XPRINT GET STRETCHMODE | Retrieves the default bitmap stretching mode for the attached DC. |
| XPRINT GET TRAY | Retrieve the active printer tray. |
| XPRINT GET TRAYS | Retrieve a list of supported paper trays. |
| XPRINT GET WORDWRAP | Retrieves the status of XPRINT WordWrap Mode. |
| XPRINT GET WRAP | Retrieves the status of XPRINT Wrap Mode. |
| XPRINT IMAGELIST | Print an image from an IMAGELIST . |
| XPRINT LINE | Draw a line on a host printer page. |
| XPRINT PIE | Draw a pie section on a host printer page. |
| XPRINT POLYGON | Draw a polygon on a host printer page. |
| XPRINT POLYLINE | Draw a series of connected lines on a host printer page. |
| XPRINT PREVIEW | Display a replica of a printed document on the screen. |
| XPRINT PREVIEW CLOSE | Reverts XPRINT output back to the host printer. |
| XPRINT PRINT | Output text to be printed on the selected printer. |
| XPRINT RENDER | Render an image on a host printer page. |
| XPRINT SCALE | Define a custom world coordinate system for a host printer page. |
| XPRINT SCALE PIXELS | Resets the coordinate system to the original default pixel coordinates. |

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| XPRINT SET CLIP | Establishes margins around the outer edges of the print page. |
| XPRINT SET COLLATE | Change the XPRINT collate status. |
| XPRINT SET COLORMODE | Change the XPRINT colormode status. |
| XPRINT SET COPIES | Change the XPRINT copy count. |
| XPRINT SET DUPLEX | Change the XPRINT duplex status. |
| XPRINT SET FONT | Select a font for the XPRINT statement. |
| XPRINT SET MIX | Set the color mix mode for a host printer page. |
| XPRINT SET ORIENTATION | Set the paper orientation for a host printer page. |
| XPRINT SET OVERLAP | Enables or disables XPRINT Overlap Mode. |
| XPRINT SET PAGES | Sets the XPRINT page number limits for this print job. |
| XPRINT SET PAPER | Set a new paper size/type. |
| XPRINT SET PIXEL | Set the color of a pixel on a host printer page. |
| XPRINT SET POS | Retrieve the last point referenced (POS) by an XPRINT statement. |
| XPRINT SET QUALITY | Set the print quality for a host printer. |
| XPRINT SET STRETCHMODE | Sets the default bitmap stretching mode for the current DC. |
| XPRINT SET TRAY | Set a new active printer tray. |
| XPRINT SET WORDWRAP | Enables or disables XPRINT WordWrap Mode. |
| XPRINT SET WRAP | Enables or disables XPrint Wrap Mode. |
| XPRINT SPLIT | Splits a string into two parts for printing with XPRINT. |
| XPRINT STRETCH | Copy and resize a bitmap to a host printer page. |
| XPRINT STRETCH PAGE | Copy and resize a bitmap to the clip or client area of the host printer page. |
| XPRINT STYLE | Set the line style to be used by various XPRINT statements. |
| XPRINT TEXT WIDTH | Calculate the size of text to be printed on a host printer. |
| XPRINT WIDTH | Set the graphic line width to be used by various XPRINT statements. |

String Operations

String Operations

The following functions manipulate and manage

data:

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| ACODES\$ | Translate a Unicode string into an ANSI string. |
| ARRAY ASSIGN | Assign a number of values to successive elements of an array . |
| ARRAY DELETE | Delete a single item from a given array. |
| ARRAY INSERT | Insert a single item into a given array. |
| ARRAY SCAN | Scan all or part of an array for a given value. |
| ARRAY SORT | Sort all or part of a given array. |
| BIN\$ | Return a string with the binary (base 2) representation of a value. |
| BITS\$ | Copies string contents without modification. |
| BUILD\$ | Concatenate multiple strings with high efficiency. |
| CHOOSE\$ | Return one of several values, based upon the value of an index. |
| CHR\$ | Convert one or more character codes into ASCII character(s). |
| CHR\$\$ | Convert one or more character codes into Unicode character(s). |
| CHRBYTES | Determine the size of a single character in a string variable. |
| ChrToOem\$ | Translates a string of ANSI/WIDE characters to OEM byte characters. |
| ChrToUtf8\$ | Translates a string of ANSI/WIDE characters to UTF-8 byte characters. |
| CLIP\$ | Deletes characters from a string. |
| CLSID\$ | Return a 16-byte (128-bit) GUID string containing a CLSID. |
| COMM LINE | Receive a CR/LF terminated "line" of data from a serial port . |
| COMM PRINT | Send a "line" of binary data through a serial port. |
| COMM RECVD | Receive binary data from a serial port. |
| COMM SEND | Send a string of binary data through a serial port. |
| COMMAND\$ | Return the command-line used to start the program. |
| CSET | Center a string within the space of another string or UDT . |

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| CSETS | Return a string containing a centered (padded) string. |
| CURDIR\$ | Return the current directory for a given drive. |
| DATA | Declare an array of constants to be read by READ\$. |
| DATACOUNT | Return the total count of the number of local data items. |
| DATES | Set and retrieve the system date. |
| DEC\$ | Convert an integral value to a decimal string. |
| DIM | Declare and dimension arrays, scalar variables , and pointers . |
| DIR\$ | Return a filename that matches the given mask. |
| DIR\$ CLOSE | Force the release the operating system FindNext handle. |
| ENVIRON | Modify the current program's environment table. |
| ENVIRON\$ | Retrieve strings from the operating system's environment table. |
| ERASE | Deallocate array memory. |
| ERL\$ | Return the last label, line number, or procedure name executed prior to the most recent error. |
| ERROR\$ | Return a string containing the descriptive name of an error . |
| EXTRACT\$ | Return up to the first occurrence of a specified character. |
| EXE | Return the path and/or name of the executing program. |
| FIELD | Bind a field string variable to a particular sub-section of a random file buffer or a dynamic string variable. |
| FIELD RESET | Reset the FIELD string to a nul (zero-length) dynamic string. |
| FIELD STRING | Change the FIELD string to a dynamic string, but first assigns the current sub-section of a random file buffer to a particular sub-section of a dynamic string variable. |
| FILENAME\$ | Return the file-system name of an open file. |
| FORMAT\$ | Return a string containing formatted numeric data. |
| FUNCNAME\$ | Return the name of the current Sub/Function/Method/Property . |
| GET | Read a record from a random-access file . |
| GET\$ | Read a string from a file opened in binary mode . |
| GET\$\$ | Reads WIDE string data from a file opened in binary mode. |
| GRAPHIC SPLIT | Splits a string into two parts for display on a graphic target . |
| GUID\$ | Return a 16-byte (128-bit) Globally Unique Identifier GUID. |
| GUIDTXT\$ | Return a 38-byte human-readable GUID/UUID string. |
| HEX\$ | Hexadecimal (base 16) string representation of an argument. |
| IIF\$ | Return one of two values based upon a True/False evaluation. |
| INPUT# | Load variables with data from a sequential file . |
| INPUTBOX\$ | INPUTBOX\$ displays a dialog box containing a prompt. |
| INSTR | Search a string for the first occurrence of a character or string. |
| ISNOTNULL | Determine if a string is not nul (contains 1 or more characters). |
| ISNULL | Determine if a string is nul (zero-length). |
| IStringBuilderA.Add | Appends an ANSI string to the object. |
| IStringBuilderA.Capacity <Get> | Retrieves the size of the internal buffer. |
| IStringBuilderA.Capacity <Set> | Sets the size of the internal buffer. |
| IStringBuilderA.Char <Get> | Returns the numeric character code of the character at the specified position. |
| IStringBuilderA.Char <Set> | Changes the numeric character code of the character at the specified position. |
| IStringBuilderA.Clear | All data in the object is erased. |
| IStringBuilderA.Delete | Deletes a specified number of characters starting at a specified position. |
| IStringBuilderA.Insert | Inserts a string at a specified position. |
| IStringBuilderA.Len | Returns the number of characters stored in the object. |
| IStringBuilderA.String | The ANSI string stored in the object is returned to the caller. |
| IStringBuilderW.Add | Appends an WIDE string to the object. |
| IStringBuilderW.Capacity <Get> | Retrieves the size of the internal buffer. |
| IStringBuilderW.Capacity <Set> | Sets the size of the internal buffer. |
| IStringBuilderW.Char <Get> | Returns the numeric character code of the character at the specified position. |
| IStringBuilderW.Char <Set> | Changes the numeric character code of the character at the specified position. |
| IStringBuilderW.Clear | All data in the object is erased. |
| IStringBuilderW.Delete | Deletes a specified number of characters starting at a specified position. |
| IStringBuilderW.Insert | Inserts a string at a specified position. |
| IStringBuilderW.Len | Returns the number of characters stored in the object. |
| IStringBuilderW.String | The WIDE string stored in the object is returned to the caller. |

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| JOIN\$ | Return a string consisting of all of the strings in a string array . |
| LCASE\$ | Return a lowercase version of a string argument. |
| LEFT\$ | Return the left-most <i>n</i> characters of a string. |
| LEN | Return the logical length of a variable, UDT, or Union . |
| LET | Assign a value to a variable. |
| LET (with Types) | Assign data to a user-defined type variable. |
| LET (with Variants) | Assign a value or an object reference to a variant variable. |
| LINE INPUT# | Read line(s) from a sequential file into a string variable or array. |
| LPRINT | Output text and data to a printer device. |
| LPRINT\$ | Return the current printer device used for LPRINT operations. |
| LSET | Left-align a string within the space of another string or UDT . |
| LSET\$ | Return a string containing a left-justified (padded) string. |
| LTRIM\$ | Return a string with leading characters or strings removed. |
| MAX\$ | Return the argument with the largest (maximum) value. |
| MCASE\$ | Return a mixed case version of a string argument. |
| MID\$ | Return a portion of a string. |
| MID\$ | Replace characters in a string with characters from another string. |
| MIN\$ | Return the argument with the smallest (minimum) value. |
| MKBYT\$ | Convert a Byte value into a binary encoded string. |
| MKCUR\$ | Convert a Currency value into a binary encoded string. |
| MKCUX\$ | Convert an Extended Currency value into a binary encoded string. |
| MKD\$ | Convert a Double-precision value into a binary encoded string. |
| MKDWD\$ | Convert a Double-word value into a binary encoded string. |
| MKE\$ | Convert an Extended-precision value into a binary encoded string. |
| MKI\$ | Convert a integral value into a binary encoded string. |
| MKL\$ | Convert a Long-integer value into a binary encoded string. |
| MKQ\$ | Convert a Quad-integer value into a binary encoded string. |
| MKS\$ | Convert a Single-precision value into a binary encoded string. |
| MKWRD\$ | Convert a Word value into a binary encoded string. |
| MKDIR | Create a subdirectory/folder (like the DOS MKDIR command). |
| NUL\$ | Return a string containing a specified number of \$NUL characters. |
| OBJRESULT\$ | Returns a string which describes an OBJRESULT (hResult) code. |
| OCT\$ | Return a string that is a octal (base 8) representation of a value. |
| OemToChr\$ | Translates a byte string of OEM characters into ANSI/WIDE characters. |
| PARSE | Parse a string and extract all delimited fields into an array. |
| PARSE\$ | Return a delimited field from a string expression . |
| PARSECOUNT | Return the count of delimited fields in a string expression. |
| PATHNAME\$ | Parse a path/file name to extract component parts. |
| PATHSCAN\$ | Find a file on disk and return the path and/or file name parts.. |
| PEEK\$ | Returns consecutive 1-byte characters starting at a specific memory location. |
| PEEK\$\$ | Returns consecutive 2-byte wide characters starting at a specific memory location. |
| POKE\$ | Store a sequence of bytes starting at a specific memory location. |
| POKE\$\$ | Store a sequence as 2-byte wide characters starting at a specific memory location. |
| PRINT# | Write a complete array to a sequential file. |
| PROGID\$ | Return the alphanumeric PROGID string (text) of a given CLSID. |
| PUT | Write a record to a random-access file or variable to a binary file. |
| PUT\$ | Writes an ANSI string to a file opened in binary mode. |
| PUT\$\$ | Writes a WIDE Unicode string to a file opened in binary mode. |
| READ\$ | Retrieve string data from a local DATA list. |
| REGEXPR | Scan a string for a matching "wildcard" or regular expression. |
| REGREPL | Scan a "wildcard" match in a string with a new string. |
| REMAIN\$ | Returns the portion of a string which follows the first occurrence of a character or group |
| REMOVE\$ | Return a copy of a string with characters or strings removed. |
| REPEAT\$ | Return a string consisting of multiple copies of a specified string. |
| REPLACE | Replace all occurrences of one string with another string. |
| RESET | Clear a string, string array subscript , or an entire array. |

| | |
|-------------------------------|---|
| RESOURCES\$ | Returns predefined resource data. |
| RETAINS\$ | Return a string with all non-specified characters removed. |
| RIGHTS\$ | Return the rightmost <i>n</i> characters of a string. |
| RSET | Right justify a string into the space of a string variable or UDT. |
| RSETS\$ | Return a string containing a right-justified (padded) string. |
| RTRIMS\$ | Return a copy of a string with trailing characters/strings removed. |
| SHRINKS\$ | Shrinks a string to use a consistent single character delimiter. |
| SIZEOF | Return the total or physical length of any PowerBASIC variable. |
| SPACE\$ | Return a string consisting of a specified number of spaces. |
| SPLIT | Splits a string into two parts. |
| STR\$ | Return the string representation of a number in printable form. |
| STRDELETES\$ | Delete a specified number of characters from a string expression. |
| STRING\$ | Returns an ANSI string consisting of multiple copies of a specified character. |
| STRING\$\$ | Returns a WIDE string consisting of multiple copies of a specified character. |
| STRINSERT\$ | Insert a string at a specified position within another string. |
| STRPTR | Return the address of the data held by a variable length string . |
| STRREVERSE\$ | Reverse the contents of a string expression. |
| SWAP | Exchange the values of two strings, pointers, or pointer targets. |
| SWITCH\$ | Return one item of a series based upon a True/False evaluation. |
| TABS\$ | Return a string with TAB characters expanded with spaces. |
| TALLY | Count the number of occurrences of specified characters/strings. |
| TIME\$ | Read and/or set the system time. |
| TRIMS\$ | Return a string with leading and trailing characters removed. |
| TYPE SET | Assign the value of a UDT or string expression to a UDT. |
| UCASE\$ | Return an all-uppercase (capitalized) version of a string. |
| UCODE\$ | Translate an ANSI string into a Unicode string. |
| UCODEPAGE | Set the default codepage used for ANSI / UNICODE conversions. |
| UNWRAPS\$ | Removes paired characters from the beginning and end of a string. |
| USINGS\$ | Format string/numeric expressions using a mask string. |
| Utf8ToChr\$ | Translates a byte string of OEM characters into ANSI/WIDE characters. |
| VAL function | Returns the equivalent of a string argument. |
| VAL statement | Converts a text string to a numeric value with additional information. |
| VARIANTS\$ | Returns the ANSI dynamic string contained in a Variant variable. |
| VARIANTS\$\$ | Returns the Unicode dynamic string contained in a Variant variable. |
| VARPTR | Return the 32-bit address of a string handle. |
| VERIFY | Determine if each character of a string is in another string. |
| WRAPS\$ | Adds paired characters to the beginning and end of a string. |

Text Commands

Text Commands

The following commands can be used with a Text Window:

| | |
|--------------------------------|--|
| TXT.CELL | Sets or retrieves the cursor position. |
| TXT.CLS | Clears the Text Window and moves to caret to the upper left corner. |
| TXT.COLOR | Sets the foreground color |
| TXT.END | The Text Window currently attached to your program is destroyed and detached from the process. |
| TXT.INKEY\$ | Reads a keyboard character if one is ready. |
| TXT.INSTAT | Determines whether a keyboard character is ready. |
| TXT.LINE.INPUT | Reads an entire line from the keyboard. |
| TXT.PRINT | Write text data to the TEXT WINDOW at the current caret location. |
| TXT.WAITKEY\$ | Reads a keyboard character, waiting until one is ready. |
| TXT.WINDOW | A new Text Window is created and attached to your program. |

Thread Control

Thread Control

The following functions are used to create and manage threads:

| | |
|---|--|
| !PowerThread.Close | Releases the thread handle of this thread. |
| !PowerThread.Equals | Compares the specified object to determine if it references the same object as this object. |
| !PowerThread.Handle | Retrieves the handle of the thread for use with Windows API functions. |
| !PowerThread.Id | Retrieves the ID of the thread for use with Windows API functions. |
| !PowerThread.IsAlive | Checks the thread to see if it is currently "alive". |
| !PowerThread.Join | Waits for the specified thread object to complete before execution of this thread continues. |
| !PowerThread.Launch | Begins execution of the thread object. |
| !PowerThread.Priority | Retrieves the priority value for this thread. |
| <Get> | |
| !PowerThread.Priority <Set> | Sets the Priority Value for this thread. |
| !PowerThread.Result | If the thread has ended, the result value is retrieved and returned to the caller. |
| !PowerThread.Resume | Resumes execution of a suspended thread. |
| !PowerThread.StackSize | Retrieves the size of the stack for this thread. |
| <Get> | |
| !PowerThread.StackSize | Sets the size of the stack for this thread to the value specified. |
| <Set> | |
| !PowerThread.Suspend | Suspends execution of the thread. |
| !PowerThread.TimeCreate | Retrieves the date and time-of-day of the thread creation. |
| !PowerThread.TimeExit | Retrieves the date and time-of-day of the thread exit |
| !PowerThread.TimeKernel | Retrieves the amount of time this thread has spent in kernel mode. |
| !PowerThread.TimeUser | Retrieves the amount of time this thread has spent in user mode. |
| PROCESS GET PRIORITY | Retrieve the Priority Value for the current process . |
| PROCESS SET PRIORITY | Sets the Priority Value for the current process. |
| THREADED | Declare Thread Local Storage (TLS) variables. |
| THREAD CLOSE | Close a Windows thread. |
| THREAD CREATE | Create a Windows thread. |
| THREAD GET PRIORITY | Retrieve the Priority Value for a thread. |
| THREAD FUNCTION | Declares a thread function. |
| THREAD SET PRIORITY | Sets the Priority Value for a thread. |
| THREAD RESUME | Resume execution of a suspended Windows thread. |
| THREAD STATUS | Retrieve the Status of a Windows thread. |
| THREAD SUSPEND | Suspend execution of a Windows thread. |
| THREADCOUNT | Return the number of active threads that exist in a module. |
| THREADID | Return a Long-integer thread identifier of the current thread. |

Time Commands

Time Commands

The following functions manipulate and manage time and the system date:

| | |
|---------------------------------------|--|
| DATES | Set and retrieve the system date. |
| DAYNAME\$ | Converts a Day-of-Week number to the associated name. |
| !PowerTime.AddDays | Adds or subtracts a specified number of days to value of this object . |
| !PowerTime.AddHours | Adds or subtracts a specified number of hours to value of this object. |
| !PowerTime.AddMinutes | Adds or subtracts a specified number of minutes to value of this object. |
| !PowerTime.AddMonths | Adds or subtracts a specified number of months to value of this object. |

| | |
|---|--|
| !PowerTime.AddMSeconds | Adds or subtracts a specified number of milliseconds to value of this object. |
| !PowerTime.AddSeconds | Adds or subtracts a specified number of seconds to value of this object. |
| !PowerTime.AddTicks | Adds or subtracts a specified number of ticks to value of this object. |
| !PowerTime.AddYears | Adds or subtracts a specified number of years to value of this object. |
| !PowerTime.DateDiff | Compares the date component of an external PowerTime object with this objects date component. |
| !PowerTime.DateString | Returns the Date component of the object expressed as a |
| !PowerTime.DateStringLong | Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. |
| !PowerTime.Day | Returns the Day component of the object. |
| !PowerTime.DayOfWeek | Returns the Day-of-Week component of the object. |
| !PowerTime.DayOfWeekString | Returns the Day-of-Week of the object, expressed as a string (Sunday, Monday...). |
| !PowerTime.DaysInMonth | Returns the number of days which comprise the month of the date of the PowerTime object. |
| !PowerTime.FileTime <Get> | Returns a Quad-Integer value of the PowerTime object as a FileTime. |
| !PowerTime.FileTime <Set> | The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value. |
| !PowerTime.Hour | Returns the Hour component of the object. |
| !PowerTime.IsLeapYear | Returns true/false (-1/0) to tell if the object year is a leap year. |
| !PowerTime.Minute | Returns the Minute component of the object. |
| !PowerTime.Month | Returns the Month component of the object. |
| !PowerTime.MonthString | Returns the Month component of the object, expressed as a string (January, February...). |
| !PowerTime.MSecond | Returns the millisecond component of the PowerTime object. |
| !PowerTime.NewDate | Assigns a new value to the date component of the PowerTime object. |
| !PowerTime.NewTime | Assigns a new value to the time component of the PowerTime object. |
| !PowerTime.Now | The current local date and time on this computer is assigned to this object. |
| !PowerTime.NowUTC | The current Coordinated Universal date and time (UTC) is assigned to this object. |
| !PowerTime.Second | Returns the Second component of the object. |
| !PowerTime.Tick | Returns the Tick component of the object. |
| !PowerTime.TimeDiff | Compares the time component of an external PowerTime object with this objects time component. |
| !PowerTime.TimeString | Returns the Time component of the PowerTime object expressed as a string. |
| !PowerTime.TimeString24 | Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation. |
| !PowerTime.TimeStringFull | Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.tt in 24-hour notation. |
| !PowerTime.Today | The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only. |
| !PowerTime.ToLocalTime | The object is converted to local time. |
| !PowerTime.ToUTC | The object is converted to Coordinated Universal Time (UTC). |
| !PowerTime.Year | Returns the Year component of the PowerTime object as a numeric value. |
| MONTHNAME\$ | Converts a Month number to the associated name. |
| SLEEP | Pause the current thread for a specified number of milliseconds. |
| TIME\$ | Read and/or set the system time. |
| TIMER | Return the number of seconds that have elapsed since midnight. |
| TIX | Measures elapsed CPU cycles. |

Misc Operations

Misc. Operations

Miscellaneous functions:

| | |
|-------------------------------|---|
| ASM | Identify an assembly-language statement. |
| ASMLIGN | Rounds up the instruction location to a power of two address |
| ASMDATA/END | Define a block where primitive read-only data is stored. |
| ASMDATA | |
| BEEP | Play the default Windows sound through the computer speaker(s). |
| IMPORT | Load or free a library (DLL) to access an imported procedure. |
| PLAY WAVE | Play a sound under program control. |
| PLAY WAVE END | Stops any waveform sound which is currently playing. |
| REM | Indicates the remainder of a line of source code is a remark or comment. |

%DEF operator

%DEF operator

IMPROVED

| Purpose | Determine if an has been previously defined. | | | | | | | | | | | | | | | | |
|----------------------------|--|---------------|-------------------|-----------------------|---|------------------------|---|------------------------|----------------------|------------------------|---|---------------------------|---|----------------------------|--|----------------------|---|
| Syntax | <code>%DEF({<i>numeric_equate</i> <i>string_equate</i>})</code> | | | | | | | | | | | | | | | | |
| Remarks | <p>The %DEF operator tests whether or not an equate has been defined. If the equate has been defined, %DEF returns TRUE (non-zero); or FALSE (zero) if it has not be defined.</p> <p>PowerBASIC automatically defines the equates in the following table according to the PowerBASIC compiler being used. Please note the references to other PowerBASIC compilers are included for those writing programs that may be compilable by more than one PowerBASIC compiler.</p> <table> <thead> <tr> <th>Equate</th> <th>Definition</th> </tr> </thead> <tbody> <tr> <td><code>%PB_CC32</code></td> <td>Pre-defined as TRUE (non-zero) in PB/CC for Windows, but is not defined in other compilers.</td> </tr> <tr> <td><code>%PB_DLL16</code></td> <td>Pre-defined as TRUE (non-zero) in PB/DLL 16-bit, but is not defined in other compilers.</td> </tr> <tr> <td><code>%PB_DLL32</code></td> <td>Synonym of %PB_WIN32</td> </tr> <tr> <td><code>%PB_WIN32</code></td> <td>Pre-defined as TRUE (non-zero) in PB/Win 32-bit, but is not defined in other compilers.</td> </tr> <tr> <td><code>%PB_REVISION</code></td> <td>Pre-defined as the hex revision (10.00 = &H1000).</td> </tr> <tr> <td><code>%PB_REVLETTER</code></td> <td>Pre-defined as the ASCII code of the revision letter (a = &H61), or &H20 if there is no revision letter.</td> </tr> <tr> <td><code>%PB_EXE</code></td> <td>Pre-defined as TRUE (non-zero) if compiling to EXE or as FALSE (zero) if compiling to DLL (PB/Win only) or SLL format. The equate %PB_EXE is always defined in PowerBASIC, so %DEF(%PB_EXE) will always be evaluated as TRUE. The difference being the value assigned to the equate by the compiler. See the examples below.</td> </tr> </tbody> </table> <p>These can be used in conjunction with #IF as a compiler directive to selectively include or exclude code from the compiled file.</p> | Equate | Definition | <code>%PB_CC32</code> | Pre-defined as TRUE (non-zero) in PB/CC for Windows, but is not defined in other compilers. | <code>%PB_DLL16</code> | Pre-defined as TRUE (non-zero) in PB/DLL 16-bit, but is not defined in other compilers. | <code>%PB_DLL32</code> | Synonym of %PB_WIN32 | <code>%PB_WIN32</code> | Pre-defined as TRUE (non-zero) in PB/Win 32-bit, but is not defined in other compilers. | <code>%PB_REVISION</code> | Pre-defined as the hex revision (10.00 = &H1000). | <code>%PB_REVLETTER</code> | Pre-defined as the ASCII code of the revision letter (a = &H61), or &H20 if there is no revision letter. | <code>%PB_EXE</code> | Pre-defined as TRUE (non-zero) if compiling to EXE or as FALSE (zero) if compiling to DLL (PB/Win only) or SLL format. The equate %PB_EXE is always defined in PowerBASIC, so %DEF(%PB_EXE) will always be evaluated as TRUE. The difference being the value assigned to the equate by the compiler. See the examples below. |
| Equate | Definition | | | | | | | | | | | | | | | | |
| <code>%PB_CC32</code> | Pre-defined as TRUE (non-zero) in PB/CC for Windows, but is not defined in other compilers. | | | | | | | | | | | | | | | | |
| <code>%PB_DLL16</code> | Pre-defined as TRUE (non-zero) in PB/DLL 16-bit, but is not defined in other compilers. | | | | | | | | | | | | | | | | |
| <code>%PB_DLL32</code> | Synonym of %PB_WIN32 | | | | | | | | | | | | | | | | |
| <code>%PB_WIN32</code> | Pre-defined as TRUE (non-zero) in PB/Win 32-bit, but is not defined in other compilers. | | | | | | | | | | | | | | | | |
| <code>%PB_REVISION</code> | Pre-defined as the hex revision (10.00 = &H1000). | | | | | | | | | | | | | | | | |
| <code>%PB_REVLETTER</code> | Pre-defined as the ASCII code of the revision letter (a = &H61), or &H20 if there is no revision letter. | | | | | | | | | | | | | | | | |
| <code>%PB_EXE</code> | Pre-defined as TRUE (non-zero) if compiling to EXE or as FALSE (zero) if compiling to DLL (PB/Win only) or SLL format. The equate %PB_EXE is always defined in PowerBASIC, so %DEF(%PB_EXE) will always be evaluated as TRUE. The difference being the value assigned to the equate by the compiler. See the examples below. | | | | | | | | | | | | | | | | |

See also [#IF](#), [Numeric Equates](#), [Built-in numeric equates](#), [String Equates](#), [Built-in string equates](#)

Example

```
' 1. Conditional compilation for PB/CC or PB/Win
#IF %DEF(%PB_CC32)
  'Assume PB/CC
  #COMPILE EXE "\PBCC\APPS\MYPROG.EXE"
```

```

#ELSE
    'Assume PB/Win
    #COMPILE DLL "MYAPP.DLL"
#ENDIF

' 2. Conditional compilation for EXE or DLL
#IF %PB_EXE
    ' we are compiling to an EXE (PB/CC or PB/Win)
    FUNCTION PBMAIN
        [statements]
    END FUNCTION
#ELSE
    ' we are compiling to a DLL (PB/Win)
    FUNCTION PBLIBMAIN
        [statements]
    END FUNCTION
#ENDIF

```

%PB_COMPILETIME numeric equate

Keyword Template

Purpose

Syntax

Remarks

See also

Example

%PB_COMPILETIME numeric equate **New!**

Purpose Helps to determine the date/time of compilation.

Remarks Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the [PowerTIME](#) Class to convert it to a text equivalent for use in your application.

Example

```

LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX Built.DateString
MSGBOX Built.TimeString

```

#ALIGN metastatement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

#ALIGN metastatement

| | |
|-----------------|--|
| Purpose | Align the next instruction to a boundary. |
| Syntax | <code>#ALIGN <i>boundary</i></code> |
| Remarks | <p>The #ALIGN metastatement is primarily used by advanced assembler programmers to gain ultimate efficiency from critical code sections.</p> <p>#ALIGN is used to round up the instruction location to a power of two address. The boundary parameter shown must be a power of two, in the range of 2 through 256.</p> <p>PowerBASIC inserts NOP instructions into the code section to bring the instruction location up to the desired address. If the instruction location is already at a multiple of boundary, #ALIGN has no effect.</p> |
| See also | #OPTIMIZE , ASM , ASM ALIGN , TIX |

#BLOAT metastatement

#BLOAT metastatement

| | |
|-----------------|---|
| Purpose | Artificially inflate the disk image size of a compiled program. |
| Syntax | <code>#BLOAT <i>size_expression</i></code> |
| Remarks | <p>#BLOAT allows the creation of artificially bloated program files on disk, in order to match or exceed that generated by competing "BloatWare" compilers. #BLOAT does not affect the memory image size (running size) of a compiled program.</p> <p><i>size_expression</i> The <i>size_expression</i> parameter is a simple Long-integer expression that specifies the total desired size of the compiled programs disk image, but is ignored if it is smaller than the actual program size. #BLOAT uses sections of the actual compiled code to fill and obfuscate the portion added to the file.</p> <p>While #BLOAT adds no true merit to the technical efficiency of the compiled code, there are a number of reasons for its use, including:</p> <ol style="list-style-type: none"> 1. To allow "BloatWare" programmers to feel more comfortable when using PowerBASIC. 2. To impress project leaders/managers with the volume of executable code created. 3. To allay the fears of uninformed customers who may mistakenly infer that "such tiny programs couldn't possibly do everything that..." 4. To make certain versions of a program more readily identifiable simply by examining the size of the file on disk. 5. To improve convolution of the contents of the executable disk image, because the bloat region appears to contain executable code. |
| See also | #COMPILE EXE , #OPTIMIZE |
| Example | <code>#BLOAT 1024 * 1024 * 4 ' Create a 4 MB EXE file</code> |

#COM metastatement

Keyword Template

| |
|----------------|
| Purpose |
| Syntax |
| Remarks |

See also

Example

#COM metastatement IMPROVED

| | |
|----------------|---|
| Purpose | Declare information to be included in a COM Type Library . |
| Syntax | <pre>#COM CLASS <i>ClassName</i> [, <i>ClassName...</i>] #COM DOC "This is specific information to be used in the Help String" #COM HELP "MyProg.chm"[, &H1E00] #COM NAME "LibName", 3.32 #COM GUID GUID\$("{20000000-2000-2000-2000000000000002}") #COM TLIB {ON + OFF -}</pre> |
| Remarks | <p>The #COM metastatement establishes information about the COM library or application which can be extracted by COM client programs.</p> <p>#COM CLASS allows you to add the COM attribute to a class defined elsewhere. The COM attribute can even be added to a class in an SLL which was compiled separately. A class which is declared AS COM makes it available to external programs through the COM services of Windows. When you define a class as COM, it is automatically considered to be COMMON as well.</p> <p>#COM DOC specifies a help string which usually provides a general description of the COM server.</p> <p>#COM HELP specifies the name of the associated help file and the help context code. The name must appear as a string literal, while the context code is an unsigned DWORD value greater than zero. The context code may be specified in decimal or radix format.</p> <p>#COM NAME specifies the name of the server and the version number. The name must consist of only letters, numbers, and underscore characters, and may contain no punctuation nor spaces. If no name is specified, PowerBASIC substitutes the module name. If no version is specified, PowerBASIC uses version number 0.0.</p> <p>#COM GUID specifies the GUID which identifies the entire application or library (APPID or LIBID). If no GUID is specified, PowerBASIC substitutes a random GUID for this purpose.</p> <p>#COM TLIB ON specifies that the compiler should create a type library for the compiled EXE or DLL.</p> <p>#COM TLIB OFF (default) specifies that the compiler should not create a type library for the compiled EXE or DLL.</p> |

Type Libraries only support the following data types: [BYTE](#), [WORD](#), [DWORD](#), [INTEGER](#), [LONG](#), [QUAD](#), [SINGLE](#), [DOUBLE](#), [CURRENCY](#), [OBJECT](#), [STRING](#), and [VARIANT](#). If any Methods or Properties use data types not supported by Type Libraries, you will receive a [Error 581 - Type Library creation error](#), when using the [#COM TLIB ON](#) metastatement.

See also [CLASS](#), [INTERFACE \(Direct\)](#), [INTERFACE \(IDBind\)](#), [Just what is COM?](#)

#COMPILE metastatement

#COMPILE metastatement IMPROVED

| | |
|----------------|---|
| Purpose | Determine what type of file will be created by the compiler. |
| Syntax | <pre>#COMPILE {EXE DLL SLL} ["filename{.exe .dll .sll}"]</pre> |
| Remarks | This metastatement is used to specify whether a module is to be compiled as an EXE, DLL , or SLL file. The #COMPILE metastatement can only be used once per program, and must be placed before any executable code. |

You may, optionally, specify the target name and path of the file. If the optional equal sign (=) is included, the name given is considered to be an exact name, and nothing is appended or changed. Otherwise, the file type is forced to be EXE, DLL, or SLL by the compiler.

If the filename clause is omitted, the compiled file is given the name of the main source code file with an appropriate extension.

If a path is included, the compiled file is placed in the named directory; otherwise, it is placed in the current directory.

If the named directory does not exist, the filename is invalid or locked, if the EXE is still running, or if the file cannot be successfully stored in that location for some other reason, a compile-time [Error 496](#) ("Destination file write error") occurs.

A related item is the built-in numeric equate [%PB_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the [PowerTIME](#) Class to convert it to a text equivalent for use in your application.

Restrictions If #COMPILE is not specified, the default is #COMPILE EXE.

Examples

```
#COMPILE EXE ' Same name as source, i.e., ABC.EXE
#COMPILE DLL ' Same name as source, i.e., ABC.DLL
#COMPILE SLL "ABC" ' Compiles to ABC.SLL
#COMPILE EXE "ABC.BAS" ' Compiles to ABC.BAS.EXE
```

See also [%PB_COMPILETIME](#), [#COMPILER](#), [DLLMAIN](#), [LIBMAIN](#), [PBLIBMAIN](#), [PBMAIN](#), [WINMAIN](#)

#COMPILER metastatement

#DEBUG CODE metastatement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

#DEBUG CODE metastatement

Purpose Compiler directive to suppress generation of debugging code.

Syntax #DEBUG CODE {ON|+ | OFF|-}

Remarks When a program is compiled for [debugging](#) in the PowerBASIC IDE, the compiler must generate some additional code to facilitate setting of breakpoints and some other debug operations. In most cases, this does not affect the execution of your program. However, in the case of code repetition in a tight

, or for certain assembler code or data which must not be altered, it may be very important that some debugging code be suppressed so that code will execute correctly, and at full speed.

#DEBUG CODE OFF suppresses generation of debug code, from that line, until a subsequent #DEBUG CODE ON (or the end of the [Sub/Function/Method/Property](#)) is reached. Of course, when debug code is suppressed, it is not possible to set

breakpoints on those lines.

#DEBUG CODE metastatements are ignored if not compiling for debug.

See also [Error Trapping](#), [Errors](#), [Debugging](#), [#DEBUG DISPLAY](#), [#DEBUG ERROR](#), [#DEBUG PRINT](#)

#DEBUG DISPLAY metastatement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

#DEBUG DISPLAY metastatement

Purpose Display a message when an untrapped run-time error occurs.

Syntax #DEBUG DISPLAY {ON|+ | OFF|-}

Remarks #DEBUG DISPLAY ON enables error display mode within a compiled PowerBASIC program. In this mode, whenever an untrapped error occurs (without the benefit of [ON ERROR GOTO](#), [TRY/CATCH](#), etc.), program execution is suspended, and a descriptive message is displayed. This message includes the error number, a brief description of the error, and a position descriptor word to help you find the location of the error. The position descriptor word is the first 8 characters of the name of the last (most recent) label, line number, or procedure that was executed. This mode should only be used during program development and debugging. It should never be used in a production program.

When the descriptive message is displayed, it is accompanied by two buttons marked "OK" and "Cancel". If "OK" is selected, program execution continues despite the error condition. If "Cancel" is selected, program execution is stopped. However, if any child processes were started, it is possible they will continue running until ended normally.

#DEBUG DISPLAY OFF suppresses display mode, and is the default condition.

Restrictions #DEBUG DISPLAY ON|OFF can only be executed once and must precede all executable code. If #DEBUG DISPLAY is omitted, the default condition is #DEBUG DISPLAY OFF.

See also [Error Trapping](#), [Errors](#), [Debugging](#), [#DEBUG CODE](#), [#DEBUG ERROR](#), [#DEBUG PRINT](#)

#DEBUG ERROR metastatement

#DEBUG ERROR metastatement

Purpose Control generation of [error](#) checking code.

Syntax #DEBUG ERROR {ON|+ | OFF|-}

Remarks #DEBUG ERROR option specifies whether the compiler should generate code that checks for [array](#) boundary and null-[pointer](#) errors wherever they may occur. The default setting is OFF.

When #DEBUG ERROR mode is ON, any attempt to access an array outside of its boundaries, or attempting to use a null-pointer will generate a run-time [Error 9](#) ("Subscript/Pointer out of range"), and the statement itself is not executed.

When OFF, all statements are executed "as-is" and no errors are generated. However, accessing an array outside its boundaries or using a null-pointer can cause a General Protection Fault (GPF) or Exception error.

It is best to enable #DEBUG ERROR error checking when developing a program. Once all of the more obvious bugs have been eradicated, you will want to return to the default setting (OFF), as this will make your code smaller and faster. Depending on the type of application being developed, the final (production) version of a program may not need to contain any error-checking code.

Restrictions #DEBUG ERROR is always enabled when code is running within the Debugger, regardless of any explicit #DEBUG ERROR metastatement.

[Disk I/O errors](#) are always caught, regardless of the state of #DEBUG ERROR.

#DEBUG ERROR ON does not trap array boundary errors of arrays within [User-Defined Types](#) and [Unions](#). Pointers are only tested for null (zero) values. Non-zero pointer target addresses are not tested for readability or writeability.

See also [Error Trapping](#), [Errors](#), [Debugging](#), [#DEBUG CODE](#), [#DEBUG DISPLAY](#), [#DEBUG PRINT](#)

#DEBUG PRINT metastatement

#DEBUG PRINT metastatement

Purpose Display information in the [IDE's](#) Debugger Output Window

Syntax #DEBUG PRINT *string_expression*

Remarks The PRINT option allows the programmer to display arbitrary information in the IDE's Debug Output Window during a [debugging](#) session. The output window is provided by debugger to display status information about the state of the debugging session; however, #DEBUG PRINT provides a convenient way of creating a "process log" of a [Sub/Function/Method/Property/Variable](#) as the program runs. Combined with [FUNCNAME\\$](#), #DEBUG PRINT can be a useful tool for debugging application code. See the Example below.

This is possible because the Debugger Output Window has a scrollable range somewhat like a console window, whereas the [Watch Window](#) shows only the instantaneous value of a [variable](#).

#DEBUG PRINT statements are ignored when code is compiled into a standalone (EXE/DLL) file; they are only included when using the Debugger. Control codes in the string are translated into hex format in the output window. For example, embedded [CHR\\$\(0\)](#) or [\\$NUL](#) bytes are displayed as "<00>".

Restrictions You may use [Unicode](#) strings with #DEBUG PRINT, but the results will always be converted to ANSI by Windows. This is a Windows design limitation, not a limitation of PowerBASIC.

See also [Debugging](#), [#DEBUG ERROR](#), [FUNCNAME\\$](#)

Example

```
FUNCTION PBMAIN() AS LONG
    Arg1% = 10000
    Arg2% = 20000
    CALL MySub(Arg1%, Arg2%)
    CALL MySub(Arg2%, Arg1%)
    #DEBUG PRINT "Done!"
END FUNCTION

SUB MySub(Arg1%, Arg2%)
    #DEBUG PRINT "We're in " & FUNCNAME$
    #DEBUG PRINT "Arg2% is" & STR$(Arg2%)
END SUB
```

```

Result      We're in MYSUB
            Arg2% is 20000
            We're in MYSUB
            Arg2% is 10000
            Done!

```

#DIM metastatement

#DIM metastatement

Purpose Specify if [variables](#) must be declared before use.

Syntax #DIM {ALL | NONE}

Remarks #DIM NONE (the default), requires you to dimension [arrays](#), but not other kinds of variables, before their use.

Using #DIM ALL requires you to declare all variables before they are used in a program. This option makes PowerBASIC behave a lot like languages like C++ and Pascal which require that all variables be declared before they can be used. Although this will require more work, as even simple variables must be declared with [DIM](#), [INSTANCE](#), [LOCAL](#), [GLOBAL](#), [STATIC](#), or [THREADED](#) statements, it will protect you from subtle errors like misspelling a variable name. For example, if you are using a variable *NumRecords* in your program and write a line like:

```
INCR NumRecrods
```

PowerBASIC will detect that you're trying to use a previously undeclared variable (since *NumRecrods* is misspelled) and give you a compile-time [error 519](#) ("Missing declaration"). If you hadn't specified #DIM ALL, you wouldn't have gotten an error, but your program would now have a bug that could be difficult to diagnose.

#DIM ALL means the same thing as [OPTION EXPLICIT](#), and the two can be used interchangeably.

Restrictions When #DIM ALL is used, type-specifier symbols with variable names are not allowed in a [DIM](#) var statement. e.g. Dim a\$(10) will result in compile error 519. Instead variables or arrays defined with the DIM statement must use the AS vartype format. Additionally, [DEFtype](#) statements, such as DEFINT, DEFLNG, etc. will be ignored, resulting in an error 519 where any variable they would otherwise define is used.

See also [DEFtype](#), [DIM](#), [GLOBAL](#), [INSTANCE](#), [LOCAL](#), [REDIM](#), [STATIC](#), [OPTION EXPLICIT](#)

Example

```

#DIM ALL
[statements]
DIM ListName(1 TO 400) AS STRING
[statements]
FOR ix = 1 TO 10 ' PowerBASIC flags this line
                 ' since "ix" wasn't dimensioned
    ListName(ix) = "Test"
NEXT

```

#EXPORT metastatement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

#EXPORT metastatement New!

Purpose Declare a Sub/Function to have the EXPORT attribute.

Syntax `#EXPORT SubFuncName [, SubFuncName...]`

Remarks #EXPORT allows you to add the EXPORT attribute to a [Sub/Function](#) defined elsewhere. The EXPORT attribute can even be added to a Sub/Function in an [SLL](#) which was compiled separately.

The EXPORT descriptor identifies a Sub/Function which may be accessed between Dynamic Link Libraries ([DLLs](#)), and/or the main executable which links them. If a procedure is not marked EXPORT, it is hidden from these other modules. Generally speaking, it's best not to mark a Sub/Function in an SLL as EXPORT. While it is syntactically acceptable, it may limit your future options when linking the SLL into host modules. PowerBASIC recommends that you mark them as COMMON in the SLL, and add the EXPORT attribute in the host module.

It's easy to create an SLL which can be linked into an executable program or a dedicated DLL for the same purpose. To add the EXPORT attribute to a linked Sub/Function, just add the word EXPORT to the [DECLARE](#) statement in the host module or add an #EXPORT metastatement.

Using this technique, your SLL can be linked directly into an application executable without publishing the Subs/Functions as EXPORT. However, you can also link the same SLL into a DLL host module which adds the EXPORT attribute with #EXPORT.

For example, let's say you want to make a library which publishes the SUB named XXX. You want to provide it in two forms, a linkable SLL and an industry standard DLL. So, first just create the SLL:

```
#COMPILE SLL = "XXXLib.SLL"

SUB xxx() COMMON
  MSGBOX "Hello"
END SUB
```

Just compile it, and you're ready to link it into your application. But now you want to create a DLL, too, since it might be used with other applications. It's just this easy:

```
#COMPILE DLL = "XXXLib.DLL"

#EXPORT xxx
#LINK "XXXLib.SLL"
```

That's all there is to it. You now have an SLL and an equivalent DLL to do the job of the XXX procedure.

See also [#LINK](#), [DECLARE](#)

#IF metastatement

#IF/#ELSEIF/#ELSE/#ENDIF metastatements

Purpose Define sections of source code to be compiled or ignored, depending on a certain condition. This is often referred to as conditional compilation.

Syntax

```
#IF [NOT] {%equate | %DEF({%numeric_equate | $string_equate}) | expression}
  [statements]
[#ELSEIF [NOT] {%equate | %DEF({%numeric_equate | $string_equate}) |
expression}
  [statements]]
```

```
[ #ELSE
  [statements]]
#ENDIF
```

Remarks

%equate is a named [constant](#) or constant value. The [%DEF](#) operator allows you to test whether an equate has been defined. [%DEF](#) returns [TRUE](#) or [FALSE](#). Typical usage: `#IF %DEF(%PB_DLL16) or #ELSEIF NOT %DEF(%PB_WIN32)`. *expression* may be a simple numeric expression using the arithmetic operators `+`, `-`, `*`, `/`, and `\`, and the relational operators `>`, `<`, `>=`, `<=`, `<>`, and `=`, and may also include the [CVQ](#) function.

PowerBASIC automatically defines the equates in the following table according to the PowerBASIC compiler being used. Please note the references to other PowerBASIC compilers are included for those writing programs that may be compilable by more than one PowerBASIC compiler.

| Equate | Definition |
|----------------------------|---|
| <code>%PB_CC32</code> | Pre-defined as TRUE (non-zero) in PB/CC for Windows, but is not defined in other compilers. |
| <code>%PB_DLL16</code> | Pre-defined as TRUE (non-zero) in PB/DLL 16-bit, FALSE (zero) in other compilers. |
| <code>%PB_DLL32</code> | Synonym of <code>%PB_WIN32</code> |
| <code>%PB_WIN32</code> | Pre-defined as TRUE (non-zero) in PB/Win 32-bit, but is not defined in other compilers. |
| <code>%PB_REVISION</code> | Pre-defined as the hex revision (10.00 = <code>&H1000</code>). |
| <code>%PB_REVLETTER</code> | Pre-defined as the ASCII code of the revision letter (a = <code>&H61</code>), or <code>&H20</code> if there is no revision letter. |
| <code>%PB_EXE</code> | Pre-defined as TRUE (non-zero) if compiling to EXE or as FALSE (zero) if compiling to DLL format (PB/Win only). The equate <code>%PB_EXE</code> is always defined in PowerBASIC, so <code>%DEF(%PB_EXE)</code> will always be evaluated as TRUE. The difference being the value assigned to the equate by the compiler. |

Examples of valid expressions can include:

```
#IF %DEBUG = -1&
#IF %DEBUG AND (NOT %RELEASE)
#IF NOT %DEBUG
#IF %VERSION <> CVQ("DemoMode")
```

Note that the [AND](#), [OR](#) and [NOT](#) operators work as bitwise operators, rather than logical operators, in `#IF` metastatements.

If the value of *%equate* or if `%DEF(%equate|$equate)` is TRUE (non-zero) or if the result of *expression* is TRUE, the statements between `#IF` and `#ELSE` or `#ELSEIF` are compiled, and the statements between `#ELSE` or `#ELSEIF` and `#ENDIF` are ignored.

If the value of *%equate* or `%DEF(%equate|$equate)` is FALSE (zero) or the result of *expression* is FALSE, the statements between `#IF` and `#ELSE` or `#ELSEIF` are ignored, and those between `#ELSE` or `#ELSEIF` and `#ENDIF` are compiled.

The `#ELSE` or `#ELSEIF` clause and associated statements are optional, but `#ENDIF` is required.

Conditional compilation statements can be nested up to 16 levels deep. A primary use of conditional compilation is to include test code in your programs that will be compiled during program development (but not in the final product), and to facilitate building special editions of an application from a single source code file.

It is possible to perform bitwise operations on

to produce a TRUE/FALSE result. For example:

```
#IF (%PB_REVISION AND &H0FF00) - &H0700
  SoftwareVersion$ = "not 7.x"
#ELSE
  SoftwareVersion$ = "7.x"
#ENDIF
```

See also [%DEF operator](#), [IF statement](#), [IF block](#)

Example

```

Example ' 1. Conditional compilation by equate value
%DEBUG = -1      'set to 0 for no debugging
#IF %DEBUG
    CALL SubRoutine(Arg1, Arg2, Arg3, Answer)
    CALL DisplayDebugData(Answer)
#ELSE
    CALL SubRoutine(Arg1, Arg2, Arg3, Answer)
#ENDIF

' 2. Conditional compilation for EXE or DLL
#IF %PB_EXE
    ' we are compiling to an EXE (PB/CC or PB/Win)
    FUNCTION PBMAIN
        [statements]
    END FUNCTION
#ELSE
    ' we are compiling to a DLL (PB/Win)
    FUNCTION PBLIBMAIN
        [statements]
    END FUNCTION
#ENDIF

```

#INCLUDE metastatement

#INCLUDE metastatement

IMPROVED

Purpose Instruct the compiler to read a text file from disk and treat it as an integral part of the source code.

Syntax

```

#INCLUDE "FileSpec"
#INCLUDE ONCE "FileSpec"
#INCLUDE THIS ONCE

```

Remarks Use #INCLUDE to compile the text of another file along with the current file. The first form causes *FileSpec* to be included in every case it is encountered. The second form causes *FileSpec* to be included only once, the first time it is encountered. This is particularly useful when including common declaration files like WIN32API.INC to avoid redundant code, and the resulting errors. To be effective, the ONCE option must appear on every #INCLUDE of a particular file. Effectively, #INCLUDE ONCE means: "Include this file only if it has not already been included."

The third form (#INCLUDE THIS ONCE) is placed in the file to be included, and produces an end result similar to form two. It tells the compiler to "Include me only one time, no matter how many times it is requested". Depending upon the content and context, this may be a simpler and more readable method to achieve the desired result.

FileSpec is a string constant that follows normal LFN file-naming conventions, and which names a PowerBASIC source code file. If *FileSpec* does not include an extension, the compiler looks for that file name with the default extension of .BAS.

If *FileSpec* does not include a path, the compiler scans the search path for each #INCLUDE file before checking the current (default) directory. For the IDE, the search path can be set in the [Compiler Preferences tab](#) in the [Options dialog](#). The search path can also be specified when compiling from the [command-line](#) by using the /I Include option. The search path can contain one path or multiple paths to scan. If multiple paths are used, they are separated by a semicolon (;).

When the compiler encounters an #INCLUDE metastatement, it reads *FileSpec* from disk and continues compilation with the source code in *FileSpec*. When the end of *FileSpec* is reached, compilation continues with the statement immediately following the

#INCLUDE in the original source file. The result is the same as if the contents of the included file were physically present within the original text. This allows large source files to be broken into smaller sections that are more manageable.

#INCLUDE metastatements can be nested as many as twelve levels deep. That is, an included file can have #INCLUDE metastatements of its own, including files that also have #INCLUDE metastatements, and so on, for a total of twelve levels of files (including the primary file). Note that [macros](#) count as #include files for nesting purposes.

See also [WIN32API.INC Updates](#)

Example

```
' MYHELLO.BAS
#include ONCE "WIN32API.INC" 'include Windows API calls
FUNCTION PBMAIN
    MessageBox 0, "Hello World!", "PowerBASIC", %MB_OK
END FUNCTION
```

#LINK metastatement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

#LINK metastatement New!

Purpose LINK a pre-compiled [Static Link Library](#) (SLL) or a [Power Library](#) (PBLIB) into your host program.

Syntax #LINK "*filespec*.SLL"
#LINK "*filespec*.PBLIB"

Remarks The #LINK metastatement is used to link pre-compiled Unit files (SLL or PBLIB) into your primary host program. The host program must compile to an EXE or [DLL](#) module. You cannot link a unit file into another unit file.

If a specified SLL unit file (or a component SLL in a PBLIB) is not needed by other compiled code, it is ignored entirely. This allows the host program to be compiled to the smallest possible size.

The *filespec* may include an optional path name, and must include the extension ".SLL" or ".PBLIB". The #LINK metastatement may be placed at any location in your source file, as long as it is outside of any block structure, such as [Sub](#), [Function](#), [Method](#), [Class](#), etc.

#LINK shares the file search path with [#INCLUDE](#). If *filespec* does not include a path, the compiler scans the search path for each #LINK file before checking the current (default) directory. For the IDE, the search path can be set in the [Compiler Preferences](#) tab in the Options dialog. The search path can also be specified when compiling from the command-line by using the /I Include option. The search path can contain one path or multiple paths to scan. If multiple paths are used, they are separated by a semicolon (;).

See Also [#COMPILE](#), [#EXPORT](#)

#MESSAGES metastatement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

#MESSAGES metastatement

Purpose Specify which messages should be sent to a Control Callback Function.

Syntax `#MESSAGES COMMAND`
`#MESSAGES NOTIFY`

Remarks #MESSAGES COMMAND specifies that only %WM_COMMAND messages be sent to [Control Callback](#) Functions, just as in earlier versions of PowerBASIC

#MESSAGES NOTIFY specifies that %WM_NOTIFY messages (as well as %WM_COMMAND messages) be sent to Control Callback Functions. This is the default condition, and need not be explicitly stated.

There are two general types of Callback Functions. The first is the [DIALOG CALLBACK](#), which is specified with the CALL DLGPROC clause of the

statement. It receives all messages which are directed to the [dialog](#), including certain messages regarding its child controls. Specifically, this would include both %WM_COMMAND and %WM_NOTIFY messages. The second is the CONTROL CALLBACK, which is specified with the CALL CTLPROC clause of the statement. If specified, it receives all %WM_COMMAND and %WM_NOTIFY messages sent to the parent dialog.

Prior to version 9.0 of PowerBASIC for Windows, Control Callback Functions received only %WM_COMMAND messages. Beginning with PB 9.0, %WM_NOTIFY messages are sent as well. There are many situations where these added messages will prove to be very important to you. If your existing callback functions are written with complete error checking (ensuring that CB.MSG = %WM_COMMAND), this minor addition will cause no problems. It just presents additional information which can be acted upon, or just ignored. However, if callbacks were written without complete error checking, some ambiguity is possible. In this case, you should either update your Control Callback code, or suppress %WM_NOTIFY messages with a #MESSAGES Command metastatement.

See also [Callbacks](#), [DIALOG SHOW MODAL](#), [DIALOG SHOW MODELESS](#), [FUNCTION/END FUNCTION](#)

#OPTIMIZE metastatement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

#OPTIMIZE metastatement IMPROVED

| | |
|---------------------|---|
| Purpose | Choose the optimization which should be applied to your program. |
| Syntax | <code>#OPTIMIZE CODE [ON OFF]</code> <code>#OPTIMIZE {SIZE SPEED}</code> |
| Remarks | <p>The #OPTIMIZE metastatement is used to tell the compiler your preferences in regards to the optimization of generated code. You can specify optimization for either execution speed or smaller code size.</p> <p>The first form of the directive (CODE) tells the compiler whether unreferenced code should be removed from the compiled program to minimize the executable file size. This option defaults to ON as there are few reasons to disable it (other than curiosity as to the effectiveness). Regardless of the compiled module type (SLL, DLL, or EXE), PowerBASIC removes every unneeded:</p> <ol style="list-style-type: none"> 1 Sub 2 Function 3 FastProc 4 Method 5 Property 6 String Literal 7 Numeric Literal 8 Static Link Library <p>Extraction is always performed on a procedure basis, not an entire class. If you have a CLASS with 50 Methods, but only one is ever called, the other 49 are removed entirely. This level of granularity is particularly important with your personal code library of general purpose functions. You can include them all, and PowerBASIC will use just the minimum necessary. If you generate a log file (using the /L command line option), a list of the extracted procedures, classes, and SLL modules is provided.</p> <p>The second form of the directive (SIZE/SPEED) tells the compiler whether you want additional optimization for execution speed or smaller total code size. If not used, the default is to choose faster code speed.</p> <p>If you choose the SPEED option, one of the primary actions of the compiler is to align heavily used code sections on an address boundary which is most beneficial to the CPU/FPU.</p> <p>In some cases, the speed of mechanisms (FOR/NEXT, DO/UNTIL...) can be improved by as much as 100%, and occasionally even more.</p> |
| Restrictions | #OPTIMIZE SIZE SPEED can only be executed once and must precede all executable code. If #OPTIMIZE is omitted, the default condition is #OPTIMIZE SPEED. |
| See also | #ALIGN , ASM ALIGN |

#OPTION metastatement

#OPTION metastatement IMPROVED

| | |
|----------------|--|
| Purpose | Establish various compiler options. |
| Syntax | <code>#OPTION {LARGEMEM32 VERSION3 VERSION4 VERSION5 WIN95 ANSIAPI}</code> |
| Remarks | <p><u>#OPTION LARGEMEM32</u></p> <p>For 32-bit Windows applications, this option sets the "Large Memory Model" flag. This allows your application to use more than the original limit of 2 Gigabytes of memory.</p> |

Depending upon the version of Windows in use, and the installed memory, the exact increase may vary from computer to computer. In most cases, you will likely be limited to a total of approximately 3 Gigabytes.

#OPTION VERSION3, VERSION4, VERSION5

When the #OPTION metastatement is used with any one of the VERSION directives, it controls the "minimum Windows version" tag that is written into your compiled code. If the version you select is equal or lower to the version of Windows that is running, the application will be executed. In turn, Windows will tailor the messages it sends to your program according to this version number, so your program will not need to handle messages from a later Windows version. The version tag may also affect the appearance and behavior of Windows common dialogs.

Conversely, if the version tag you select is higher than the version of Windows that is running, Windows will display an error message instead of running your application. For example, running a VERSION5 application on a VERSION4 platform would fail. It is your responsibility to make sure that your program only uses the Windows features that are present in the specified version of Windows. For example, don't call an API that's present only in Windows XP, if you want your program to run under Windows 98.

#OPTION VERSION3

Use #OPTION VERSION3 to make the compiled output file require a minimum of Windows 95 or NT 3.1. That includes Windows 95, 98, ME, Windows NT 3.1-4.0, Windows 2000, XP, Windows 2003, Windows Vista, Windows 7, and later.

#OPTION VERSION4

Use #OPTION VERSION4 (default) to make the compiled output file require a minimum of Windows 95 or NT4. That includes Windows 95, 98, ME, Windows NT 4.0, Windows 2000, XP, Windows 2003, Windows Vista, Windows 7, and later.

#OPTION VERSION5

Use #OPTION VERSION5 to make the compiled output file require a minimum of Windows 2000. That includes Windows 2000, XP, Windows 2003, Windows Vista, Windows 7, and later.

#OPTION WIN95

Windows95, Windows98, and Windows ME do not offer [Unicode](#) support for Windows API functions. Normally, that would make it possible to execute your compiled programs on these operating systems, as this version of PowerBASIC offers complete support for Wide Unicode text. However, if you specify #OPTION WIN95 in your source code, PowerBASIC will include a complete Unicode emulation package in your executable or DLL to allow them to run properly on these operating systems, This option will cause your code to be a bit larger, so it should only be used where necessary.

#OPTION ANSIAPI

This version of PowerBASIC offers complete support for Wide Unicode text, so it follows that the internal runtime library would call Unicode versions of functions in the Windows API. In some fairly rare cases, this could cause an incompatibility with code you have written, if your code calls ANSI functions in the Windows API. If you specify #OPTION ANSIAPI in your source code, PowerBASIC will call only [ANSI](#) versions of these functions. This option will cause your code to be a bit larger, so it should only be used when needed.

Example

```
#OPTION VERSION5
```

#PAGE metastatement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

#PAGE metastatement **New!**

Purpose Sets a page boundary for the PowerBASIC [IDE](#).

Syntax #PAGE

Remarks Program listings which are nicely formatted are easier to read and understand, particularly after some elapsed time.

The #PAGE metastatement is used to set a page boundary when the source code is printed from the PowerBASIC IDE. Each time a #PAGE is found, the PowerBASIC IDE starts printing on a new page.

#PAGE has no effect on your compiled code.

#PBFORMS metastatement

#PBFORMS metastatement

Purpose Compiler directive to mark named blocks of generated [PowerBASIC Forms™](#) code.

Syntax #PBFORMS *named_block_marker*

Remarks #PBFORMS metastatements are generated by the **PowerBASIC Forms™** visual design tool, and placed automatically into the generated source code. #PBFORMS metastatements identify named blocks of code that have special meaning to both the compiler and the **PowerBASIC Forms™** visual design tool.

#PBFORMS metastatements should not be removed or utilized - they should only be created and positioned by **PowerBASIC Forms™**. For more information, please refer to the documentation supplied with **PowerBASIC Forms™**.

PowerBASIC Forms™ is a visual design environment that enables rapid visual design of GUI application dialogs. PowerBASIC Forms generates compilable Dynamic Dialog Tools ([DDT](#)) source code, directly from the dialogs created in the designer. PowerBASIC Forms product information can be found at <http://www.powerbasic.com/products/pbforms>.

An example **PowerBASIC Forms™** template and completed project can be found in the PB\SAMPLES\DDT\INTERFACE EXPLORER folder installed with PowerBASIC for Windows.

Example #PBFORMS CREATED
#PBFORMS BEGIN INCLUDES

#REGISTER metastatement

#REGISTER metastatement

| | |
|---------------------|---|
| Purpose | Control automatic allocation of Register variables . |
| Syntax | <code>#REGISTER {ALL DEFAULT NONE}</code> |
| Remarks | <p>Register variables may be Extended-precision floating-point variables, or 16/32-bit integral-class variables (Word, Dword, Integer, or Long). The #REGISTER metastatement determines the method of automatic allocation of Register variables.</p> <p>The #REGISTER metastatement works at two levels - a "global" setting, and a "local" setting for each Sub/Function/Method/Property. To set the global default #REGISTER options, it must precede all executable code. To override the global register option for an individual routine, it must be placed between the FUNCTION/END FUNCTION, SUB/END SUB, METHOD/END METHOD, or PROPERTY/END PROPERTY pairs before any executable code.</p> |
| ALL | #REGISTER ALL requests automatic allocations of all possible Register variables, both integral-class and Extended-precision float variables. |
| DEFAULT | #REGISTER DEFAULT (default) requests automatic allocations of integral-class variables in all cases, and Extended-precision floating-point variables located in a routine which contains no reference to another procedure. |
| NONE | #REGISTER NONE disables automatic assignment of Register variables. You can still use the REGISTER statement to explicitly define Register variables in your code on an individual basis. This provides a way to hand-optimize your code to help obtain the utmost performance. |
| Restrictions | PowerBASIC transparently prevents the automatic register conversion of the variable used in the TO clause of the DIALOG SHOW MODAL and DIALOG SHOW STATE statements. If the target variable is explicitly declared as a register variable, PowerBASIC raises a compile-time Error 491 ("Invalid register variable"). This is necessary as the result values stored in such variables may be assigned from the context of other procedures, and this may only occur with a memory variable. |
| See also | REGISTER , Optimizing your code |
| Example | <pre>#REGISTER DEFAULT ' global register setting FUNCTION PBMAIN() AS LONG #REGISTER NONE ' No automatic register ' vars in this function REGISTER x& ' Explicitly declare x& ... END FUNCTION</pre> |

#RESOURCE metastatement

#RESOURCE metastatement

IMPROVED

| | |
|----------------|--|
| Purpose | Embed a PowerBASIC Resource data into a compiled EXE or DLL . |
| Syntax | <pre>#RESOURCE BITMAP, ResID, "filespec.BMP" #RESOURCE ICON, ResID, "filespec.ICO" #RESOURCE MANIFEST, 1, "filespec.XML" #RESOURCE RCDATA, ResID, "filespec.DAT" #RESOURCE STRING, ResID, "YourWideText"\$\$ [,LangID] #RESOURCE TYPELIB, 1, "filespec.TLB" #RESOURCE WAVE, ResID, "filespec.WAV" #RESOURCE VERSIONINFO <<block>> #RESOURCE RES, "filespec.RES" #RESOURCE PBR, "filespec.PBR"</pre> |

Remarks

This metastatement is used to include PowerBASIC Resource data into your program or DLL. Resource data may consist of

, , , [COM Type Libraries](#), Version Information, and more. You can even embed custom binary data for your personal, specialized needs.

The parameter *ResID* is a unique identifier which you create to reference this item. It can be a number or an alphanumeric label. If a number, it must be an integral value from 0 to 65535. If a label, it must begin with a letter, and consist of letters and numbers.

Alphanumeric labels are not case sensitive. The filespec parameter must always be expressed as a string [literal](#) which tells the location of the resource data.

With most programming languages, creation and embedding of resource data is a cumbersome process. First you create a resource script (an .RC file) with a text editor.

Then you save the .RC file. Now, compile the .RC file with a resource compiler to get a .RES file. Next, you convert it to a linkable file using Microsoft's CVTRES.EXE or another converter program like PBRES.EXE. Finally, you link it into your .EXE or .DLL with a compiler or linker program. What if you find you need to make a tiny change? Do it all over again, from the beginning. Even older versions of PowerBASIC suffered from this problem.

Isn't there a better way? Yes, PowerBASIC now handles the entire process in a single line of code. Need an embedded bitmap?

```
#RESOURCE BITMAP, 123, "MyPicture.BMP"
```

PowerBASIC finds your bitmap in the file MyPicture.BMP and embeds it in your executable. When you need to use it, you can reference it by the ID you chose for it (123). The ID can be an integral numeric value or a text name of your choice. So, to display the bitmap on a [graphic window](#), it's as simple as:

```
GRAPHIC RENDER "#123", (100,100)-(160,140)
```

The second group of syntax examples show how you can embed resources which have been pre-compiled using a resource compiler. Standard resource compilers output a binary resource with a .RES extension. PowerBASIC will embed this resource just as it is given in the file. This form will always be supported to offer support resource forms which are typically not needed for most PowerBASIC programs, or which usually require the use of a resource editor.

The final example, using a .PBR file, will only be supported for a limited period of time.

This is the form created by the PowerBASIC PBRES utility in older versions of the compiler. It is recommended that you change to the .RES version soon, as it is more efficient, and needs less effort from the programmer. It should be noted that prior versions of PowerBASIC allowed the descriptor "PBR" to be omitted. While this option will be supported for a limited period of time, we recommend that you always insert "PBR" for clarity.

String Resources

The String resource contains string data which is always created and stored as Wide [Unicode](#) characters. It is retrieved at run-time with the [RESOURCES\\$](#) function. Due to the manner in which Windows stores string resources in a string table, the *ResID* must be numeric.

The string data must be from 1 to 127 characters in length, and may not contain any embedded nuls ([CHR\\$\(0\)](#)). The string data may be specified as a quoted wide [string literal](#) ("MyText"\$\$), or as a wide string literal expression. A string literal expression can be constructed from combinations of wide string equates or wide quoted string literals, the CHR\$ function, [SPACES\\$](#) function, and the [STRINGS\\$](#) function when used with numeric parameters.

VersionInfo Resources

The VersionInfo resource contains information about the file, such as its version number, its intended operating system, its original file name, and much more. This resource is

intended to be used with the Version Information API functions, so that Windows Explorer, and other programs, can display the relevant information about your EXE. The VersionInfo resource cannot be embedded in a [Static Link Library](#) (SLL).

The VersionInfo resource is unique in that it requires several #RESOURCE metastatements which are interpreted as a complete block. They must be placed consecutively in the correct sequence in order to be processed correctly.

1. The block begins with the VERSIONINFO metastatement which marks the beginning of the version block.

```
#RESOURCE VERSIONINFO
```

2. Next, you may choose to add one or more of the numeric version metastatements which embed numeric values.

```
#RESOURCE FILEFLAGS FlagValue&
```

```
#RESOURCE FILEVERSION HiNum1&, LoNum1&, HiNum2&, LoNum2&
```

```
#RESOURCE PRODUCTVERSION HiNum1&, LoNum1&, HiNum2&, LoNum2&
```

3. Next, the mandatory STRINGINFO metastatement is added, to identify the Language ID and CharSet to be used. Each of these parameters must be passed as a 4-digit HEX value in a string literal. The parameter must not contain the "&H" prefix used with numeric hex numbers.

```
#RESOURCE STRINGINFO "LangID", "CharSet"
```

4. Finally, you will add one or more of the string version metastatements, to provide extensive information about the file. The first string literal parameter chooses one of the following predefined names. The second string literal parameter adds your personal choice of information about the file.

```
#RESOURCE VERSION$ "Comments", "Additional info"
```

```
#RESOURCE VERSION$ "CompanyName", "PowerBASIC Inc."
```

```
#RESOURCE VERSION$ "FileDescription", "Presented to users"
```

```
#RESOURCE VERSION$ "FileVersion", "Readable VerNum 1.02"
```

```
#RESOURCE VERSION$ "InternalName", "Private"
```

```
#RESOURCE VERSION$ "LegalCopyright", "Copyright 2011 PB Inc"
```

```
#RESOURCE VERSION$ "LegalTrademarks", "xx is a..."
```

```
#RESOURCE VERSION$ "OriginalFilename", "Original name w/o path"
```

```
#RESOURCE VERSION$ "PrivateBuild", "Private info"
```

```
#RESOURCE VERSION$ "ProductName", "Product distributed with"
```

```
#RESOURCE VERSION$ "ProductVersion", "Version distributed with"
```

```
#RESOURCE VERSION$ "SpecialBuild", "Special info"
```

FILEFLAGS

| <i>FlagValue&</i> | Description |
|-------------------------|---|
| % VS_FF_DEBUG | File contains debugging information or is compiled with debugging features enabled. |
| % VS_FF_PATCHED | File has been modified and is not identical to the original shipping file of the same version number. |
| % VS_FF_PRERELEASE | File is a development version, not a commercially released product. |
| % VS_FF_PRIVATEBUILD | File was not built using standard release procedures. If this value is given, you must include a <i>PrivateBuild</i> string item. |
| % VS_FF_SPECIALBUILD | File was built by the original company using standard release procedures, but is a variation of the standard file of the same version number. If this value is given, you must include a <i>SpecialBuild</i> string item. |

STRINGINFO

| <i>LangID</i> | Language | <i>LangID</i> | Language |
|---------------|---------------------|---------------|---------------------------|
| &H0401 | Arabic | &H0415 | Polish |
| &H0402 | Bulgarian | &H0416 | Portuguese (Brazil) |
| &H0403 | Catalan | &H0417 | Rhaeto-Romanic |
| &H0404 | Traditional Chinese | &H0418 | Romanian |
| &H0405 | Czech | &H0419 | Russian |
| &H0406 | Danish | &H041A | Croato-Serbian (Latin) |
| &H0407 | German | &H041B | Slovak |
| &H0408 | Greek | &H041C | Albanian |
| &H0409 | U.S. English | &H041D | Swedish |
| &H040A | Castilian Spanish | &H041E | Thai |
| &H040B | Finnish | &H041F | Turkish |
| &H040C | French | &H0420 | Urdu |
| &H040D | Hebrew | &H0421 | Bahasa |
| &H040E | Hungarian | &H0804 | Simplified Chinese |
| &H040F | Icelandic | &H0807 | Swiss German |
| &H0410 | Italian | &H0809 | U.K. English |
| &H0411 | Japanese | &H080A | Spanish (Mexico) |
| &H0412 | Korean | &H080C | Belgian French |
| &H0413 | Dutch | &H0816 | Portuguese (Portugal) |
| &H0414 | Norwegian - Bokmal | &H081A | Serbo-Croatian (Cyrillic) |
| &H0810 | Swiss Italian | &H0C0C | Canadian French |
| &H0813 | Belgian Dutch | &H100C | Swiss French |
| &H0814 | Norwegian - Nynorsk | | |

STRINGINFO

| <i>CharSet</i> | Character Set |
|----------------|----------------------------|
| &H0000 | 7-bit ASCII |
| &H03A4 | Japan (Shift - JIS X-0208) |
| &H03B5 | Korea (Shift - KSC 5601) |
| &H03B6 | Taiwan (Big5) |
| &H04B0 | Unicode |
| &H04E2 | Latin-2 (Eastern European) |
| &H04E3 | Cyrillic |
| &H04E4 | Multilingual |
| &H04E5 | Greek |
| &H04E6 | Turkish |
| &H04E7 | Hebrew |
| &H04E8 | Arabic |

RES/PBR Resources

The second group of syntax examples show how you can embed resources which have been pre-compiled using a resource compiler. Standard resource compilers output a binary resource with a .RES extension. PowerBASIC will embed this resource just as it is

given in the file. This form will always be supported to support resource forms which are typically not needed for most PowerBASIC programs, or which usually require the use of a resource editor.

The final example, using a .PBR file, will only be supported for a limited period of time. This is the form created by the PowerBASIC PBRES utility in older versions of the compiler. It is recommended that you change to the .RES version soon, as it is more efficient, and needs less effort from the programmer. It should be noted that prior versions of PowerBASIC allowed the descriptor "PBR" to be omitted. While this option will be supported for a limited period of time, we recommend that you always insert "PBR" for clarity.

Restrictions Windows 95, 98, and ME offer limited support for resources. When compiling on one of these versions of Windows, only #RESOURCE RES and #RESOURCE PBR may be used. Other forms of the #RESOURCE metastatement are not functional.

RES and PBR resources cannot be mixed with any other resources. Once you add a PBR or RES resource, you cannot add any other #RESOURCE metastatements in your program.

See also [RESOURCE\\$](#), [Resource Files](#)

Example #RESOURCE ICON, MySpecialIcon, "Icon.ICO"

#STACK metastatement

#STACK metastatement

Purpose Set the maximum potential [stack](#) size.

Syntax #STACK *num_expr*

Remarks The literal numeric expression is expressed in bytes, and is rounded up to the next 64 Kb boundary. The minimum allowable stack size is 128 Kb, and a typical stack size of at least 1 Megabyte (the default) is usually recommended.

Upon program startup, an initial block of 128 Kb of physical memory is allocated to the stack. As the stack grows, additional memory is automatically added, as necessary, up to the specified maximum. Since physical memory is only committed as required, it is usually prudent to overestimate potential stack needs.

Restrictions #STACK is meaningful with EXE (executable) files only.

#TOOLS metastatement

#TOOLS metastatement

Purpose Enable or disable integrated development tool code in compiled code.

Syntax #TOOLS [ON|+ | OFF|-]

Remarks The #TOOLS metastatement allows integrated development tools like [TRACE](#), [PROFILE](#), and [CALLSTK](#) to be readily disabled, ensuring that extra code and data is not compiled into the final (distribution) version of an application. #TOOLS defaults to ON, and may appear only once in the source code, before any statement that generates executable code.

See also [CALLSTK](#), [CALLSTK\\$](#), [CALLSTKCOUNT](#), [FUNCNAME\\$](#), [PROFILE](#), [TRACE](#)

#UNIQUE metastatement

Keyword Template

Purpose
Syntax
Remarks
See also
Example

#UNIQUE metastatement **New!**

Purpose Specify whether unique [variable](#) names are required.

Syntax #UNIQUE VAR [ON|OFF]

Remarks The #UNIQUE metastatement is used to tell the compiler whether it should require unique variable names.

If this option is enabled, only [LOCAL](#), [STATIC](#), and parameter variable names may be reused in other . Other variable names ([GLOBAL](#), [THREADED](#), and [INSTANCE](#)) must be unique from all other variable names.

If #UNIQUE VAR is omitted, the default condition is #UNIQUE VAR OFF.

See also [#DIM](#), [DEFtype](#), [DIM](#), [GLOBAL](#), [LOCAL](#), [REDIM](#), [STATIC](#), [OPTION EXPLICIT](#)

#UTILITY metastatement

Keyword Template

Purpose
Syntax
Remarks
See also
Example

#UTILITY metastatement

Purpose Compiler directive to allow external utility programs to read text inserted on the #UTILITY line.

Syntax #UTILITY *"any text for an external program"*

Remarks The entire line is ignored by the PowerBASIC compiler.

ABS function

ABS function

Purpose Return the absolute value of a expression.

Syntax *y = ABS(numeric_expression)*

Remarks The absolute value of a number is its non-negative value. For example, the absolute value of -3 is 3, and the absolute value of +3 is also 3. The absolute value of 0 is 0.

See also [SGN](#)

ACCEL ATTACH statement

ACCEL ATTACH statement

Purpose Attach a table of keyboard accelerators to a [DDT](#) dialog.

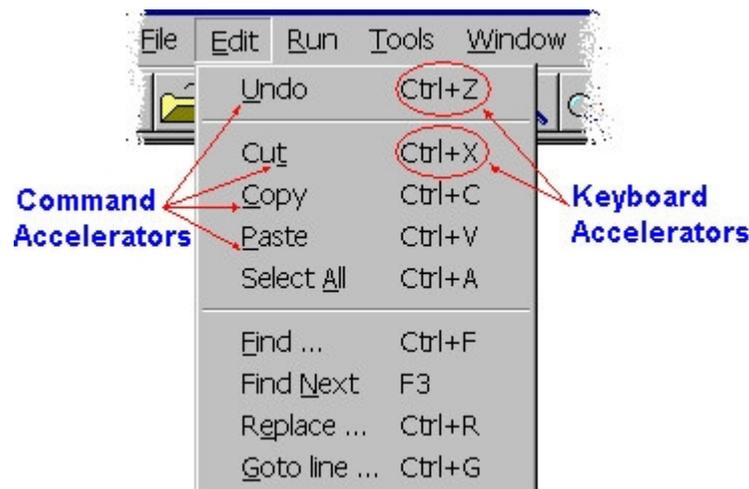
Syntax `ACCEL ATTACH hDlg, AccelTbl() TO hAccelHandle`

Remarks ACCEL ATTACH permits you to attach one table of accelerator key definitions to each DDT dialog in your application.

The keyboard accelerator itself is a specific keystroke combination, which results in a %WM_COMMAND or %WM_SYSCOMMAND [message](#) being placed into the application's message queue.

Keyboard accelerators are very similar to command accelerators, and often permit the same action selections as menus offer. Since keyboard accelerators can be used directly, they negate the need to navigate a menu in order to perform a specific action.

Typically, application menu items inform users of available keyboard accelerators so expert users can work more efficiently without using the actual menus, but can still use the menu if required. The following image shows a menu showing command accelerator and keyboard accelerators for menu items (the command accelerators are underscored):



On Windows XP and Windows 2000 you may need to press the ALT key before Command Accelerators are made visible. You can set if Command Accelerators are visible when using the ALT key or all the time in the Windows Display Settings.

For a command accelerator to operate, the specific menu item must be visible and enabled. Conversely, keyboard accelerators can be used without the menu being open. In the example above, the CTRL+X keystroke combination will perform the CUT action, but the accelerator letter t will only perform the Cut action if the EDIT menu is opened first.

AccelTbl()

To utilize ACCEL ATTACH, you must first build the [array](#) *AccelTbl()* of *ACCELAPI User-Defined Types* (UDTs). This *ACCELAPI* structure is a 6-byte structure with the following definition:

```

TYPE ACCELAPI WORD
  FVIRT AS BYTE ' Flags: One or more of %FVIRTKEY, %FSHIFT, %FALT and %
FCONTROL
  KEY AS WORD ' Accelerator key: ASCII code, or virtual key code {%
FVIRTKEY}
  CMD AS WORD ' Accelerator ID code gets passed in CB.CTL {LO(WORD,
WPARAM)}

```

END TYPE

You must build the array of *ACCELAPI* types yourself, then attach it to a dialog by executing an `ACCEL ATTACH` statement. There must be no empty elements in the array, so it must be sized accurately.

.FVIRT

The `.FVIRT` flags can be combined together with the [OR](#) operator to combine the actions of the individual flags, as follows:

| | |
|------------------------|---|
| <code>%FALT</code> | The ALT key must be pressed along with the accelerator key. |
| <code>%FCONTROL</code> | The CTRL key must be pressed along with the accelerator key. |
| <code>%FSHIFT</code> | The SHIFT key must be pressed along with the accelerator key. |
| <code>%FVIRTKEY</code> | The <code>.KEY</code> member specifies a virtual-key code. If this flag is not specified, the key member is assumed to specify an ASCII character code. <code>%FVIRTKEY</code> permits case-insensitive accelerator keystroke definitions - the Capslock state is ignored. For example, ALT+A and ALT+a (as determined by the Capslock key) produce the same accelerator event. If <code>%FVIRTKEY</code> is not used, the accelerator ALT+A would not trigger if Capslock were inactive. |

.KEY

If the `%FVIRTKEY` flag is specified in the `.FVIRT` member, the `.KEY` field contains the virtual key code for the accelerator key. Virtual key equates are defined in the [WIN32API.INC](#) file, starting with the prefix `%VK_`.

If `%FVIRTKEY` is not specified, the accelerator key code in the `.KEY` member is the [ASCII](#) code of the accelerator key. In this case, alphanumeric keystrokes become case-sensitive and the state of the Capslock key state becomes important. For example, if an accelerator were defined for ALT+A, it would be activated only if the Capslock key was on. Conversely, if an accelerator were defined for ALT+a then it would only be activated Capslock was off.

.CMD

The `.CMD` member should contain the user-defined numeric ID code of the accelerator. When an accelerator keystroke occurs, a `WM_COMMAND` message is sent to the dialog [Callback](#) Function, with the accelerator identifier returned by the [CB.CTL](#) function.

It is usual practice to use the ID of a control that is to be activated by an accelerator. Accelerator notification codes sent to the Callback Function have [CB.CTLMSG](#) set to 1 (as opposed to button click events messages where `CB.CTLMSG = %BN_CLICKED`).

hDlg

The handle of the dialog to attach the accelerator table to.

hAccelHandle

[Double-word](#) or [Long-integer](#) variable where the [handle](#) of the attached accelerator table will be stored, or zero if the attach operation was unsuccessful.

Restrictions

If a previous table was attached to the target dialog, the table is automatically destroyed when the new table is attached in its place. The accelerator table is also destroyed automatically when the dialog is closed.

You can destroy the current accelerator table by executing `ACCEL ATTACH` with an array which is not dimensioned, but there is little or no reason to ever perform this action.

Accelerator tables can only run correctly when they are created in the same module that creates the dialog to which each table is attached.

See also

[DIALOG NEW](#), [MENU ADD STRING](#), [MENU ATTACH](#)

Example

```
DIM ac(0 TO 8) AS ACCELAPI
LOCAL hAccelHandle AS DWORD

FOR x& = 0 TO 8
  ac(x&).fvirt = %FCONTROL OR %FSHIFT OR %FVIRTKEY
  ac(x&).key = %VK_1 + x& ' CTRL+SHIFT+1 to 9
  ac(x&).cmd = %BTN1 + x& ' %BTN1 to %BTN9
NEXT x&

ACCEL ATTACH hDlg, ac() TO hAccelHandle
```

ACODE\$ function

ACODE\$ function

Purpose Translates [Unicode](#) bytes into [ANSI](#) bytes.

Syntax `a$ = ACODE$(UnicodeStrExpression [,CodePage&])`

Remarks This version of PowerBASIC handles all conversions between ANSI strings and UNICODE strings automatically. For example:

```
MyAnsiString$ = MyWideString$$
```

In this case, the wide characters are transparently converted to byte characters when they are stored in *MyAnsiString\$*. You should not insert an ACODE\$ function here. The simple fact that the variables are of differing types (ANSI/WIDE) causes the compiler to make all conversions for you, whenever they are needed.

Of course, this automatic conversion was not available in previous versions of the compiler. In the past, there were no WIDE UNICODE variables offered, so it was necessary to force wide characters into standard byte strings when UNICODE was needed. The ACODE\$ and [UCODE\\$](#) functions are used for this purpose alone: to support legacy programs which calculated strings in this fashion.

New PowerBASIC programs and updates to your older PowerBASIC programs should use the new WIDE UNICODE variables which are now available.

ACODE\$ presumes that the *UnicodeStrExpression* contains WIDE UNICODE characters stored in an ANSI byte string. It converts them into ANSI byte characters and returns them as an ANSI string. To convert an ANSI byte string into a UNICODE byte string, use the UCODE\$ function.

If the optional parameter *CodePage&* is present, it represents the code page to be used for the conversion process. If not given, the default code page for the locale of the executing computer is used.

Unicode strings require two bytes to represent a Unicode character, whereas ANSI strings (the native PowerBASIC string format) use one byte to represent a character.

Therefore, ACODE\$ returns a string that has half of the byte count of the Unicode string, yet represents the same number of characters.

See also [UCODE\\$](#), [UCODEPAGE](#)

AND operator

AND operator

Purpose The AND operator works as both a logical and a bitwise arithmetic operator.

Syntax `p AND q`

Using AND as a logical operator

AND returns [TRUE](#) (non-zero) if (and only if) both its operands are TRUE. The AND truth table looks like this:

| x | y | x AND y |
|---|---|---------|
| T | T | T |
| T | F | F |
| F | T | F |
| F | F | F |

Using AND as a bitwise arithmetic operator

AND masks clear selected bits of an integral-class value without affecting the other bits. For example, to clear the most-significant (leftmost) 2 bits in the integer value &H9700, AND it with &H3FFF. That is, the mask contains all 1s, except for the bit positions you want to force to 0:

```

      1001 0111 0000 0000 = &H09700
AND  0011 1111 1111 1111 = &H03FFF (the mask)
-----
      0001 0111 0000 0000 = &H01700 (result)
MSB  ↑                               ↑ LSB (bit 0)

```

See also [Arithmetic Operators](#), [EQV](#), [IMP](#), [ISFALSE](#), [ISTRUE](#), [NOT](#), [OR](#), [XOR](#)

ARRAY ASSIGN statement

ARRAY ASSIGN statement

Purpose Allow the assignment of a number of values to successive elements of an [array](#).

Syntax `ARRAY ASSIGN array() = param1 [,param2] [,...]`

Remarks ARRAY ASSIGN allows the assignment of a number of values to successive elements of an array. The assignment always starts with the first array element, and continues sequentially as the elements appear in memory. The values to be assigned must match the array type, and may be [literals](#), [variables](#), or expressions. ARRAY ASSIGN cannot be used on an array of [interfaces](#).

See also [ARRAY DELETE](#), [ARRAY INSERT](#), [ARRAY SCAN](#), [ARRAY SORT](#), [DIM](#), [LBOUND](#), [PowerArray](#), [REDIM](#), [UBOUND](#)

Example `ARRAY ASSIGN x&() = 1,2,3,4,5,6,7,8,9,10`

ARRAY DELETE statement

ARRAY DELETE statement

Purpose Delete a single item from a given [array](#).

Syntax `ARRAY DELETE array([index]) [FOR count] [, expression]`

Remarks ARRAY DELETE deletes the data stored at the nominated element in *array*, an n-dimensional array. You can specify the *index* of the element which is to have its data deleted, how many elements (*count*) are to be automatically shifted down by one position, and what data value to give the last element after the rest of the elements have been shifted (*expression*).

All of these parameters are optional. If *index* is not specified, the data stored in the element at the beginning of the array is deleted. If *expression* is not present, the last element that the data is shifted out of will contain zero if *array* is a numeric array, or an empty

if *array* is a [string array](#). If a shift *count* is given, when shifting the rest of the array to eliminate the element, only *count* elements will be shifted.

By default, ARRAY DELETE throws away the data at the element *index* of *array*, shifting the data in the appropriate portion of the array to cover the old element:

```

DIM A(1 TO 4) AS LONG
ARRAY DELETE A(2), 17&

```

makes $A(2)=A(3)$, $A(3)=A(4)$, and $A(4)=17$. The original value of $A(1)$ remains in place. Use *count* to "protect" a portion of the array from the shift:

```

DIM A(1 TO 4) AS LONG
ARRAY DELETE A(2) FOR 2, 17&

```

makes $A(2)=A(3)$ and $A(3)=17$ because you told it to shift only 2 elements. The original values of $A(4)$ and $A(1)$ remain in place.

DELETE with multi-dimensional arrays

count can also be used with a [multi-dimensional array](#) (stored in linear column-major order; see [ARRAY SORT](#)), to prevent shifting element data from one dimension into another dimension, thus preserving the organization of the array. For example:

```
DIM A(0 TO 1,0 TO 1) AS INTEGER
A(0,0)=0
A(1,0)=100
A(0,1)=200
A(1,1)=300
ARRAY DELETE A(0,0) FOR 2, 17%
```

makes $A(0,0)=100$ and $A(1,0)=17$. The original values of $A(0,1)$ and $A(1,1)$ remain in place since you told it to shift only 2 elements. Without *count*:

```
ARRAY DELETE A(0,0), 17%
```

makes $A(0,0)=100$, $A(1,0)=200$, $A(0,1)=300$, and $A(1,1)=17$. The original value of $A(0,0)$ is lost.

Restrictions

ARRAY DELETE cannot be used on arrays within [UDT](#) structures. However, ARRAY DELETE can be used with arrays of UDT structures - simply treat them as if they were an array of [fixed-length strings](#).

To use ARRAY DELETE on an embedded UDT array, use [DIM..AT](#) to dimension a regular array (of the same type) directly "over the top" of the UDT array, and use ARRAY DELETE on that array. For example:

```
TYPE SalesType
  OrderNum AS LONG
  PartNumber(1 TO 20) AS STRING * 20
END TYPE
[statements]
DIM Sales AS SalesType
[statements]
DIM Temp(1 TO 20) AS STRING * 20 AT VARPTR(Sales.PartNumber(1))
ARRAY DELETE Temp(5), "string"
ERASE Temp()
```

See also

[ARRAY ASSIGN](#), [ARRAY INSERT](#), [ARRAY SCAN](#), [ARRAY SORT](#), [DIM](#), [LBOUND](#), [PowerArray](#), [REDIM](#), [UBOUND](#)

Example

Makes $A(2)=3$ and $A(3)=2.5$. $A(0)$ and $A(1)$ remain in place:

```
DIM A(0 TO 3) AS CUX
A(0)=0
A(1)=1
A(2)=2
A(3)=3
ARRAY DELETE A(2), 2.5@@
```

Makes $A(0)=2$, $A(1)=3$, and $A(2)=0$. The original value of $A(0)$ is lost:

```
DIM A(0 TO 2) AS EXT
A(0)=1
A(1)=2
A(2)=3
ARRAY DELETE A()
```

ARRAY INSERT statement

ARRAY INSERT statement

Purpose Insert a single item into a given [array](#).

Syntax `ARRAY INSERT array([index]) [FOR count] [, expression]`

Remarks ARRAY INSERT inserts a single data item into *array*, an n-dimensional array. You can specify the *index* at which the new element data is to be inserted, how many elements (*count*) are to be shifted up by one position to make room for the new element data, and what data value to give the new element (*expression*).

All of these parameters are optional. If *index* is not specified, the element data is inserted at the beginning of the array. If *expression* is not present, the new element will contain zero if *array* is a numeric array, or an empty

if *array* is a [string array](#).

If a shift *count* is given, when shifting the rest of the array to make way for the new element data, only *count* elements will be shifted.

By default, ARRAY INSERT throws away the data in last element of *array*, then shifts the appropriate portion of the array to make way for the new element data:

```
DIM A(1 TO 4) AS LONG
ARRAY INSERT A(2), 17
```

makes $A(4)=A(3)$, $A(3)=A(2)$, and $A(2)=17$. The original value of $A(4)$ is lost, while the original value of $A(1)$ remains in place. Use *count* to "protect" a portion of the array from the shift:

```
DIM A(1 TO 4) AS LONG
ARRAY INSERT A(2) FOR 2, 17
```

makes $A(3)=A(2)$ and $A(2)=17$ because you told it to shift only 2 elements. The original values of $A(4)$ and $A(1)$ remain in place.

INSERT with multi-dimensional arrays

count can also be used with a [multi-dimensional array](#) (stored in linear column-major order; see [ARRAY SORT](#)), to prevent shifting data from one dimension into another dimension, and thus preserving the organization of the array. For example:

```
DIM A(0 TO 1,0 TO 1) AS SINGLE
A(0,0)=0
A(1,0)=100
A(0,1)=200
A(1,1)=300
ARRAY INSERT A(0,0) FOR 2, 17
```

makes $A(0,0)=17$ and $A(1,0)=0$. The original values of $A(0,1)$ and $A(1,1)$ remain in place since you told it to shift only 2 elements. Without *count*:

```
ARRAY INSERT A(0,0), 17
```

makes $A(0,0)=17$, $A(1,0)=0$, $A(0,1)=100$, and $A(1,1)=200$. The original value of $A(1,1)$ is lost.

Restrictions ARRAY INSERT cannot be used on arrays within [UDT](#) structures or on an array of [Interfaces](#). However, ARRAY INSERT can be used with arrays of UDT structures - simply treat them as if they were an array of fixed-length strings.

To use ARRAY INSERT on an embedded UDT array, use [DIM..AT](#) to dimension a regular array (of the same type) directly "over the top" of the UDT array, and use ARRAY INSERT on that array. For example:

```
TYPE SalesType
  OrderNum AS LONG
  PartNumber(1 TO 20) AS STRING * 20
END TYPE
[statements]
DIM Sales AS SalesType
[statements]
DIM Temp(1 TO 20) AS STRING * 20 AT VARPTR(Sales.Partnumber(1))
ARRAY INSERT Temp(5), "string"
```

```
ERASE Temp()
```

See also [ARRAY ASSIGN](#), [ARRAY DELETE](#), [ARRAY SCAN](#), [ARRAY SORT](#), [DIM](#), [LBOUND](#), [PowerArray](#), [REDIM](#), [UBOUND](#)

Example Makes $A(3)=2.5$ and $A(4)=3$. $A(0)$, $A(1)$, and $A(2)$ remain in place:

```
DIM A(0 TO 4) AS DOUBLE
A(0)=0
A(1)=1
A(2)=2
A(3)=3
ARRAY INSERT A(3), 2.5#
```

Makes $A(0)=0$, $A(1)=1$, and $A(2)=2$. The original value of $A(2)$ is lost:

```
DIM A(0 TO 2) AS QUAD
A(0)=1
A(1)=2
A(2)=3
ARRAY INSERT A()
```

ARRAY SCAN statement

ARRAY SCAN statement

Purpose Scan all or part of an [array](#) for a given value.

Syntax *Numeric array:*

```
ARRAY SCAN array([index]) [FOR count], expression, TO lvar&
```

String arrays:

```
ARRAY SCAN array ([index]) [FOR count] [, FROM startChar TO endChar] [,
COLLATE {UCASE |
cstring}], expression, TO lvar&
```

Remarks ARRAY SCAN scans all or part of array, an n-dimension array, for the first element that satisfies *expression*. *expression* consists of a relational operator (=, >, <, <>, >=, =>, <=, =<) followed by an expression of the same data type as *array*. The relative index of the first match is stored in *lvar&*, which must be a [Long-integer](#) variable:

```
ARRAY SCAN A&(), > 5, TO I&
```

This line of code identifies the relative index of the first element of array $A\&()$ that is greater than 5, and stores the relative index in $I\&$. The match index ranges from 1 to the last element of the scan + 1.

Since it is a relative index:

```
DIM A(1 TO 10) AS SINGLE
ARRAY SCAN A(), > 17.42!, TO I&
```

...will store 2 in $I\&$ if $A(2) > 17.42$, but:

```
DIM A(5 TO 20) AS SINGLE
ARRAY SCAN A(), > 17.42!, TO lvar&
```

...will store 2, not 6, in $lvar\&$ if $A(6) > 17.42$.

If none of the scanned elements satisfy *expression*, zero will be stored in *lvar&*.

Together, *index* and *count* specify the portion of array to be scanned. *index* specifies the element at which the scan is to begin, while *count* specifies the number of consecutive elements to be scanned. If *index* is not specified, the scan begins at the first element of *array*. If *count* is not specified, the array is scanned from element *index* to the last element of *array*. If neither is specified, the entire array is scanned:

```
DIM A&(1 TO 100)
ARRAY SCAN A&(5), =1, TO I&           'scans 5..100
ARRAY SCAN A&() FOR 10, =1, TO I&     'scans 1..10
```

```

ARRAY SCAN A$(10) FOR 20, =1, TO I& 'scans 10..29
ARRAY SCAN A$( ), =1, TO I&        'scans 1..100

```

Scanning a string array

When scanning a [string array](#), COLLATE UCASE treats all lowercase letters as uppercase during the scan (for example, element "Bob" would satisfy the condition = "BOB"):

```

ARRAY SCAN A$( ), COLLATE UCASE, = "BOB", TO I&
' scans A$( ) for "BOB"; all letters treated as
' uppercase

```

COLLATE string is used to specify a non-standard scanning order. *cstring* must contain exactly 256 characters, in the order in which they should be compared, from lowest to highest. For example, the normal ascending [ASCII](#) scan order (where "A" is considered less than "B", etc.) would be described by a

containing ASCII codes 0 through 255 in order:

```

C$ = CHR$(0 TO 255)
ARRAY SCAN A$( ), COLLATE C$, > "BOB", TO I&

```

The normal descending ASCII scan order would be described by a string containing the reverse of the above:

```

C$ = STREVERSE$(CHR$(0 TO 255))
ARRAY SCAN A$( ), COLLATE C$, > "BOB", TO I&

```

The COLLATE string option is provided as a flexible means with which to specify a descending scan, or to specify the scanning order for strings containing international characters or other special symbols.

See [ARRAY SORT](#) for more information on building collating strings.

When scanning a string array, all characters of each element of the array are normally considered when performing comparisons. To limit the comparison to a specific subset of characters, use FROM to specify the *startChar* position, and TO to specify the *endChar* position that ARRAY SCAN will consider within each array element. For example, you could scan based on the zip code contained in the last 5 characters of a 40-character address string:

```

ARRAY SCAN A$( ), = "90210", TO I&
' considers all characters when scanning for "90210"

ARRAY SCAN A$( ), FROM 36 TO 40, = "90210", TO I&
' considers positions 36..40 only when scanning

```

Scanning a multi-dimensional array

When scanning a [multi-dimensional array](#), the array is treated as a single-dimension array containing all of the elements of the multi-dimensional array, in linear column-major order. That is, all elements where all dimensions (except the first), are held at their minimum bounds, will come first in memory. These are immediately followed by the elements where the second dimension is set to its next consecutive index value, etc.

For example, the elements of a two-dimensional array (DIM A(0 TO n, 0 TO x)) would be stored in consecutive memory locations as follows:

```

A(0,0), A(1,0), ..., A(n,0) ' The first n+1 elements,
A(0,1), A(1,1), ..., A(n,1) ' The next n+1 elements,
[statements]                ' Subsequent elements,
A(0,x), A(1,x), ..., A(n,x) ' The last n+1 statements.

```

...or more clearly:

```

A(0,0), A(1,0)..., A(n,0), A(0,1), A(1,1)..., A(n,1), A(0,x),
A(1,x) ..., A(n,x)

```

In this case, ARRAY SCAN A(0,0) FOR n+1, >5, TO I& would scan only elements (0,0)...(n,0), while ARRAY SCAN A(0,0), >5, TO I& would scan the entire array: elements (0,0)...(n,x). As mentioned earlier, since ARRAY SCAN records the relative index of the

matched element, `ARRAY SCAN A(0,0), >5, TO I&` would store 2 in `I&` if `A(1,0) > 5`.

Options The options for `ARRAY SCAN` can be specified in any order, as long as the `FOR` option, if present, directly follows the closing parenthesis of the name of *array*.

Restrictions `ARRAY SCAN` cannot be used on arrays within [UDT](#) structures or on an array of [Interfaces](#). However, `ARRAY SCAN` can be used with arrays of UDT structures - simply treat them as if they were an array of fixed-length strings.

To use `ARRAY SCAN` on an embedded UDT array, use [DIM..AT](#) to dimension a regular array (of the same type) directly "over the top" of the UDT array, and use `ARRAY SCAN` on that array. For example:

```
TYPE SalesType
    OrderNum AS LONG
    PartNumber(1 TO 20) AS STRING * 20
END TYPE
[statements]
DIM Sales AS SalesType
[statements]
DIM Temp(1 TO 20) AS STRING * 20 AT VARPTR(Sales.Partnumber(1))
ARRAY SCAN Temp(), FROM 1 TO LEN(Search$), = Search$, TO IResult&
ERASE Temp()
```

See also [ARRAY ASSIGN](#), [ARRAY DELETE](#), [ARRAY INSERT](#), [ARRAY SORT](#), [DIM](#), [LBOUND](#), [PowerArray](#), [REDIM](#), [UBOUND](#)

Example `ARRAY SCAN A&(5) FOR 10, > 64000&, TO B&`
Scans elements 5 through 14 of array `A&`, looking for the first element whose value is `> 64000`, and stores the relative index of that element in `B&`.

```
ARRAY SCAN A$(5) FOR 10, FROM 16 TO 25, COLLATE C$, = D$, TO B&
```

Scans elements 5 through 14 of array `A$`, looking only at characters 16 to 25 of each element, using the order specified by collating string `C$`, looking for the first element whose value is equal to `D$`, and stores the relative index of that element in `B&`.

ARRAY SORT statement

ARRAY SORT statement

Purpose Sort all or part of a given [array](#).

Syntax *Numeric array:*

```
ARRAY SORT darray([index]) [FOR count] [,TAGARRAY tarray()] [,{ASCEND | DESCEND}]
```

String array:

```
ARRAY SORT dArray([index]) [FOR count] [,FROM startChar TO endChar]
[,COLLATE {UCASE |
    cstring}] [,TAGARRAY tarray()] [,{ASCEND | DESCEND}]
```

Custom sort array:

```
ARRAY SORT darray([index]) [FOR count] [,TAGARRAY tarray()] ,CALL
custfunc()
```

Remarks `ARRAY SORT` sorts all or part of *darray*, an n-dimensional array, in ascending or descending order. *tarray* is a tag-along array whose elements are swapped in the same order as those in *darray* as the sort proceeds (you could sort an array of names and have an array of corresponding addresses tag along, for example). *tarray* must have at least as many elements as *darray*, since corresponding elements of *tarray* will be swapped during the sort.

Note that *tarray* does not have to be of the same type as *darray*. For example, you could have a

array containing account numbers tag along with a [string array](#) containing user names:

```
DIM Users$(100 TO 500), AcctNum$(100 TO 500)
ARRAY SORT Users$( ), TAGARRAY AcctNum$( )
```

Together, *index* and *count* specify the portion of *darray* to be sorted. *index* specifies the element at which the sort is to begin, while *count* specifies the number of consecutive elements to be sorted. If *index* is omitted, the sort begins at the first element of *darray*. If *count* is omitted or is zero, the array is sorted from element *index* to the last element of *darray*. If both are omitted, the entire array is sorted:

```
DIM A$(1 TO 99)
ARRAY SORT A$(5)           'sorts elements 5..99 of A$
ARRAY SORT A$( ) FOR 10    'sorts elements 1..10 of A$
ARRAY SORT A$(9) FOR 20    'sorts elements 9..28 of A$
ARRAY SORT A$( )           'sorts elements 1..99 of A$
```

Sorting numeric arrays

By default, arrays are sorted in ascending order. To sort in descending order, include the DESCEND keyword:

```
ARRAY SORT A$( ), DESCEND  ' descending order
ARRAY SORT A$( ), ASCEND   ' ascending order
ARRAY SORT A$( )           ' ascending order
```

Sorting string arrays

When sorting a

array, the sort is performed in ascending order by default. In addition to DESCEND, ARRAY SORT provides the COLLATE UCASE and COLLATE *string* options.

COLLATE UCASE treats all lowercase letters as equal to their uppercase counterparts during the sort (elements "Bob" and "BOB" would be considered equal, for example):

```
DIM A$(1 TO 5)
A$(1) = "Bob"
A$(2) = "Jan"
A$(3) = "Linda"
A$(4) = "Ann"
A$(5) = "Jerry"
ARRAY SORT A$( ), COLLATE UCASE, DESCEND
'sorts A$( ) in descending order; case-insensitive
```

COLLATE *cstring* is used to specify an entirely new sorting order. This can be used for a variety of purposes, the most obvious of which is the case of international character sets. The collate string *cstring* must contain exactly 256 characters, one for each of the [ASCII](#) codes 0-255, in the order that they would be sorted (from lowest to highest, if an ascending sort were performed on them).

Each position in the string represents the ASCII code of that value. The contents of the [byte](#) at that position tells PowerBASIC the "weight" or importance factor of that particular ASCII code. The default is that position 0 has a weight of 0, position 1 has a weight of 1, etc, so that [CHR\\$\(0\)](#) sorts first, [CHR\\$\(1\)](#) sorts next, and so on through [CHR\\$\(255\)](#).

Suppose you want the special character "ä" to have the same weight as the standard character "a". It's easy: construct a string of 256 characters, 0-255; then go to the position of "ä" (ASCII code 132), and change the contents of that byte so it is exactly equal to the code for "a" (97). The following code fragment constructs just such a collate string:

```
' Create a 256-character string:
FOR ix = 0 TO 255
  C$ = C$ + CHR$(ix)
NEXT
MID$(C$, 132 + 1) = CHR$(97)
```

We add one to the [ASC](#) value for [MID\\$](#) because string positions start at 1, not 0. We can also use the expanded [CHR\\$](#) function to create the same collating string using less code:

```
C$ = CHR$(0 TO 131, 97, 133 TO 255)
```

It is most important to remember the rule for creating a collating string, as it is easy to make an intuitive jump to the wrong conclusion. Each position in the string (1-256) represents the ASCII code with that value minus one (CHR\$(0) to CHR\$(255)). The contents of the byte at that position tell the ARRAY SORT procedure the new "weight" or importance factor for that particular code. This is exactly the technique used by the 80x86-assembly opcode XLAT.

Suppose you want CHR\$(0) to sort at the very end of the sequence. To do that, you would set the byte at position 0+1 to CHR\$(255) and the bytes at positions 0+2 to 0+256 to the values 0 to 254. The ASCII sequence in the collating string would appear like this: 255,0,1,2,3,4...254. Using the expanded CHR\$ function, this is straightforward:

```
C$ = CHR$(255, 0 TO 254)
```

To sort upper case and lower case alphabetic characters as exactly equal, just set positions 97 to 122 (a-z) to the values 65-90 (A-Z). This is precisely how COLLATE UCASE is handled. With the collating method implemented by this procedure in PowerBASIC, it is possible for two or more ASCII codes to have equal "weight".

As mentioned earlier, many programmers make a common, fatal mistake by intuitively creating a collating string that is simply a list of ASCII codes, in the sequence they wish to sort. That is, they expect the byte which appears first in the string to sort first, the byte which appears next to sort second, so that creating a collate string from the BASIC code:

```
CHR$(65) + CHR$(66) + CHR$(67) + ...
```

...might cause the characters "ABC..." to be sorted first. *This technique will never work with the ARRAY statement and must be carefully avoided.* We describe it here only because it is a common error. While it is arguably more intuitive than the technique implemented in PowerBASIC, the reason it does not work is that it doesn't allow two or more ASCII codes to have the same "weight".

The following code builds a collating string compatible with the American OEM ASCII character set. For the fastest operation, this code should be run only once and the collating string should be made [global](#).

```
GLOBAL cu AS STRING
FOR x = 0 TO 255
  cu = cu + CHR$(x)
NEXT
MID$(cu, 97+1, 26) = "ABCDEFGHIJKLMNOPQRSTUVWXYZ"
MID$(cu, 129+1, 6) = "ueaaaa"      ' üéääää
MID$(cu, 136+1, 9) = "eeiiiAAE"    ' ëëïîÏÄÅĖ
MID$(cu, 147+1, 8) = "ooouuyOU"    ' ôöôûÿŸŮ
MID$(cu, 161+1, 5) = "iounN"       ' ïòùñÑ
MID$(cu, 168+1, 1) = "?"           ' ¿
[ your code goes here ]
ARRAY SORT MyArray$, COLLATE cu
```

An alternative arrangement using the expanded CHR\$ function may look like this:

```
cu = CHR$(0 TO 96, "ABCDEFGHIJKLMNOPQRSTUVWXYZ", _
      123 TO 128, "ueaaaa", _      ' üéääää
      135, "eeiiiAAE", _          ' ëëïîÏÄÅĖ
      145 TO 146, "ooouuyOU", _   ' ôöôûÿŸŮ
      155 TO 160, "iounN", _      ' ïòùñÑ
      166 TO 167, "?", _          ' ¿
      169 TO 255)
```

For example, the normal ascending ASCII sort order would be described by a string containing ASCII codes 0 through 255 in order:

```
C$ = CHR$(0 TO 255)
ARRAY SORT A$, COLLATE C$
```

The normal descending ASCII sort order would be described by a collating string

containing the reverse of the above:

```
C$ = STREVERSE$(CHR$(0 TO 255))
ARRAY SORT A$( ), COLLATE C$
```

COLLATE *string* can also be used with the ASCEND or DESCEND option. With ASCEND, the sort is performed in the order specified by COLLATE *string*; DESCEND sorts using the reverse of the order specified by COLLATE *string*.

```
ARRAY SORT A$( ), COLLATE C$, DESCEND
```

The COLLATE string option is provided as a flexible means with which to specify the sorting order for strings containing international characters or other special symbols. Please keep in mind that the characters with ASCII code above CHR\$(127) may have different meanings in different countries. The examples here assume that the default American OEM ASCII code page is in use.

When sorting a string array, all characters of each element of the array are normally considered when performing comparisons. To limit the comparison to a specific subset of characters, use FROM to specify the *startChar* position, and TO to specify the *endChar* position that ARRAY SORT will consider within each array element. For example, you could sort based on the zip code contained in the last 5 characters of a 40-character address string:

```
ARRAY SORT A$( ) ' sorts all chars
ARRAY SORT A$( ), FROM 36 TO 40 ' sorts 36 - 40 only/p>
```

By using the FROM..TO keywords, it also becomes possible to sort an array of User-Defined Types. In this case, ARRAY SORT can sort the array as if it were an array of [fixed-length strings](#).

Sorting custom arrays:

In most cases, the standard numeric and string sorts should serve your needs very well.

However, in the case of more complex data, it is frequently necessary to create multi-key sorts, or other unusual data sequences. Generally speaking, a multi-key sort is used when you wish to order data based upon multiple sections of a string or UDT. For example, you may wish to have customers sequenced by name -- but in the case of duplicate names, order each set of duplicates by ZIP code. With the custom array option, you can sort by any number of keys, in any sequence you may desire.

A custom array may be user-defined types, fixed-length strings, or [nul-terminated](#) strings.

With a custom array sort, you can write your own simple function to tell PowerBASIC the correct sequence for any two array elements. In the following example, the array MyType() is sorted based upon the code you write in the user-written function named MyFunc().

```
ARRAY SORT MyType( ), CALL MyFunc( )
```

As PowerBASIC proceeds through the sort, each time it needs to compare two array elements, it calls your custom function (in this case named MyFunc) to determine the correct sequence of the two elements. The custom function you write must always have exactly two ByRef parameters with precisely the same data type as the sorted array, for nul-terminated and FIELD strings, they must contain the length. These are the two variables which you must compare to determine the correct sequence. Your custom function must return a long integer to tell the correct sequence. It returns -1 if the first parameter should precede the second parameter. It returns +1 if the second parameter should precede the first. It returns 0 if the parameters are equal. This affords the PowerBASIC programmer the ultimate tool in sorting capabilities. You can have any number of keys. You can sort ascending, descending, or some other special sequence. The conditions are now totally under your control. The following example show how easy it is to create a multi-key sort, even those based upon non-string members of a UDT.

```
Type TheType
  LastName as String * 40
  FirstName as String * 20
  BalanceDue as Currency
End Type
```

```

[statements]
Dim MyType(100) as TheType
[statements]
Array Sort MyType(), Call MyFunc()
[statements]
Function MyFunc(Param1 as TheType, Param2 as TheType) As Long
  If Param1.LastName < Param2.LastName Then
    Function = -1 : Exit Function
  End If
  If Param1.LastName > Param2.LastName Then
    Function = +1 : Exit Function
  End If
  If Param1.FirstName < Param2.FirstName Then
    Function = -1 : Exit Function
  End If
  If Param1.FirstName > Param2.FirstName Then
    Function = +1 : Exit Function
  End If
  If Param1.BalanceDue < Param2.BalanceDue Then
    Function = +1 : Exit Function
  End If
  If Param1.BalanceDue > Param2.BalanceDue Then
    Function = -1 : Exit Function
  End If
End Function

```

Notice that this function first sorts by last name in ascending sequence. If the last names are equal, it then sorts by first name in ascending sequence. If both names are equal, it then sorts by Balance Due in descending sequence so that the accounts with the highest balance appear first. This descending sequence is accomplished by switching the values -1/+1 in the final tests.

The array to be sorted, and the function parameters, must be fixed-length strings, null-terminated strings, or user-defined types. PowerBASIC verifies that the size of the data and parameters are identical. However, to allow maximum flexibility, it does not require that the data types be the same. Therefore, for example, it's possible to sort an array of fixed-length strings using a function with UDT parameters as long as the data size is identical. It is the programmer's responsibility to ensure accuracy.

Sorting a multi-dimensional array

When sorting a [multi-dimensional array](#), the array is treated as a single-dimension array containing all of the elements of the multi-dimensional array, in linear column-major order. That is, all elements where all dimensions (except the first), are held at their minimum bounds, will come first in memory. These are immediately followed by the elements where the second dimension is set to its next consecutive index value, etc.

For example, the elements of a two-dimensional array (i.e., DIM A(n,x)) would be stored in consecutive memory locations like this:

```
(0,0), ..., (n,0), (0,1), ..., (n,1), ..., (0,x), ..., (n,x)
```

In this case, ARRAY SORT A(0,0) FOR n+1 would sort only elements (0,0)...(n,0), while ARRAY SORT A(0,0) would sort the entire array: elements (0,0)...(n,x).

Be very careful when using ARRAY SORT with multi-dimensional arrays so as not to disrupt the organization of the data in the arrays.

Options

The options for ARRAY SORT can be specified in any order, as long as the FOR option, if it is present, directly follows the closing parenthesis of the name of *darray*.

Restrictions

ARRAY SORT cannot be used on arrays *within* [UDT](#) structures or on an array of [Interfaces](#). However, ARRAY SORT can be used with arrays *of* UDT structures - simply treat them as if they were an array of fixed-length strings.

To use ARRAY SORT on an embedded UDT array, use [DIM..AT](#) to dimension a regular

array (of the same type) directly "over the top" of the UDT array, and use ARRAY SORT on that array. For example:

```

TYPE SalesType
  OrderNum AS LONG
  PartNumber(1 TO 20) AS STRING * 20
END TYPE
[statements]
DIM Sales AS SalesType
[statements]
DIM Temp(1 TO 20) AS STRING * 20 AT VARPTR(Sales.Partnumber(1))
ARRAY SORT Temp()
ERASE Temp()

```

See also [ARRAY ASSIGN](#), [ARRAY DELETE](#), [ARRAY INSERT](#), [ARRAY SCAN](#), [CHR\\$](#), [DIM](#), [LBOUND](#), [PowerArray](#), [REDIM](#), [UBOUND](#)

Example `A&(5) FOR 10, TAGARRAY B$, DESCEND`

Sorts elements 5 through 14 of array *A&* in descending order, tagging along elements 5 through 14 of array *B\$*.

```
ARRAY SORT A#()
```

Sorts all elements of array *A#* in ascending order, using no tag-along array.

```
ARRAY SORT A$(5) FOR 10, FROM 16 TO 25, COLLATE C$, TAGARRAY D()
```

Sorts elements 5 to 14 of array *A\$*, considering only characters 16 to 25 of each element, using the sort order specified by collating string *C\$*, tagging along elements 5 to 14 of array *D*.

```
ARRAY SORT A$()
```

Sorts all elements of array *A\$* in ascending order, considering all characters of each element, using no tag-along array.

```
ARRAY SORT MYTYPE(), USING MYFUNC()
```

Sorts all elements of the UDT array *MYTYPE*, using the custom UDT comparison function *MYFUNC()* to determine the sequence.

ARRAYATTR function

ARRAYATTR function

Purpose Return descriptive attributes of a given [array](#).

Syntax `y = ARRAYATTR(Arr(), AttrNum)`

Remarks ARRAYATTR returns various descriptive attributes of an array, depending upon the value of *AttrNum*

AttrNum Definition

m

0 Returns TRUE (-1) if the array is currently dimensioned, FALSE (0) if not.

1 Returns the data *type*, as defined in the following table. Note that the [numeric equates](#) listed on the right of the table are built into PowerBASIC, but the numeric values they represent are subject to change. Therefore, application code should always use the numeric equates rather than the numeric value, to ensure compatibility with future versions of PowerBASIC. The current data type definitions are:

| Type | Array type | Keyword | Equate |
|------|-----------------------------|---------|---------------|
| 0 | Byte | BYTE | %VARCLASS_BYT |
| 1 | Word | WORD | %VARCLASS_WRD |
| 2 | Double-word | DWORD | %VARCLASS_DWD |

| | | | |
|----|-------------------------------------|---------------------------|-----------------|
| 4 | Integer | INTEGER | %VARCLASS_INT |
| 5 | Long-integer | LONG | %VARCLASS_LNG |
| 8 | Quad-integer | QUAD | %VARCLASS_QUD |
| 10 | Single-precision | SINGLE | %VARCLASS_SNG |
| 11 | Double-precision | DOUBLE | %VARCLASS_DBL |
| 12 | Extended-precision | EXT | %VARCLASS_EXT |
| 13 | Currency | CURRENCY | %VARCLASS_CUR |
| 14 | Extended Currency | CURRENCYX | %VARCLASS_CUX |
| 17 | Variant | VARIANT | %VARCLASS_VRNT |
| 18 | Interface | INTERFACE | %VARCLASS_IFAC |
| 19 | GUID | GUID | %VARCLASS_GUID |
| 20 | UDT or Union | TYPE/UNION | %VARCLASS_TYPE |
| 21 | ANSI NulTrm string | ASCIIZ/STRINGZ * <i>n</i> | %VARCLASS_STRZ |
| 22 | Fixed-length string | STRING * <i>n</i> | %VARCLASS_FIX |
| 23 | Dynamic string | STRING | %VARCLASS_STR |
| 24 | Field string | FIELD | %VARCLASS_FLD |
| 25 | Wide NulTrm string | WSTRINGZ | %VARCLASS_WSTRZ |
| 26 | Wide FixLen string | WSTRING * <i>n</i> | %VARCLASS_WFIX |
| 27 | Wide Dynamic string | WSTRING * <i>n</i> | %VARCLASS_FLD |
| 28 | Wide Field string | WFIELD | %VARCLASS_WFLD |

2 Returns TRUE (-1) if it is an array of pointers, FALSE (0) if not.

3 Returns the number of dimensions of the array. The lower and upper boundaries of each dimension can be retrieved with the [LBOUND](#) and [UBOUND](#) functions respectively

4 Returns the total number of elements in the array. For example, the array [DIM](#) A&(3,4,5) would comprise 120 elements (4 x 5 x 6 = 120).

5 Returns the array element size. For example, an array of Double-precision variables would be 8 bytes. For dynamic strings, the size of the string handle (4 bytes) is returned. For [DISPATCH](#) and INTERFACE arrays, ARRAYATTR returns the size of a [pointer](#) variable (4 bytes).

You should note that a GUID is stored internally as a 16 byte User-defined type. Therefore, ARRAYATTR returns %VARCLASS_TYPE.

See also

[DIM](#), [LBOUND](#), [UBOUND](#), [PowerArray](#), [REDIM](#)

Example

```
DIM z(3,4,5) AS CURRENCYX
DIM x AS LONG, Answer AS STRING
FOR x = 0 TO 5
    Answer = Answer + FORMAT$(x)
    Answer = Answer + $TAB
    Answer = Answer + FORMAT$(ARRAYATTR(z()),x)
    Answer = Answer + $CRLF
NEXT x
' The results are stored in Answer:
```

Result

```
0      -1
1      14
2      0
3      3
4      120
5      8
```

ASC function

ASC function

IMPROVED

| | |
|---------------------|--|
| Purpose | Returns the character code of the character at the specified position in a |
| Syntax | <code>y = ASC(string_expression [, position&])</code> |
| Remarks | <p>ASC returns the character code of a particular character in the string_expression. If the string is an ANSI string, the returned value will be in the range of 0 to 255. If it is a Unicode string, the returned value will be in the range of 0 to 65535.</p> <p>The optional <i>position&</i> parameter determines which character is to be checked. The first character is one, the second two, etc. If the <i>position&</i> parameter is missing, the first character is presumed. If <i>position&</i> is negative, ASC counts from the end of the string in reverse. That is, -1 specifies the last character, -2 specifies the second to last character, etc.</p> <p>CHR\$ is the natural complement of ASC. It produces a one-character string corresponding to its ASCII or Unicode argument.</p> |
| Restrictions | If the string passed is null (zero-length) or the position is zero or greater than the length of the string, the value -1 is returned. |
| See also | ASC statement , CHR\$ |
| Example | <code>x\$ = "The ASCII value of A is" + STR\$(ASC("A"))</code> |
| Result | The ASCII value of A is 65 |

ASC statement

ASC statement

IMPROVED

| | |
|---------------------|--|
| Purpose | Replaces one character in a by using its character code. |
| Syntax | <code>ASC(stringvar, position&) = CharCode&</code> |
| Remarks | <p>The ASC statement replaces one character in a string variable. The <i>position&</i> parameter determines which character is replaced. The first character is one, the second two, etc. If <i>position&</i> is negative, ASC counts from the end of the string in reverse. That is, -1 specifies the last character, -2 specifies the second to last character, etc.</p> <p>If the <i>stringVar</i> is ANSI, the <i>CharCode</i> must be in the range of 0 to 255. If Unicode, the <i>CharCode</i> must be in the range of 0 to 65535.</p> |
| Restrictions | The ASC statement cannot be used to extend the length of a string. If <i>string</i> is null (zero-length), or <i>position</i> is zero or greater than the length of <i>stringvar</i> , the operation is ignored. |
| See also | ASC function , CHR\$, MID\$ statement |
| Example | <pre>A\$ = "hello There" ASC(A\$,1) = 72 'replace 1st character with an "H"</pre> |

ASM statement

ASM statement

IMPROVED

| | |
|----------------|---|
| Purpose | Identify an assembly-language statement. PowerBASIC's Inline Assembler supports |
|----------------|---|

8086/8088, 80286, 80386, 80486, Pentium, Floating-Point, SIMD and [MMX](#) instructions.

Syntax

```
{! | ASM} {opcode | label}
{! | ASM} ALIGN boundary
```

Remarks

This statement allows you to place [assembly-language code](#) within your PowerBASIC source code. An exclamation mark (!) serves as a shortcut for the ASM keyword.

Each group of ASM statements must preserve the following CPU [registers](#) if the assembler code causes them to change: EBX, ESI, EDI, ESP, EBP, and all segment registers. See [Saving Registers](#) for more information.

No other statements may appear on the same line as an ASM statement; however, comments are acceptable.

Any variable referenced in an assembly-language statement must be defined prior to use. For example:

```
x% = 10
! MOV AX, x%
```

You cannot access the target of a pointer with a single ASM statement as you might do in BASIC source code. Instead, you must use the pointer [address](#) indirectly. To simulate the BASIC statement [INCR](#) @x, you would write:

```
DIM x AS INTEGER PTR
ASM MOV EAX, x           ; EAX holds a pointer to an Integer
ASM INC WORD PTR [EAX]  ; Add one to target value
```

[Labels](#) can be created and accessed with the ASM statement as follows:

```
! CMP EAX, EBX
! JNE Done
...
! Done:
...
```

[String literals](#) of up to four characters may be used in Inline Assembler code:

```
! MOV AL, "a"           ; move char a into reg AL
! MOV AX, "ab"          ; move chars ab into reg AX
!                       ; "a" into AL, "b" into AH
! MOV EAX, "abcd"       ; move chars abcd into reg EAX
```

PowerBASIC recognizes either an apostrophe (') or a semi-colon (;) to specify a [comment](#) after a line of assembler code:

```
! PUSH EAX ; save the EAX register
! PUSH EBX ' save the EBX register
```

ALIGN

ASM ALIGN is used in critical situations to gain maximum efficiency from assembler code sections.

ASM ALIGN is used to round up the instruction location to a power of two address. The *boundary* parameter shown must be a power of two, in the range of 2 through 256.

PowerBASIC inserts NOP instructions into the code section to bring the instruction location up to the desired address. If the instruction location is already at a multiple of *boundary*, ALIGN has no effect.

The #ALIGN metastatement functions in the same respect as ASM ALIGN, but the ASM ALIGN statement is more suited to being used in a [PREFIX/END PREFIX](#) block.

Restrictions

Care should be exercised to ensure registers are appropriately preserved when Inline Assembler code is intermixed with BASIC statements. See [Saving Registers](#) for more information.

See also

[The Inline Assembler](#), [ASMDATA](#)

Example

To add the values a&, b&, and c&, you would write:

```
LOCAL a&, b&, c&, z&
! MOV EAX, a&
! ADD EAX, b&
```

```
! ADD EAX, c&
! MOV z&, EAX
```

Notes

The follow lists outline the supported [mnemonics](#), data types, operators, and registers that can be used with the ASM statement.

The ASM statement supports the following mnemonics:

AAA, AAD, AAM, AAS, ADC, ADD, ADDPD, ADDPS, ADDSD, ADDSS, ADDSUBPD, ADDSUBPS, ANDNPD, ANDNPS, ANDPD, ANDPS, AND

BLENDDPD, BLENDPS, BLENDVPD, BLENDVPS, BOUND, BSF, BSR, BSWAP, BT, BTC, BTR, BTS

CALL, CBW, CWD, CDQ, CLC, CLD, CLFLUSH, CLI, CMC, CMOVA, CMOVAE, CMOVB, CMOVBE, CMOVC, CMOVE, CMOVG, CMOVGE, CMOVL, CMOVLE, CMOVNA, CMOVNAE, CMOVNB, CMOVNBE, CMOVNC, CMOVNE, CMOVNG, CMOVNGE, CMOVNL, CMOVNLE, CMOVNO, CMOVNP, CMOVNS, CMOVNZ, CMOVQ, CMOVPE, CMOVPO, CMOVPS, CMOVZ, CMP, CMPPD, CMPPS, CMPSB, CMPSD, CMPSW, CMPXCHG, CMPXCHG8B, COMISD, COMISS, CPUID, CRC32, CVTDQ2PD, CVTDQ2PS, CVTPD2DQ, CVTPD2PI, CVTPD2PS, CVTPI2PD, CVTPI2PS, CVTPS2DQ, CVTPS2PD, CVTPS2PI, CVTSD2SI, CVTSD2SS, CVTSI2SD, CVTSI2SS, CVTSS2SD, CVTSS2SI, CVTTPD2DQ, CVTTPD2PI, CVTTPS2DQ, CVTTPS2PI, CVTTSD2SI, CVTTSS2SI, CWDE

DAA, DAS, DEC, DIV, DIVPD, DIVPS, DIVSD, DIVSS, DPPD, DPPS

EMMS, ENTER, EXTRACTPS

F2XM1, FABS, FADD, FADDP, FBLD, FBSTP, FCHS, FCLEX, FCMOVB, FCMOVBE, FCMOVE, FCMOVNB, FCMOVNBE, FCMOVNE, FCMOVNU, FCMOVU, FCOM, FCOMI, FCOMIP, FCOMP, FCOMPP, FCOS, FDECSTP, FDIV, FDIVP, FDIVR, FDIVRP, FFREE, FIADD, FICOM, FICOMP, FIDIV, FIDIVR, FILD, FIMUL, FINCSTP, FINIT, FIST, FISTP, FISTTP, FISUB, FISUBR, FLD, FLD1, FLDCW, FLDENV, FLDL2E, FLDL2T, FLDLG2, FLDLN2, FLDPI, FLDZ, FMUL, FMULP, FNCLEX, FNINIT, FNLDCW, FNOP, FNSAVE, FNSTCW, FNSTENV, FNSTSW, FPATAN, FPREM, FPREM1, FPTAN, FRNDINT, FRSTOR, FSAVE, FSCALE, FSIN, FSINCOS, FSQRT, FST, FSTCW, FSTENV, FSTP, FSTSW, FSUB, FSUBP, FSUBR, FSUBRP, FTST, FUCOM, FUCOMI, FUCOMP, FUCOMPP, FWAIT, FXAM, FXCH, FXRSTOR, FXSAVE, FXTRACT, FYL2X, FYL2XP1

HADDDPD, HADDPS, HLT, HSUBPD, HSUBPS

IDIV, IMUL, IN, INC, INSB, INSD, INSERTPS, INSW, INT, INTO, IRET, IRETD

JA, JAE, JB, JBE, JC, JE, JECXZ, JG, JGE, JL, JLE, JMP, JNA, JNAE, JNB, JNBE, JNC, JNE, JNG, JNGE, JNL, JNLE, JNO, JNP, JNS, JNZ, JO, JP, JPE, JPO, JS, JZ

LAHF, LAR, LDDQU, LDMXCSR, LDS, LEA, LEAVE, LES, LFENCE, LFS, LGS, LOCK, LODSB, LODSD, LODSW, LOOP, LOOPE, LOOPNE, LOOPNZ, LOOPZ, LSL, LSS

MASKMOVDQU, MASKMOVQ, MAXPD, MAXPS, MAXSD, MAXSS, MFENCE, MINPD, MINPS, MINSD, MINSS, MONITOR, MOV, MOVAPD, MOVAPS, MOVD, MOVDDUP, MOVDQA, MOVDQU, MOVDQ2Q, MOVHLP, MOVHPD, MOVHPS, MOVLHPS, MOVLPD, MOVLPS, MOVMSKPD, MOVMSKPS, MOVNTDQA, MOVNTDQ, MOVNTI, MOVNTPD, MOVNTPS, MOVNTQ, MOVQ2DQ, MOVQ, MOVSB, MOVSD, MOVSHDUP, MOVSLDUP, MOVSS, MOVSW, MOVSX, MOVUPD, MOVUPS, MOVZX, MPSADBW, MUL, MULPD, MULPS, MULSD, MULSS, MWAIT

NEG, NOP, NOT

OR, ORPD, ORPS, OUT, OUTSB, OUTSD, OUTSW

PASB, PASD, PASW, PACKSSDW, PACKSSWB, PACKUSDW, PACKUSWB,

| | | | |
|-----|----|----|----|
| ECX | CX | CH | CL |
| EDX | DX | DH | DL |
| ESI | SI | | |
| EDI | DI | | |
| ESP | SP | | |
| EBP | BP | | |

Segments

CS, DS, ES, SS, FS, GS

MMX Registers

MM(0), MM(1), MM(2), MM(3), MM(4), MM(5), MM(6), MM(7)
MM0, MM1, MM2, MM3, MM4, MM5, MM6, MM7

Floating Point registers

ST(0), ST(1), ST(2), ST(3), ST(4), ST(5), ST(6), ST(7)

XMM registers

XMM(0), XMM(1), XMM(2), XMM(3), XMM(4), XMM(5), XMM(6), XMM(7)
XMM0, XMM1, XMM2, XMM3, XMM4, XMM5, XMM6, XMM7

ASM supports these special words

PowerBASIC supports three special reserved words, which are used to specify a return value from a procedure of the same type:

```

FUNCTION      ASM  mov FUNCTION,  eax
N
METHOD       ASM  mov METHOD,    3
PROPERTY     ASM  mov PROPERTY, dx
Y

```

The above examples are the functional equivalent of the comparable BASIC syntax:

```

FUNCTION = x&
METHOD   = 3
PROPERTY = z%

```

The exception is that the assembler syntax allows you to assign a return value directly from an appropriate CPU register. Of course, these special reserved words may only be referenced within a procedure of the same type (FUNCTION may only be used in a user-defined function, etc.)

See Also [#ALIGN](#), [ASMDATA/END ASMDATA](#)

ASM ALIGN statement**ASM statement** IMPROVED

Purpose Identify an assembly-language statement. PowerBASIC's [Inline Assembler](#) supports 8086/8088, 80286, 80386, 80486, Pentium, Floating-Point, SIMD and [MMX](#) instructions.

Syntax `{! | ASM} {opcode | label}`
`{! | ASM} ALIGN boundary`

Remarks This statement allows you to place [assembly-language code](#) within your PowerBASIC source code. An exclamation mark (!) serves as a shortcut for the ASM keyword.

Each group of ASM statements must preserve the following CPU [registers](#) if the assembler code causes them to change: EBX, ESI, EDI, ESP, EBP, and all segment registers. See [Saving Registers](#) for more information.

No other statements may appear on the same line as an ASM statement; however, comments are acceptable.

Any variable referenced in an assembly-language statement must be defined prior to use. For example:

```
x% = 10
! MOV AX, x%
```

You cannot access the target of a pointer with a single ASM statement as you might do in BASIC source code. Instead, you must use the pointer [address](#) indirectly. To simulate the BASIC statement [INCR @x](#), you would write:

```
DIM x AS INTEGER PTR
ASM MOV EAX, x           ; EAX holds a pointer to an Integer
ASM INC WORD PTR [EAX] ; Add one to target value
```

[Labels](#) can be created and accessed with the ASM statement as follows:

```
! CMP EAX, EBX
! JNE Done
...
! Done:
...
```

[String literals](#) of up to four characters may be used in Inline Assembler code:

```
! MOV AL, "a"           ; move char a into reg AL
! MOV AX, "ab"          ; move chars ab into reg AX
!                       ; "a" into AL, "b" into AH
! MOV EAX, "abcd"      ; move chars abcd into reg EAX
```

PowerBASIC recognizes either an apostrophe (') or a semi-colon (;) to specify a [comment](#) after a line of assembler code:

```
! PUSH EAX ; save the EAX register
! PUSH EBX ' save the EBX register
```

ALIGN

ASM ALIGN is used in critical situations to gain maximum efficiency from assembler code sections.

ASM ALIGN is used to round up the instruction location to a power of two address. The *boundary* parameter shown must be a power of two, in the range of 2 through 256.

PowerBASIC inserts NOP instructions into the code section to bring the instruction location up to the desired address. If the instruction location is already at a multiple of *boundary*, ALIGN has no effect.

The #ALIGN metastatement functions in the same respect as ASM ALIGN, but the ASM ALIGN statement is more suited to being used in a [PREFIX/END PREFIX](#) block.

Restrictions

Care should be exercised to ensure registers are appropriately preserved when Inline Assembler code is intermixed with BASIC statements. See [Saving Registers](#) for more information.

See also

[The Inline Assembler](#), [ASMDATA](#)

Example

To add the values a&, b&, and c&, you would write:

```
LOCAL a&, b&, c&, z&
! MOV EAX, a&
! ADD EAX, b&
! ADD EAX, c&
! MOV z&, EAX
```

Notes

The follow lists outline the supported [mnemonics](#), data types, operators, and registers that can be used with the ASM statement.

The ASM statement supports the following mnemonics:

```
AAA, AAD, AAM, AAS, ADC, ADD, ADDPD, ADDPS, ADDSD, ADDSS,
ADDSUBPD, ADDSUBPS, ANDNPD, ANDNPS, ANDPD, ANDPS, AND
BLENDPD, BLENDPS, BLENDVPD, BLENDVPS, BOUND, BSF, BSR, BSWAP,
BT, BTC, BTR, BTS
CALL, CBW, CWD, CDQ, CLC, CLD, CLFLUSH, CLI, CMC, CMOVA, CMOVAE,
```

CMOVB, CMOVBE, CMOV, CMOVE, CMOVG, CMOVGE, CMOVL, CMOVLE,
 CMOVNA, CMOVNAE, CMOVNB, CMOVNBE, CMOVNC, CMOVNE, CMOVNG,
 CMOVNGE, CMOVNL, CMOVNLE, CMOVNO, CMOVNP, CMOVNS, CMOVNZ, CMOV,
 CMOVPE, CMOVPO, CMOVPS, CMOVZ, CMP, CMPPD, CMPPS, CMPSB,
 CMPSD, CMPS, CMPSW, CMPXCHG, CMPXCHG8B, COMISD, COMISS, CPUID,
 CRC32, CVTDQ2PD, CVTDQ2PS, CVTPD2DQ, CVTPD2PI, CVTPD2PS,
 CVTPI2PD, CVTPI2PS, CVTPS2DQ, CVTPS2PD, CVTPS2PI, CVTSD2SI,
 CVTSD2SS, CVTSI2SD, CVTSI2SS, CVTSS2SD, CVTSS2SI, CVTTPD2DQ,
 CVTTPD2PI, CVTTPS2DQ, CVTTPS2PI, CVTTS2SI, CVTSS2SI, CWDE
 DAA, DAS, DEC, DIV, DIVPD, DIVPS, DIVSD, DIVSS, DPPD, DPPS
 EMMS, ENTER, EXTRACTPS
 F2XM1, FABS, FADD, FADDP, FBLD, FBSTP, FCHS, FCLEX, FCMOVB,
 FCMOVBE, FCMOVE, FCMOVNB, FCMOVNBE, FCMOVNE, FCMOVNU, FCMOVU,
 FCOM, FCOMI, FCOMIP, FCOMP, FCOMPP, FCOS, FDECSTP, FDIV, FDIVP,
 FDIVR, FDIVRP, FFREE, FIADD, FICOM, FICOMP, FIDIV, FIDIVR, FILD,
 FIMUL, FINCSTP, FINIT, FIST, FISTP, FISTTP, FISUB, FISUBR, FLD,
 FLD1, FLDCW, FLDENV, FLDL2E, FLDL2T, FLDLG2, FLDLN2, FLDPI,
 FLDZ, FMUL, FMULP, FNCLEX, FNINIT, FNLDCW, FNOP, FNSAVE, FNSTCW,
 FNSTENV, FNSTSW, FPATAN, FPREM, FPREM1, FPTAN, FRNDINT, FRSTOR,
 FSAVE, FSCALE, FSIN, FSINCOS, FSQRT, FST, FSTCW, FSTENV, FSTP,
 FSTSW, FSUB, FSUBP, FSUBR, FSUBRP, FTST, FUCOM, FUCOMI, FUCOMP,
 FUCOMP, FUCOMPP, FWAIT, FXAM, FXCH, FXRSTOR, FXSAVE, FXTRACT,
 FYL2X, FYL2XP1
 HADDPD, HADDPS, HLT, HSUBPD, HSUBPS
 IDIV, IMUL, IN, INC, INSB, INSD, INSERTPS, INSW, INT, INTO,
 IRET, IRETD
 JA, JAE, JB, JBE, JC, JE, JECXZ, JG, JGE, JL, JLE, JMP, JNA,
 JNAE, JNB, JNBE, JNC, JNE, JNG, JNGE, JNL, JNLE, JNO, JNP, JNS,
 JNZ, JO, JP, JPE, JPO, JS, JZ
 LAHF, LAR, LDDQU, LDMXCSR, LDS, LEA, LEAVE, LES, LFENCE, LFS,
 LGS, LOCK, LODSB, LODSD, LODSW, LOOP, LOOPE, LOOPNE, LOOPNZ,
 LOOPZ, LSL, LSS
 MASKMOVDQU, MASKMOVQ, MAXPD, MAXPS, MAXSD, MAXSS, MFENCE, MINPD,
 MINPS, MINSD, MINSS, MONITOR, MOV, MOVAPD, MOVAPS, MOVD,
 MOVDDUP, MOVDQA, MOVDQU, MOVDQ2Q, MOVHLPS, MOVHPD, MOVHPS,
 MOVLHPS, MOVLPD, MOVLPS, MOVMSKPD, MOVMSKPS, MOVNTDQA, MOVNTDQ,
 MOVNTI, MOVNTPD, MOVNTPS, MOVNTQ, MOVQ2DQ, MOVQ, MOVSB, MOVSD,
 MOVSHDUP, MOVSLDUP, MOVSS, MOVSW, MOVSX, MOVUPD, MOVUPS, MOVZX,
 MPSADBW, MUL, MULPD, MULPS, MULSD, MULSS, MWAIT
 NEG, NOP, NOT
 OR, ORPD, ORPS, OUT, OUTSB, OUTSD, OUTSW
 PABS, PABSD, PABSW, PACKSSDW, PACKSSWB, PACKUSDW, PACKUSWB,
 PADDB, PADDD, PADDQ, PADDSB, PADDSW, PADDUSB, PADDUSW, PADDW,
 PALIGNR, PAND, PANDN, PAUSE, PAVGB, PAVGW, PBLENDVB, PBLENDW,
 PCMPEQB, PCMPEQD, PCMPEQW, PCMPEQQ, PCMPSTRI, PCMPSTRM,
 PCMPISTRI, PCMPISTRM, PCMPGTB, PCMPGTD, PCMPGTQ, PCMPGTW,
 PEXTRB, PEXTRD, PEXTRW, PHADD, PHADDW, PHADDSW, PHMINPOSUW,
 PHSUBD, PHSUBSW, PHSUBW, PINSRB, PINSRD, PINSRW, PMADDUSW,
 PMADDWD, PMAXS, PMAXSD, PMAXSW, PMAXUB, PMAXUD, PMAXUW, PMINSB,
 PMINS, PMINSW, PMINUB, PMINUD, PMINUW, PMOVMSKB, PMOVSBW,
 PMOVSB, PMOVSBQ, PMOVSBW, PMOVSBXQ, PMOVSDQ, PMOVZXBW,
 PMOVZXB, PMOVZXBQ, PMOVZXD, PMOVZXDQ, PMULDQ,
 PMULHSW, PMULHUW, PMULHW, PMULLD, PMULLW, PMULUDQ, POP, POPA,
 POPAD, POPCNT, POPF, POPFD, POR, PREFETCHT0, PREFETCHT1,

PREFETCHT2, PREFETCHNTA, PSADBW, PSHUFB, PSHUFD, PSHUFW,
 PSHUFLW, PSHUFW, PSIGNB, PSIGND, PSIGNW, PSLLD, PSLLDQ, PSLLQ,
 PSLLW, PSRAD, PSRAW, PSRLD, PSRLDQ, PSRLD, PSRLQ, PSRLW, PSUBB,
 PSUBD, PSUBQ, PSUBW, PSUBSB, PSUBSW, PSUBUSB, PSUBUSW, PTEST,
 PUNPCKHBW, PUNPCKHDQ, PUNPCKHQDQ, PUNPCKHWD, PUNPCKLBW,
 PUNPCKLDQ, PUNPCKLQDQ, PUNPCKLWD, PUSH, PUSHA, PUSHAD, PUSHF,
 PUSHFD, PXOR

RCL, RCR, RCPPS, RCPSS, RDPMC, RDTSC, REP, REPE, REPNE, REPNZ,
 REPZ, RET, RETF, RETN, ROL, ROR, ROUNDPD, ROUNDPS, ROUNDSD,
 ROUNDSS, RSQRTPS, RSQRTSS

SAHF, SAL, SAR, SBB, SCASB, SCASD, SCASW, SETA, SETAE, SETB,
 SETBE, SETC, SETE, SETG, SETGE, SETL, SETLE, SETNA, SETNAE,
 SETNB, SETNBE, SETNC, SETNE, SETNG, SETNGE, SETNL, SETNLE,
 SETNO, SETNP, SETNS, SETNZ, SETO, SETP, SETPE, SETPO, SETS,
 SETZ, SFENCE, SHL, SHLD, SHR, SHRD, SHUFPD, SHUFPS, SQRTPD,
 SQRTPS, SQRTSD, SQRTSS, STC, STD, STI, STMXCSR, STOSB, STOSD,
 STOSW, SUB, SUBPD, SUBPS, SUBSD, SUBSS

TEST

UCOMISD, UCOMISS, UNPCKHPD, UNPCKHPS, UNPCKLPD, UNPCKLPS

VERR, VERW

WAIT

XADD, XCHG, XGETBV, XLAT, XOR, XORPD, XORPS, XRSTOR, XSAVE,
 XSETBV

The ASM statement supports the following data types and operators:

BYTE

DB, DD, DW, DWD, DWORD

FAR

NEAR

POINTER, PTR

QWD, QWORD

SHORT

TBY, TBYTE

WORD, WRD

The ASM statement supports the following registers:

Integer

| 32-bit | Low 16-bit | High 8-bit | Low 8-bit |
|--------|------------|------------|-----------|
| EAX | AX | AH | AL |
| EBX | BX | BH | BL |
| ECX | CX | CH | CL |
| EDX | DX | DH | DL |
| ESI | SI | | |
| EDI | DI | | |
| ESP | SP | | |
| EBP | BP | | |

Segments

CS, DS, ES, SS, FS, GS

MMX Registers

MM(0), MM(1), MM(2), MM(3), MM(4), MM(5), MM(6), MM(7)

MM0, MM1, MM2, MM3, MM4, MM5, MM6, MM7

Floating Point registers

ST(0), ST(1), ST(2), ST(3), ST(4), ST(5), ST(6), ST(7)

XMM registers

XMM(0), XMM(1), XMM(2), XMM(3), XMM(4), XMM(5), XMM(6), XMM(7)
XMM0, XMM1, XMM2, XMM3, XMM4, XMM5, XMM6, XMM7

ASM supports these special words

PowerBASIC supports three special reserved words, which are used to specify a return value from a procedure of the same type:

```

FUNCTION      ASM  mov FUNCTION, eax
N
METHOD        ASM  mov METHOD, 3
PROPERTY      ASM  mov PROPERTY, dx
Y
```

The above examples are the functional equivalent of the comparable BASIC syntax:

```

FUNCTION = x&
METHOD   = 3
PROPERTY = z%
```

The exception is that the assembler syntax allows you to assign a return value directly from an appropriate CPU register. Of course, these special reserved words may only be referenced within a procedure of the same type (FUNCTION may only be used in a user-defined function, etc.)

See Also [#ALIGN, ASMDATA/END ASMDATA](#)

ASMDATA/END ASMDATA statements

Keyword Template

Purpose

Syntax

Remarks

See also

Example

ASMDATA/END ASMDATA statements New!

Purpose Define a block where primitive read-only data is stored.

Syntax

```

ASMDATA BlockName
    DB 1, "ABC"$, 0
    DW 2, "XYZ"$$, 0
    DD &H12345678
    DQ 1234567890
END ASMDATA
```

Remarks It is frequently convenient to define some data within the code section of your program. This data is read-only, so it may never be altered. An attempt to do so will result in a GPF (General Protection Fault), which will cause termination of your program. This type of data is generally accessed only by [ASM](#) code.

Defined Data can be placed inside of a [Sub](#), [Function](#), [Method](#), or [Property](#) using ASM statements, but there are a number of pitfalls to that technique. When debugging, or

when using [TRACE](#), [PROFILE](#), [#DEBUG_DISPLAY](#), [ERL](#), [ERL\\$](#), etc., PowerBASIC must insert special code in various places which makes it difficult (if not impossible) for you to access the data accurately. You don't know the size of the inserted code, so you'll have some difficulty addressing it accurately.

An ASMDATA block solves that problem entirely. It is designed for the sole purpose of defining data, and no extra code or extra data is ever inserted for any reason. Data within the block is never [aligned](#), so you always know the exact location of each item. The ASMDATA block must be located outside of any Sub, Function, Method, or Property.

However, the *BlockName* you assign is public, so it may be referenced from any place in your program. You may have one block on your program, or many.

By default, all ASMDATA blocks are positioned at the first available [byte](#). This allows contiguous blocks to be accessed as though they were one larger block. You can align any or all of the blocks differently by preceding the block with an [#ALIGN](#) metastatement.

[Labels and line numbers](#) are not allowed in an ASMDATA block. If you need a reference point to a particular sub-section of your data, just split it into two or more blocks, using each *BlockName* as the reference point.

The only statements allowed within an ASMDATA block are DB, DD, DQ, and DW, so they do not need to be preceded by an ASM statement. An [ANSI](#) string literal expression may be placed in a DB statement, and a [WIDE](#) (unicode) string literal expression may be placed in a DW statement. A string [literal expression](#) may consist of quoted string literals, [string equates](#), and the concatenation operators (&,+). You may also use [CHR\\$\(\)](#), [SPACE\\$\(\)](#), and [STRING\\$\(\)](#) if they use only literal parameters.

You can access the address of an ASMDATA block with the [CODEPTR\(\)](#) function. So, if you create a block named ABC, like this:

```
ASMDATA ABC
  DB 5,2,3
  DB 7,8,9
END ASMDATA
```

You would access it something like this:

```
AsmVar = CODEPTR(ABC)
```

Another option is to access it directly to a CPU [register](#) of your choice by using one of these opcodes:

```
ASM LEA EBX, abc
ASM MOV EBX, Offset abc
```

This would result in moving the first data byte (5) into register AL.

Or even move it directly to a 32-bit variable:

```
ASM MOV AsmVar, Offset abc
```

See also [ASM](#)

ATN function

ATN function

Purpose Return the arctangent of an argument.

Syntax $y = \text{ATN}(\text{numeric_expression})$

Remarks ATN returns the arctangent (Inverse Tangent) of *numeric_expression*; that is, the angle whose tangent is *numeric_expression*.

The result, as with all operations involving *angles* in PowerBASIC, is in *radians* rather than *degrees*. Although it is common to specify angles in degrees, the radian is a more convenient measurement for mathematical operations. One radian is defined as the angle at the center of a circle that subtends an arc equal in length to one radius. Since for all

circles, using the constant π

$$\text{Circumference} / \text{radius} = 2 * \pi$$

the length of the circumference of a circle is equal to $2 * \pi * \text{radius}$, and the angle of a full circle (360 degrees) is equal to $2 * \pi$ radians.

To convert radians to degrees, just multiply the radian value by $180/\pi$, or 57.29577951308232##. For example, the arctangent of 0.23456 can be converted this way:

```
t = ATN(.23456!)           't = 0.230395 (radians)
t = 57.29577951308232## * ATN(.23456!) 't= 13.200 (degrees)
```

To convert degrees to radians, multiply by 0.0174532925199433##. For example:

$$14 \text{ degrees} = (0.0174532925199433## * 14) = 0.2443460952792062 \text{ radians}$$

Rather than memorizing the radians/degrees conversion factors, calculate them for yourself by remembering this relationship: 2π radians equals a full circle (360 degrees), so 1π radian is $180/\pi$ degrees. Conversely, 1 degree equals $\pi/180$ radians.

π is a transcendental constant, meaning that it has an infinite number of decimal places. To 15-place accuracy, adequate for most applications, $\pi = 3.141592653589793##$. This value can be closely approximated with the expression:

$$\text{pi##} = 4 * \text{ATN}(1)$$

Degrees-to-radians and radians-to-degrees conversions are good applications for user-defined functions.

The ATN function always returns an [Extended-precision](#) result.

The Tangent (TAN) of a value can be easily calculated with the [TAN](#) function.

The Hyperbolic Tangent (TANH) can be calculated:

$$\text{TanH} = (\text{EXP}(2 * \text{Value}) - 1) / (\text{EXP}(2 * \text{Value}) + 1)$$

The Inverse Hyperbolic Tangent (ARCTANH) of a value can be calculated:

$$\text{ArcTanH} = \text{LOG}((1 + \text{Value}) / (1 - \text{Value})) / 2$$

```
' Useful Macro functions
MACRO Pi = 3.141592653589793##
MACRO DegreesToRadians(dpDegrees) = (dpDegrees*0.0174532925199433##)
MACRO RadiansToDegrees(dpRadians) = (dpRadians*57.29577951308232##)
```

See also [COS](#), [SIN](#), [TAN](#)

BEEP statement

BEEP statement

| | |
|---------------------|--|
| Purpose | Sound a tone through the computer's speaker. |
| Syntax | BEEP |
| Remarks | BEEP plays the default Windows waveform sound, typically a ¼ second tone, through either the built-in speaker; or a sound card if installed (in which case the Windows "Default Beep" sound is played). The Default Beep can be configured in the Sounds section of Control Panel. |
| Restrictions | The physical aspects of the built-in speaker may have an effect on the quality and level of the resultant sound. |

BGR function

BGR function

| | |
|-----------------|---|
| Purpose | Create a BGR color value from 3 primary color values or from an RGB value |
| Syntax | <code>result& = BGR(red&, green&, blue&)</code> <code>result& = BGR(rgbexpr&)</code> |
| Remarks | <p>An RGB value is a long integer value in the range of 0 to &H00FFFFFF. It is used to specify a very precise color to various PowerBASIC functions and Windows API functions. The lowest three bytes of the value each specify the intensity of a primary color which combine to form the resultant color. Byte 1 (lowest) represents the red component, byte 2 the green, and byte 3 the blue. They can each take on a value in the range of 0 to 255. Byte 4 (highest) is always 0.</p> <p>Some Windows API functions, such as those which reference Device Independent Bitmaps (DIB), require that the colors be specified in the reverse sequence (Blue-Green-Red instead of Red-Green-Blue). In order to maximize performance and execution speed, PowerBASIC statements and functions which reference these structures also use the BGR format. These include GRAPHIC GET BITS and GRAPHIC SET BITS. When used with 3 parameters, the BGR() function creates a BGR value from the three component values.</p> <p>When used with one parameter, this function translates an RGB value to its BGR equivalent by swapping the first byte with the third byte, and returning the result.</p> <p>For example, the RGB value of blue is &HFF0000. BGR() translates it to &H0000FF. Calling RGB() with that value converts it back to &HFF0000.</p> |
| See also | Built In RGB Color Equates , RGB |

BIN\$ function

Keyword Template

| |
|-----------------|
| Purpose |
| Syntax |
| Remarks |
| See also |
| Example |

BIN\$ function IMPROVED

| | |
|-----------------|---|
| Purpose | Convert an integral value to a binary |
| Syntax | <code>s\$ = BIN\$(IntVal [, Digits, LeadSpaces, TrailSpaces])</code> |
| Remarks | <p><i>IntVal</i> is a numeric expression in the range of a 64-bit Quad Integer (-9223372036854775808 to +9223372036854775807). Any fractional part of the value is rounded. The result string is always formatted as an integral number using all the significant digits in <i>IntVal</i>. It is never expressed in scientific notation.</p> <p>If <i>Digits</i> is 0 (or not given), no leading characters will be added to the numeric field. If <i>Digits</i> is a positive number greater than 0, the result string will be prepended with leading zeros to achieve the desired length. If <i>Digits</i> is a negative number, leading spaces are added to reach the absolute length. <i>Digits</i> may be in the range of -64 to +64.</p> <p><i>LeadSpaces</i> specifies additional leading spaces to be prepended, regardless of the length of the numeric portion of the string.</p> <p><i>TrailSpaces</i> specifies additional trailing spaces to be appended to the end of the string.</p> |
| See also | DEC\$, FORMAT\$, HEX\$, OCT\$, STR\$, TRIM\$, USING\$, VAL |

BIT CALC statement

BIT CALC statement

| | |
|------------------|---|
| Purpose | Set or reset a bit in an variable (or implied bit-array) based upon the result of an expression. |
| Syntax | <code>BIT CALC <i>intvar</i>, <i>bitnumber</i>, <i>calcexpr</i></code> |
| Remarks | BIT CALC performs like a combination of the BIT SET and BIT RESET statements, offering the choice between set (1) and reset (0) according to the result of a numeric expression. |
| <i>intvar</i> | An integral class variable (Byte , Word , Double-word , Integer , Long-integer or Quad-integer), or a variable forming the base of an implied bit-array. |
| <i>bitnumber</i> | An integral class expression or numeric literal that specifies the bit number to adjust. Bit numbers start from zero (0), and extend to the size of the target variable or bit-array. For example, a 16-bit integer variable uses the range 0 to 15. An implied bit-array comprised of a Long-integer array with 100 elements (4 bytes * 100 = 400 bytes = 3200 bits) covers the bit range 0 to 3199. |
| <i>calcexpr</i> | The value derived from bit zero of <i>calcexpr</i> determines the set or reset action. If bit zero contains a zero (0), the bit in <i>intvar</i> is reset; if bit zero in <i>calcexpr</i> contains a one (1), the bit in <i>intvar</i> is set. This action can be more easily remembered if we consider PowerBASIC performs an implied bitwise AND operation (<i>calcexpr</i> AND 1) to derive the set or reset action. |

Care must be exercised to ensure that the bit index number (*bitnumber*) does not exceed the number of bits that can be validly accessed. For example, reading the 17th bit of a 16-bit scalar variable may trigger a General Protection Fault (GPF). Similarly, adjusting the 4097th bit of a bit-array derived from a 128-element [DWORD](#) array may cause similar problems. *bitnumber* is always zero-based, so the 129th bit of an implied bit-array is referenced in the BIT statement with *bitnumber* equal to 128. For example: `x& = BIT(A?(1), 128)`.

The first bit is the least-significant bit, which is bit number zero. For example:

```
&H80FE = 10000000 11111110
(bit 15) MSB ↑                               ↑ LSB (bit 0)
```

See also [BIT function](#), [BIT statement](#), [BITS functions](#)

Example

```
DIM dwStatus1 AS DWORD
DIM dwStatus2 AS DWORD
DIM iBit      AS INTEGER
DIM sResult1 AS STRING
DIM sResult2 AS STRING

FOR iBit = 0 TO 31
  BIT CALC dwStatus1, iBit, RND(0,1)
  BIT CALC dwStatus2, iBit, iBit MOD 3
NEXT iBit

sResult1 = BIN$(dwStatus1,32)
sResult2 = BIN$(dwStatus2,32)

Result
sResult1 = "01001101001110101110111010010101"
sResult2 = "10010010010010010010010010010010"
```

BIT function

BIT function

| | |
|------------------|--|
| Purpose | Return the value of a particular bit in an variable (or in an implied bit-array) |
| Syntax | <i>flag</i> = BIT(<i>intvar</i> , <i>bitnumber</i>) |
| Remarks | The BIT function is used to determine the value of one particular bit in an integral-class variable or implied bit-array. |
| <i>intvar</i> | The parameter <i>intvar</i> must be a variable, not an expression. The BIT function returns either 0 or 1 to indicate the value of the specified bit. |
| <i>bitnumber</i> | The bit in question. The allowable range for the parameter is the same as that of a Long-integer . This makes it possible to have implicit bit-arrays of more than 2 billion bits in size. For such arrays , bits 0 to 15 are in the first word starting at <i>intvar</i> , bits 16-31 are in the next word, and so forth. |

Implied bit-arrays are considered to start at the memory position of the variable *intvar*. For example, if *intvar* is itself an array variable, it is possible to access bits in any of the following elements of the array. See the array examples below.

Care must be exercised to ensure that the bit index number (*bitnumber*) does not exceed the number of bits that can be validly accessed. For example, reading the 17th bit of a 16-bit scalar variable may trigger a General Protection Fault (GPF). Similarly, adjusting the 4097th bit of a bit-array derived from a 128-element [DWORD](#) array may cause similar problems. *bitnumber* is always zero-based, so the 129th bit of an implied bit-array is referenced in the BIT statement with *bitnumber* equal to 128. For example: `x& = BIT(A?(1), 128)`.

The first bit is the least-significant bit, which is bit number zero. For example:

```
&H80FE = 10000000 11111110
(bit 15) MSB  ↑                               ↑  LSB (bit 0)
```

See also [BIT CALC statement](#), [BIT statement](#), BITS functions

Example

```
x% = 7
y% = BIT(x%, 2)
[statements]
DIM z%(1:2000000) ' 32 million element bit-array
y% = BIT(z%(1),16) ' bit 0 of 2nd word of z%()
y% = BIT(z%(2000000),15) ' MSB of last element
y% = BIT(z%(1), 31999999&) ' MSB of last element
```

BIT statement

BIT statement

| | |
|----------------|--|
| Purpose | Manipulate individual bits of an variable (or in an implied bit-array), for storing values such as TRUE/FALSE (flag) settings quickly and efficiently. |
| Syntax | BIT {SET RESET TOGGLE} <i>intvar</i> , <i>bitnumber</i> |
| Remarks | <i>intvar</i> must be one of the integral-class variable types: Byte , Word , Integer , Double-word , Long-integer , or Quad-integer . |

The allowable range for the parameter *bitnumber* is the same as that of a Long-integer, making it possible to have implicit bit-arrays of more than 2 billion bits in size. Bits 0 to 15 are in the first word starting at *intvar*, bits 16-31 are in the next word, and so forth.

Implied bit-arrays are considered to start at the memory position of the variable *intvar*. For

example, if *intvar* is itself an array variable, it is possible to access bits in any of the following elements of the array. See the array examples below.

Care must be exercised to ensure that the bit index number (*bitnumber*) does not exceed the number of bits that can be validly accessed. For example, adjusting the 17th bit of a 16-bit scalar variable may cause a subtle memory corruption problem, and/or may trigger a General Protection Fault (GPF). Similarly, adjusting the 4097th bit of a bit-array derived from a 128-element **DWORD** array may cause similar problems. *bitnumber* is always zero-based, so the 129th bit of an implied bit-array is referenced in the BIT statement with *bitnumber* equal to 128. For example: BIT SET A?(1), 128.

The first bit position is the least significant bit (LSB), which is bit number zero. For example:

```
&H80FE = 10000000 11111110
(bit 15) MSB ↑                               ↑ LSB (bit 0)
```

SET Sets the indicated bit to one.
 RESET Sets the indicated bit to zero.
 TOGGLE Toggles the indicated bit: one becomes zero; zero becomes one.

See also [BIT CALC statement](#), [BIT function](#), BITS functions

Example

```
x% = 7
BIT SET x%, 2           ' Sets the 3rd bit (bit 2) to 1
BIT RESET x%, 10       ' Sets the 11th bit (bit 10) to 0
BIT TOGGLE x%, 5       ' Toggle bit 5
[statements]
DIM z%(1 TO 2000)      ' 32000 element bit-array
BIT SET z%(1), 37      ' Sets bit 5 of 3rd word to a 1
BIT TOGGLE z%(1),0     ' Toggle lowest bit in 1st word
BIT RESET z%(2000), 15 ' Clear the MSB of integer array element
                        ' 2000 (bit 31999 of the implied bit array,
                        ' numbered 0 to 31999)
BIT RESET z%(1), 31999 ' Clear the MSB of element 2000
                        ' (this is equivalent to the previous line)
```

BITS\$ function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

BITS\$ function New!

Purpose Copy

contents without modification.

Syntax *AnsiVar\$* = BITS\$(STRING, *StringExpr*)
WideVar\$\$ = BITS\$(WSTRING, *StringExpr*)

Remarks This function copies the exact contents of a [string expression](#) to a string variable without making any [ANSI/UNICODE](#) conversions. It assumes that the data already matches the

format specified by the director word `STRING` or `WSTRING`. This functionality will not often be needed, so a certain amount of caution should be used.

For example, in older versions of PowerBASIC, there were no `WIDE` string variables available. It was therefore necessary to store Unicode data in an ANSI byte string. In updating these programs, you may find you need to transfer this `WIDE` data to a `WIDE` variable, but without the automatic internal conversion normally provided by the compiler. `BITS$` provides just that functionality. Of course, it can copy bytes from `WIDE` to ANSI as well.

See also [BITS](#)

BITS function

BITS function

Purpose Converts an integral value into another data type, based upon the bit pattern of the value. This is particularly helpful in converting between signed and unsigned representations.

Syntax `resultvar = BITS(datatype, expression)`

datatype The parameter *datatype* may be [BYTE](#), [WORD](#), [DWORD](#), [INTEGER](#), or [LONG](#) to specify the new data type which should be returned by the function.

expression An integral class variable, expression, or numeric literal, which designates the original value to be converted.

Remarks Since the integer value -1 and word value 65535 have the identical bit pattern of 1111111111111111, `BITS(WORD,-1)` would return the unsigned word value of 65535. Of course, `BITS(INTEGER,65535)` would then return the integer value -1. Other values and data types would follow the same pattern and rules.

This newer form of `BITS` condenses the functionality of the older forms (`BITS%`, `BITS&`, `BITS?`, `BITS??` and `BITS???`) into a single function. In particular, this provides for the addition of new data types in future version of PowerBASIC, particularly those which may not have an associated type-specifier character.

See also [BIT CALC statement](#), [BIT function](#), [BIT statement](#), [BITS\\$](#), [BITSE](#)

BITSE function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

BITSE function

Purpose Compare integral values for equivalent bits regardless of sign.

Syntax `x& = BITSE(nexp, nexp, bitsize)`

Remarks This function allows you to compare two integral values for equivalent bit patterns, regardless of whether they are signed or unsigned values. The two numeric expressions (*nexp*) are the integral values to be compared, The *bitsize* parameter specifies the number of bits to be compared, 8, 16, or 32.

For example, the integer value -1 and the word value 65535 both have the identical bit pattern: 1111111111111111. The difference is simply the way the bits are interpreted by a program.

```
x& = BITSE( -1, 65535, 16)
```

The above example would cause the lowest 16 bits of the expressions to be compared. Since they are equal, the value [TRUE](#) (-1) is returned.

See also [BITS](#)

BUILD\$ function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

BUILD\$ function

Purpose Build or concatenate [strings](#) with very high efficiency.

Syntax `x$ = BUILD$(a$,b$,c$,d$...)`

Remarks In some cases, string concatenation using the classic [string operators](#) can be a slow process. This is particularly true when there are many operands using longer strings. The BUILD\$ function passes all the typical bottlenecks to create a new string at the greatest possible speed. The following 2 lines are functionally identical, but the BUILD\$ version will execute substantially faster.

```
x$ = a$ + "bb" + c$ + y$(7) + y$(i&) + z$
x$ = BUILD$(a$, "bb", c$, y$(7), y$(i&), z$)
```

It's interesting to note that this string function could have been named APPEND\$ or PREPEND\$ because it performs these functionalities so well. For example, to prepend a topic number to `text$` while also adding a period at the end, you could execute:

```
text$ = BUILD$( "1) " & text$ & ".")
```

In order to extract the utmost efficiency, BUILD\$() was designed to work with a very narrow definition. The component parameters must be [dynamic string](#) variables, either scalar or [array](#), [string literals](#), or [string equates](#). They may not be [expressions](#). There is virtually no limit as to the number of parameters.

The BUILD\$() function is most valuable when you are concatenating numerous strings all at the same time. However, when you must add many string sections, in many separate operations, the StringBuilder object is much faster, and a more appropriate choice.

Generally speaking, the greater the number of parameters, the greater the increase in execution speed.

See also [LET](#), [CHR\\$](#), [CSET](#), [CSET\\$](#), [JOINS](#), [LSET](#), [LSET\\$](#), [REPEAT\\$](#), [RSET](#), [RSET\\$](#), [STRING\\$](#), [STRINGBUILDER](#), [STRINSERT\\$](#), [WRAP\\$](#)

CALL statement

CALL statement

| | |
|------------------|--|
| Purpose | Invoke a procedure (Sub , Function , Method , Property , or FastProc). |
| Syntax | <code>CALL ProcName [[arguments]] [TO result_var]</code> |
| Remarks | The CALL statement has the following parts: |
| <i>ProcName</i> | The name of a Sub, Function, Method, Property, or FastProc defined elsewhere in the program. |
| <i>arguments</i> | An optional, comma-delimited list of variables , expressions, and constants to be passed to the procedure as parameters, for up to 32 parameters. If the CALL keyword is used, the <i>arguments</i> must be enclosed in parentheses. |

You can omit the CALL keyword. If you do so, you may also omit the parentheses surrounding arguments. For example, the following lines are equivalent:

```
CALL MyProc(parm1, parm2)
MyProc(parm1, Parm2)
MyProc parm1, parm2
```

However, if the first parameter argument is enclosed in parentheses for any reason, the entire parameter list must be enclosed in parentheses. For example:

```
MyProc (3+z, b)      ' Valid syntax
MyProc ((3+z), b)   ' Valid syntax
MyProc (3+z), b     ' Invalid syntax
```

This updated syntax now permits [macros](#) to be called using the SUB-style convention if/when the macros expand directly to Function calls. For example:

```
MACRO sm(Msg) = SendMessage(a, Msg, b, c)
```

...can be called like this (when the return value is not required):

```
sm(x)
```

In all cases, the number and type of parameters passed must agree with the *arguments* in procedure definition.

Variant Arguments

You can think of a [Variant](#) as a kind of container, which can hold a variable of most any data type. If you call a procedure which requires a variant for one or more of its arguments, PowerBASIC will automatically convert a standard data type into a variant data type.

While a variant may not normally contain a [UDT](#), PowerBASIC offers a special methodology to do so. At programmer direction, a [TYPE](#) may be assigned to a variant (as a byte

) by using:

```
[LET] VvntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CALL ProcName(UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDT) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When you retrieve that UDT data (with [Variant\\$](#)), PowerBASIC understands the content and handles it accurately. However, other programming languages may not understand this technique, so it should be limited to PowerBASIC applications. This methodology is implemented in all of the PowerBASIC COLLECTION objects as it greatly enhances ease of coding and performance of the final executable.

Passing Parameters

In a procedure definition, every parameter is described by the data type, and the format used to pass it. The type may be any normal variable type, such as long, string, User-Defined Type, etc. The passing format describes how the value is presented to the procedure: by reference (BYREF), by value (BYVAL), or by reference to a copy

(BYCOPY).

BYREF When a parameter is passed by reference, it consists of a 4-byte address of the data. In this case, the original data can be modified by the procedure.

BYVAL When a parameter is passed by value, it consists of an actual copy of the data. Since the parameter is a copy, the original data cannot be modified by the procedure.

When you pass parameters from the calling code with an explicit BYVAL, you effectively switch off the compiler's type-checking for that parameter. This can be useful in cases where the called code is expecting a BYREF parameter, and you wish to pass an address of another data type that would trigger a [compile-time error](#) without the BYVAL method. For example:

```
SUB TheSub(x AS STRINGZ) ' Address of x expected
  [statements]
END SUB
[statements]
DIM a$
a$ = "Dynamic string data"
CALL TheSub(BYVAL STRPTR(a$)) ' Pass data address
```

BYCOPY A parameter passed by copy is a special case; somewhat of a hybrid of the other two methods. When a procedure expects a parameter to be passed by reference, it expects to see a [pointer](#) to the data. In some cases, such as when the parameter is a calculated expression, it is not precisely possible to pass a pointer, since an expression result is a temporary value that does not exist in a permanent memory location. On the other hand, if you wish to ensure that the original data is not modified by the procedure, you can place a BYCOPY override in the *arguments* list.

In both cases, a copy of the data is stored in a temporary memory location, and the parameter consists of a 4-byte address of this temporary location. Another way to force BYCOPY is to enclose a [variable](#) name in parentheses, so it will appear to the compiler as an expression, rather than just a single variable.

Unless declared otherwise, parameters default to BYREF passing method. [Expressions and constants](#) are always passed BYCOPY. [Fixed length strings](#), [User-Defined Types](#), and full [arrays](#) are always passed BYREF.

```
CALL MySub (i&)           ' i& is passed by reference
CALL MySub (BYREF i&)    ' i& is passed by reference
CALL MySub (BYCOPY i&)   ' i& is passed by copy
CALL MySub ((i&))        ' i& is passed by copy
```

Unless declared otherwise, parameters default to the BYREF passing method.

Expressions and constants are always passed BYCOPY. Full arrays are always passed BYREF.

Entire arrays are specified by using an empty set of parentheses after the array, while individual array elements are specified by [subscript](#) index number. For example:

```
CALL SumArray(a())       ' pass entire array 'a'
CALL SumArray(a(3))      ' pass element 3 of array 'a'
```

The CALL statement can be used to invoke functions, subs, methods, properties, or fastprocs. In this case, the return value of the function is simply discarded, unless the TO keyword is used to specify a return variable.

If a procedure expects a parameter by reference, it is possible to substitute a pointer by value, for the identical result. This is particularly useful with Fixed-length strings and Types:

```
DECLARE SUB a(z%)
DIM MyInt AS INTEGER, x AS INTEGER PTR
x = VARPTR(MyInt)
CALL a(MyInt)
' or
CALL a(BYVAL x)
' or
```

```
CALL a(BYVAL VARPTR(MyInt))
```

Of course, if the procedure is expecting a parameter by value, you may not pass the pointer, but rather the pointer target (i.e., CALL a(@x)).

PowerBASIC compilers have a limit of 32 parameters per SUB, FUNCTION, METHOD, and PROPERTY. To pass more than 32 parameters, construct a User-Defined Type (UDT) and pass (the address of) the UDT by reference (BYREF) instead.

Fixed-length strings, [STRINGZ](#) strings, and User-Defined Types/Unions may also be passed as BYVAL or OPTIONAL parameters, now. Try to avoid passing large items BYVAL, as it's terribly inefficient, and there is a maximum size limit of 64 Kb for a given parameter list. Arrays cannot be passed BYVAL.

When a procedure definition specifies either a BYREF parameter or a pointer variable parameter, the calling code may freely pass a BYVAL DWORD or a Pointer instead. While the use of the explicit BYVAL override in the calling code is optional, it is recommended for clarity. It is necessary to explicitly declare all pointer parameters as BYVAL (i.e., BYVAL XAS BYTE PTR). Failure to do so will generate a compile-time [Error 549](#) ("BYVAL required with pointers").

A procedure may also be imported and exported within the same module. That is, a function in the module may be stated as EXPORT, while a DECLARE in the same module specifies it as an imported function by the option LIB "XXX.DLL", provided that XXX.DLL is the name of the module. This may be particularly valuable when you wish to build an [#INCLUDE](#) file with all of the DECLARE statements for a project.

For information on using OPTIONAL parameters, please see [DECLARE](#), [FUNCTION](#), [METHOD](#), [PROPERTY](#) and [SUB](#) topics.

| | |
|----------------------|---|
| NOTHING | The reserved word NOTHING can be used to replace any OBJECT variable parameter. In this case, the compiler passes a null object (or a pointer to a null object if BYREF) in place of a typical parameter. While this simplifies some programming issues, the technique must be used with caution. If the target METHOD or FUNCTION is not expecting a null parameter, it could cause a fatal error condition. |
| TO <i>result_var</i> | This offers an optional way to assign a function return value to <i>result_var</i> . For example, the following code assigns the return value to x% in two different ways: <pre>x% = MyFuncall CALL MyFuncall TO x%</pre> |
| Restrictions | A thread Function may not be directly called or executed, except by a THREAD CREATE statement. |
| See also | CALL DWORD , DECLARE , FASTPROC , FUNCTION/END FUNCTION , METHOD , PROPERTY , SUB/END SUB , THREAD CREATE |

CALL DWORD statement

CALL DWORD statement

| | |
|----------------|---|
| Purpose | Invoke a Sub or Function indirectly. |
| Syntax | <pre>CALL DWORD TargetPtr CALL DWORD TargetPtr USING abc([arguments]) [TO result_var]</pre> |
| Remarks | CALL DWORD is an essential ingredient for implementing run-time (explicit) dynamic linking of DLLs , rather than the more common load-time (implicit) linking. This provides a way of constructing calls to APIs and DLLs that may not be present in all versions of Windows. This technique ensures that an application can start up successfully, even if Windows cannot resolve the location of the API or DLL function. The first (simplified) form of CALL DWORD may be used if the target Sub/Function takes no parameters and offers no return value. It also requires STDCALL () calling conventions, which is used by the vast majority (99%+) of import procedures. |

In all other cases, you must use the second form, with a USING clause to define the signature of the target Sub/Function.

| | |
|----------------------|---|
| <i>TargetPtr</i> | A Double-word , Long-integer , or pointer variable that contains the address of the entry point of a procedure (Sub or Function). If the target Sub/Function is located in the same module, you can retrieve the address with the CODEPTR function. If it's located in an external DLL, use IMPORT ADDR to load it and get the address. |
| USING | This option is used to define a model procedure declaration which matches all of the calling conventions desired to be used to invoke the target Sub/Function. For example, the following two calls to the function <i>MySubCall</i> are equivalent: <pre> DECLARE SUB MySubCall DIM PtrMySubCall AS DWORD PtrMySubCall= CODEPTR(MySubCall) [statements] CALL MySubCall CALL DWORD PtrMySubCall USING MySubCall </pre> |
| <i>arguments</i> | An optional, comma-delimited list of variables , expressions, and constants to be passed to the procedure as parameters. In the CALL DWORD context, enclosing parentheses are required. The number and type of parameters passed must agree with the <i>arguments</i> of the procedure named by the USING clause. See CALL for more information on parameter passing methods. |
| TO <i>result_var</i> | When calling a Function which returns a value, the TO keyword offers a way to assign the function return value to <i>result_var</i> . |
| Restrictions | Thread Functions and Callback Functions may not be invoked with CALL DWORD. The DECLARE model for the USING clause may not specify a LIB or IMPORT option. |
| See also | CALL , CODEPTR , DECLARE , FASTPROC , FUNCTION/END FUNCTION , IMPORT , SUB/END SUB , THREAD CREATE |

CALLSTK statement

CALLSTK statement

| | |
|----------------|--|
| Purpose | Capture a complete representation of the stack frames in the call stack. |
| Syntax | <code>CALLSTK <i>diskfilename\$</i></code> |
| Remarks | <p>PowerBASIC creates a <i>stack frame</i> for each call to a Sub, Function, Method, or Property, and records each nested call in a <i>call stack</i>. The stack frame holds the parameters being passed to the routine, and providing space for local variable storage, etc. Since procedures can call other procedures to an almost limitless depth, there may be a substantial number of stack frames present at any given moment.</p> <p>The CALLSTK statement can help provide answers to the age-old "how did I get here?" question. When combined with other debugging statements such as CALLSTK\$, CALLSTKCOUNT, and TRACE, the programmer has a set of tools that can significantly reduce the amount of effort required to debug an application.</p> <p>Executing a CALLSTK statement captures a representation of all of the stack frames that exist above the one that includes the CALLSTK statement. When the CALLSTK statement is executed, a standard sequential file (of the specified file name in <i>diskfilename\$</i>) is created. The resulting disk file contains a list of every call to a procedure, and their associated parameter values, which are currently defined on the call stack.</p> <p><i>diskfilename\$</i> must be a legal file spec, may be a Long File Name (LFN), and may include a path. If the file cannot be created for any reason, the operation will be ignored and no run-time error will be generated. If present, CALLSTK overwrites the existing file.</p> <p>If PBMAIN calls the SUB <i>aaa(x&)</i> which then calls the SUB <i>bbb(y&)</i>, the CALLSTK from</p> |

within `bbb(y&)` might look like this:

```
PBMAIN( )
aaa(77)
bbb(-1)
```

Later, if `bbb(y&)` exited, then `aaa(x&)` called `ccc(z&)`, the updated CALLSTK from within `ccc(z&)` might then appear as:

```
PBMAIN( )
aaa(77)
ccc(33)
```

Numeric parameters are displayed in decimal, while pointer and array parameters display a decimal representation of the offset of the target value.

Restrictions CALLSTK can be invaluable during debugging, but it generates substantial additional code that should be avoided in a final release version of an application. If the source code contains [#TOOLS OFF](#), all CALLSTK statements which remain in the program are ignored.

The CALLSTK statement is "thread-aware", displaying only stack frame details from the thread in which it was executed.

See also [#TOOLS](#), [CALLSTK\\$](#), [CALLSTKCOUNT](#), [FUNCNAME\\$](#), [PROFILE](#), [TRACE](#)

Example

```
FUNCTION PBMAIN
  CALL Sb1(100)
END FUNCTION

SUB Sb1(x AS LONG)
  CALL Sb2(x + 1)
END SUB

SUB Sb2(y AS LONG)
  CALLSTK "Stack frame test.txt"
END SUB
```

Result

```
PBMAIN()
SB1(100)
SB2(101)
```

CALLSTK\$ function

CALLSTK\$ function

Purpose Retrieve the details of a specific [stack](#) frame from the call stack.

Syntax `sfname$ = CALLSTK$(n)`

Remarks CALLSTK\$(1) returns the name of the current [Sub](#), [Function](#), [Method](#), or [Property](#), and the value of each of the parameters at the time it was called. CALLSTK\$(2) returns the name of the procedure which called the current one, as well as its parameters. Likewise, CALLSTK\$(3) returns the one above it, and so forth.

If the CALLSTK\$(n) parameter is outside the range of one (1) through the number of stack frames identified by [CALLSTKCOUNT](#), an empty

is returned. parameters are displayed in decimal, while [pointer](#) and [array](#) parameters display a decimal representation of the offset of the target value.

Restrictions The CALLSTK\$ function can be invaluable during [debugging](#), but it generates substantial extra code which should be avoided in a final release version of an application. If the source code contains [#TOOLS OFF](#), all CALLSTK\$ functions which remain in the program return an empty string.

The CALLSTK\$ function is "thread-aware", returning only stack frame details from the thread in which it was referenced.

See also [#TOOLS](#), [CALLSTK](#), [CALLSTKCOUNT](#), [FUNCNAME\\$](#), [PROFILE](#), [TRACE](#)

Example

```
FOR x& = CALLSTKCOUNT TO 1 STEP -1
  A$ = A$ + CALLSTK$(x&)
NEXT x&
```

CALLSTKCOUNT function

CALLSTKCOUNT function

Purpose Retrieve the number of [stack](#) frames in the call stack. Used in conjunction with the [CALLSTK\\$](#) function.

Syntax `count& = CALLSTKCOUNT`

Remarks CALLSTKCOUNT returns a [Long-integer](#) value that represents the total number of stack frames that currently exist on the application call stack.

Retrieve individual stack frame details with the CALLSTK\$ function, or write them all to a disk file with the [CALLSTK](#) statement.

Restrictions The CALLSTKCOUNT function, when used in conjunction with the CALLSTK\$ function, can be invaluable during [debugging](#), but its use generates substantial extra code which should be avoided in a final release version of an application. If the source code contains [#TOOLS OFF](#), all CALLSTKCOUNT functions which remain in the program return zero.

The CALLSTKCOUNT function is "thread-aware", returning only the stack frame count from the thread in which it was referenced.

See also [#TOOLS](#), [CALLSTK\\$](#), [CALLSTK](#), [FUNCNAME\\$](#), [PROFILE](#), [TRACE](#)

Example

```
FOR x& = CALLSTKCOUNT TO 1 STEP -1
  A$ = A$ + CALLSTK$(x&)
NEXT x&
```

CB Callback functions

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CB Callback functions

Purpose In a [Callback Function](#), return information about a message.

Syntax

```
CtlID = CB.CTL
CtlMsg = CB.CTLMSG
WinHndl = CB.HNDL
Value = CB.LPARAM
Msg = CB.MSG
Value = CB.WPARAM
CodeMsg = CB.NMCODE
```

```

NmPtr   = CB.NMHDR
NmStruc = CB.NMHDR$
NmHndl  = CB.NMHWND
NmID    = CB.NMID

```

Remarks

When an event occurs (like a user clicking on a [button](#), a character typed into a [text box](#), etc.) Windows sends a message to the

Callback Function, or the Dialog Callback Function. The CB functions are used to easily retrieve information about the message. These CB functions can only be used within a callback function.

Callback functions in Windows have a standard set of four parameters. For this reason, PowerBASIC allows you to ignore them and save some typing in your source code. The implied parameters are:

```

FUNCTION DlgCallback(BYVAL hDlg AS DWORD _
    BYVAL wParam AS LONG _
    BYVAL lParam AS LONG)

```

Generic Callback Functions

- CB.HNDL** This function returns the window handle of the [parent](#) dialog. This is the value specified by the *hDlg* parameter above.
- CB.MSG** Each type of message sent to your callback function has a unique numeric value, such as %WM_COMMAND, %WM_NOTIFY, etc. CB.MSG will return the actual numeric message value of the message being processed. The definitions of the numeric values in other CB functions (CB.LPARAM, CB.WPARAM, CB.CTL, etc.) can only be ascertained once CB.MSG is identified. Therefore, callback functions usually test the value of CB.MSG first.
- CB.WPARAM** When Windows sends a message to a callback function, the wParam value contains different values, depending on the nature of the particular message (CB.MSG). In other words, CB.WPARAM returns a message-dependent value.
- CB.LPARAM** When Windows sends a message to a callback function, the lParam value contains different values, depending on the nature of the particular message (CB.MSG). In other words, CB.LPARAM returns a message-dependent value.

%WM_COMMAND Specific Callback Functions

- CB.CTL** If CB.MSG = %WM_COMMAND, this function returns the [ID number](#) assigned to the control with the
statement. For other values of CB.MSG, it returns message-dependent values. This value is sent as the low-order word of the wParam parameter. It's functionally equivalent to [LO\(WORD, wParam&\)](#) in a conventional function, or [LO\(WORD, CB.WPARAM\)](#) in a [DDT](#) Callback Function.
- CB.CTLMSG** If CB.MSG = %WM_COMMAND, this function returns the specific control message describing the event which occurred. For example, CB.CTLMSG returns %BN_CLICKED when the user clicks a button. For other values of CB.MSG, it returns message-dependent values. This value is sent as the high-order word of the wParam parameter. It's functionally equivalent to [HI\(WORD, wParam&\)](#) in a conventional function, or [HI\(WORD, CB.WPARAM\)](#) in a [DDT](#) Callback Function.

%WM_NOTIFY Specific Callback Functions

CB.NMCODE
E If CB.MSG = %WM_NOTIFY, this function returns the specific notification message describing the event which occurred. For example, CB.NMCODE returns %NM_SETFOCUS when the described control gains the

. For other values of CB.MSG, the value returned is meaningless.

CB.NMHDR If CB.MSG = %WM_NOTIFY, this function returns the address (a) to the NMHDR [UDT](#) for this notification message. NMHDR is defined as:

Type NMHDR

 hwndFrom as DWord ' Handle of the control sending the message

 idfrom as DWord ' Identifier of the control sending the message

 code as Long ' Notification code

End Type

Some notification messages (%NM_CHAR, %NM_CLICK, etc.) require an extended version of the NM structure. However, all NM structures begin with an NMHDR UDT, so the pointer returned here is always accurate. For other values of CB.MSG, the pointer returned by CB.NMHDR is meaningless.

CB.NMHDR
\$ If CB.MSG = %WM_NOTIFY, this function returns the contents of the NMHDR UDT as a [dynamic string](#). If the notification message is one which requires an extended version of the NM structure, the string returned contains all of the data for the extended UDT. However, in all cases, the first 12 bytes of the returned string will be the contents of NMHDR. You can use [TYPE SET](#) to assign the string data to an appropriate user-defined type. For other values of CB.MSG, the string returned by CB.NMHDR\$ is meaningless.

The following notification messages use the extended NM structures as listed, so an appropriately longer string is returned:

| Message | UDT |
|-------------------|--------------------|
| %NM_CLICK | NM_MOUSE |
| %NM_RCLICK | NM_MOUSE |
| %NM_NCHITTEST | NM_MOUSE |
| %NM_KEYDOWN | NM_KEY |
| %NM_SETCURSOR | NM_MOUSE |
| %NM_CHAR | NM_CHAR |
| % | NM_TOOLTIPSCREATED |
| NM_TOOLTIPSCREATE | |

Other special notify messages may use a different extended NM structure than those listed above. To ensure compatibility, you can include an optional numeric parameter to specify the size of the special UDT you are using:

```
TYPE SET NotifyUDT = CB.NMHDR$(sizeof(NotifyUDT))
```

CB.NMHWND
D If CB.MSG = %WM_NOTIFY, this function returns the [handle](#) of the control which sent this message. For other values of CB.MSG, the value returned is meaningless.

CB.NMID If CB.MSG = %WM_NOTIFY, this function returns the ID number assigned to this control. For other values of CB.MSG, the value returned is meaningless.

Restrictions

These functions are only valid inside a Callback Function. The CB Callback functions replace CBMSG, CBHNDL, CBLPARAM, CBWPARAM, CBCTL, and CBCTLMMSG. Note

these functions are no longer supported, so update your code to use the new syntax.

See also [Callbacks](#), [Dynamic Dialog Tools](#)

CBYT function

CBYT, CCUR, CCUX, CDBL, CDWD, CEXT, CINT, CLNG, CQUD, CSNG, and CWRD functions

Purpose Convert a value to specific [variable](#) type.

Syntax

```

bytevar?           = CBYT( numeric_expression )
currencyvar@      = CCUR( numeric_expression )
currencyextvar@@  = CCUX( numeric_expression )
doublevar#        = CDBL( numeric_expression )
doublewordvar??? = CDWD( numeric_expression )
extendedvar##     = CEXT( numeric_expression )
integervar%       = CINT( numeric_expression )
longintvar&       = CLNG( numeric_expression )
quadintvar&&     = CQUD( numeric_expression )
singlevar!        = CSNG( numeric_expression )
wordvar??        = CWRD( numeric_expression )

```

Remarks Each of these functions converts a expression to a particular variable type. In each case, *numeric_expression* must be within the legal range for the result type. The *numeric_expression* will be rounded if necessary.

| Function | Result type |
|----------|---|
| CBYT | Byte |
| CCUR | Currency |
| CCUX | Extended-currency |
| CDBL | Double-precision floating-point |
| CDWD | Double-word |
| CEXT | Extended-precision floating-point |
| CINT | Integer |
| CLNG | Long-integer |
| CQUD | Quad-integer |
| CSNG | Single-precision floating-point |
| CWRD | Word |

These conversion functions are rarely needed as PowerBASIC automatically performs any necessary conversions when executing an assignment statement or passing parameters. For example:

```
e% = f#
```

is equivalent to:

```
e% = CINT(f#)
```

In the case of the functions that convert to

values, the fractional part of the number is rounded. If the fractional part is exactly .5 then it rounds to the nearest even integral value. For example, CINT(1.5) returns 2, CINT(.5) returns 0, and CLNG(-0.6) returns -1.

Restrictions CSNG limit string display to 7 significant digits.

See also [CEIL, CVI and associated functions](#), [FIX, INT, MKI\\$ and associated functions](#)

Example

```
' Calculate CINT for a series of values
FOR I! = 2.4! TO 2.65! STEP 0.05!
  x$ = FORMAT$(I!, "0.00") + " is" + STR$(CINT(I!))
NEXT I!
```

Result

```
2.40 is 2
2.45 is 2
2.50 is 2
2.55 is 3
2.60 is 3
2.65 is 3
```

CCUR function

CBYT, CCUR, CCUX, CDBL, CDWD, CEXT, CINT, CLNG, CQUD, CSNG, and CWRD functions

Purpose Convert a value to specific [variable](#) type.

Syntax

```
bytevar?           = CBYT(numeric_expression)
currencyvar@       = CCUR(numeric_expression)
currencyextvar@@   = CCUX(numeric_expression)
doublevar#         = CDBL(numeric_expression)
doublewordvar???  = CDWD(numeric_expression)
extendedvar##      = CEXT(numeric_expression)
integervar%       = CINT(numeric_expression)
longintvar&       = CLNG(numeric_expression)
quadintvar&&      = CQUD(numeric_expression)
singlevar!        = CSNG(numeric_expression)
wordvar??         = CWRD(numeric_expression)
```

Remarks Each of these functions converts a expression to a particular variable type. In each case, *numeric_expression* must be within the legal range for the result type. The *numeric_expression* will be rounded if necessary.

| Function | Result type |
|----------|---|
| CBYT | Byte |
| CCUR | Currency |
| CCUX | Extended-currency |
| CDBL | Double-precision floating-point |
| CDWD | Double-word |
| CEXT | Extended-precision floating-point |
| CINT | Integer |
| CLNG | Long-integer |
| CQUD | Quad-integer |
| CSNG | Single-precision floating-point |
| CWRD | Word |

These conversion functions are rarely needed as PowerBASIC automatically performs any necessary conversions when executing an assignment statement or passing parameters. For example:

```
e% = f#
```

is equivalent to:

```
e% = CINT(f#)
```

In the case of the functions that convert to values, the fractional part of the number is rounded. If the fractional part is exactly .5 then it rounds to the nearest even integral value. For example, CINT(1.5) returns 2, CINT(.5) returns 0, and CLNG(-0.6) returns -1.

Restrictions CSNG limit string display to 7 significant digits.

See also [CEIL, CVI and associated functions](#), [FIX, INT, MKI\\$ and associated functions](#)

Example

```
' Calculate CINT for a series of values
FOR I! = 2.4! TO 2.65! STEP 0.05!
  x$ = FORMAT$(I!, "0.00") + " is" + STR$(CINT(I!))
NEXT I!
```

Result

```
2.40 is 2
2.45 is 2
2.50 is 2
2.55 is 3
2.60 is 3
2.65 is 3
```

CCUX function

CBYT, CCUR, CCUX, CDBL, CDWD, CEXT, CINT, CLNG, CQUD, CSNG, and CWRD functions

Purpose Convert a value to specific [variable](#) type.

Syntax

```
bytevar? = CBYT(numeric_expression)
currencyvar@ = CCUR(numeric_expression)
currencyextvar@@ = CCUX(numeric_expression)
doublevar# = CDBL(numeric_expression)
doublewordvar??? = CDWD(numeric_expression)
extendedvar## = CEXT(numeric_expression)
integervar% = CINT(numeric_expression)
longintvar& = CLNG(numeric_expression)
quadintvar&& = CQUD(numeric_expression)
singlevar! = CSNG(numeric_expression)
wordvar?? = CWRD(numeric_expression)
```

Remarks Each of these functions converts a expression to a particular variable type. In each case, *numeric_expression* must be within the legal range for the result type. The *numeric_expression* will be rounded if necessary.

| Function | Result type |
|----------|---|
| CBYT | Byte |
| CCUR | Currency |
| CCUX | Extended-currency |
| CDBL | Double-precision floating-point |
| CDWD | Double-word |
| CEXT | Extended-precision floating-point |
| CINT | Integer |
| CLNG | Long-integer |
| CQUD | Quad-integer |
| CSNG | Single-precision floating-point |
| CWRD | Word |

These conversion functions are rarely needed as PowerBASIC automatically performs any necessary conversions when executing an assignment statement or passing parameters. For example:

```
e% = f#
```

is equivalent to:

```
e% = CINT(f#)
```

In the case of the functions that convert to

values, the fractional part of the number is rounded. If the fractional part is exactly .5 then it rounds to the nearest even integral value. For example, CINT(1.5) returns 2, CINT(.5) returns 0, and CLNG(-0.6) returns -1.

Restrictions CSNG limit string display to 7 significant digits.

See also [CEIL, CVI and associated functions](#), [FIX, INT, MKI\\$ and associated functions](#)

Example

```
' Calculate CINT for a series of values
FOR I! = 2.4! TO 2.65! STEP 0.05!
  x$ = FORMAT$(I!, "0.00") + " is" + STR$(CINT(I!))
NEXT I!
```

Result

```
2.40 is 2
2.45 is 2
2.50 is 2
2.55 is 3
2.60 is 3
2.65 is 3
```

CDBL function

CBYT, CCUR, CCUX, CDBL, CDWD, CEXT, CINT, CLNG, CQUD, CSNG, and CWRD functions

Purpose Convert a value to specific [variable](#) type.

Syntax

```
bytevar?           = CBYT(numeric_expression)
currencyvar@       = CCUR(numeric_expression)
currencyextvar@@   = CCUX(numeric_expression)
doublevar#         = CDBL(numeric_expression)
doublewordvar???  = CDWD(numeric_expression)
extendedvar##      = CEXT(numeric_expression)
integervar%        = CINT(numeric_expression)
longintvar&        = CLNG(numeric_expression)
quadintvar&&       = CQUD(numeric_expression)
singlevar!         = CSNG(numeric_expression)
wordvar??          = CWRD(numeric_expression)
```

Remarks Each of these functions converts a expression to a particular variable type. In each case, *numeric_expression* must be within the legal range for the result type. The *numeric_expression* will be rounded if necessary.

| Function | Result type |
|----------|---|
| CBYT | Byte |
| CCUR | Currency |
| CCUX | Extended-currency |
| CDBL | Double-precision floating-point |

| | |
|------|---|
| CDWD | Double-word |
| CEXT | Extended-precision floating-point |
| CINT | Integer |
| CLNG | Long-integer |
| CQUD | Quad-integer |
| CSNG | Single-precision floating-point |
| CWRD | Word |

These conversion functions are rarely needed as PowerBASIC automatically performs any necessary conversions when executing an assignment statement or passing parameters. For example:

```
e% = f#
```

is equivalent to:

```
e% = CINT(f#)
```

In the case of the functions that convert to

values, the fractional part of the number is rounded. If the fractional part is exactly .5 then it rounds to the nearest even integral value. For example, CINT(1.5) returns 2, CINT(.5) returns 0, and CLNG(-0.6) returns -1.

Restrictions CSNG limit string display to 7 significant digits.

See also [CEIL, CVI and associated functions](#), [FIX, INT, MKI\\$ and associated functions](#)

Example

```
' Calculate CINT for a series of values
FOR I! = 2.4! TO 2.65! STEP 0.05!
  x$ = FORMAT$(I!, "0.00") + " is" + STR$(CINT(I!))
NEXT I!
```

Result

```
2.40 is 2
2.45 is 2
2.50 is 2
2.55 is 3
2.60 is 3
2.65 is 3
```

CDWD function

CBYT, CCUR, CCUX, CDBL, CDWD, CEXT, CINT, CLNG, CQUD, CSNG, and CWRD functions

Purpose Convert a value to specific [variable](#) type.

Syntax

```
bytevar?           = CBYT(numeric_expression)
currencyvar@       = CCUR(numeric_expression)
currencyextvar@@   = CCUX(numeric_expression)
doublevar#         = CDBL(numeric_expression)
doublewordvar???   = CDWD(numeric_expression)
extendedvar##      = CEXT(numeric_expression)
integervar%        = CINT(numeric_expression)
longintvar&        = CLNG(numeric_expression)
quadintvar&&       = CQUD(numeric_expression)
singlevar!         = CSNG(numeric_expression)
wordvar??          = CWRD(numeric_expression)
```

Remarks Each of these functions converts a expression to a particular variable type. In each case, *numeric_expression* must be

within the legal range for the result type. The *numeric_expression* will be rounded if necessary.

| Function | Result type |
|----------|---|
| CBYT | Byte |
| CCUR | Currency |
| CCUX | Extended-currency |
| CDBL | Double-precision floating-point |
| CDWD | Double-word |
| CEXT | Extended-precision floating-point |
| CINT | Integer |
| CLNG | Long-integer |
| CQUD | Quad-integer |
| CSNG | Single-precision floating-point |
| CWRD | Word |

These conversion functions are rarely needed as PowerBASIC automatically performs any necessary conversions when executing an assignment statement or passing parameters. For example:

```
e% = f#
```

is equivalent to:

```
e% = CINT(f#)
```

In the case of the functions that convert to

values, the fractional part of the number is rounded. If the fractional part is exactly .5 then it rounds to the nearest even integral value. For example, CINT(1.5) returns 2, CINT(.5) returns 0, and CLNG(-0.6) returns -1.

Restrictions CSNG limit string display to 7 significant digits.

See also [CEIL, CVI and associated functions](#), [FIX](#), [INT](#), [MKI\\$ and associated functions](#)

Example

```
' Calculate CINT for a series of values
FOR I! = 2.4! TO 2.65! STEP 0.05!
  x$ = FORMAT$(I!, "0.00") + " is" + STR$(CINT(I!))
NEXT I!
```

Result

```
2.40 is 2
2.45 is 2
2.50 is 2
2.55 is 3
2.60 is 3
2.65 is 3
```

CEIL function

CEIL function

Purpose Convert a variable or expression into an *intvar* value, by returning the smallest integral value that is greater than or equal to its argument.

Syntax `intvar = CEIL(numeric_expression)`

Remarks The CEIL function rounds upward, returning the smallest integral value that is greater than or equal to *numeric_expression*. For example, `y = CEIL(1.5)` places the value 2 into `y`.

See also [CINT](#), [FIX](#), [FRAC](#), [INT](#), [ROUND](#)

Example

```
' Display the ceiling for a series of values
FOR W! = -1.5! TO 1.5! STEP 0.5!
  x$ = "CEIL" + FORMAT$(W!, "* 0.00") + _
```

```
" =" + FORMAT$(CEIL(W!), "* 0.00")
NEXT W!
```

Result

```
CEIL -1.50 = -1.00
CEIL -1.00 = -1.00
CEIL -0.50 = 0.00
CEIL 0.00 = 0.00
CEIL 0.50 = 1.00
CEIL 1.00 = 1.00
CEIL 1.50 = 2.00
```

CEXT function

CBYT, CCUR, CCUX, CDBL, CDWD, CEXT, CINT, CLNG, CQUD, CSNG, and CWRD functions

Purpose Convert a value to specific [variable](#) type.

Syntax

```
bytevar?           = CBYT( numeric_expression )
currencyvar@       = CCUR( numeric_expression )
currencyextvar@@   = CCUX( numeric_expression )
doublevar#         = CDBL( numeric_expression )
doublewordvar???  = CDWD( numeric_expression )
extendedvar##      = CEXT( numeric_expression )
integervar%       = CINT( numeric_expression )
longintvar&       = CLNG( numeric_expression )
quadintvar&&      = CQUD( numeric_expression )
singlevar!        = CSNG( numeric_expression )
wordvar??         = CWRD( numeric_expression )
```

Remarks Each of these functions converts a expression to a particular variable type. In each case, *numeric_expression* must be within the legal range for the result type. The *numeric_expression* will be rounded if necessary.

| Function | Result type |
|----------|---|
| CBYT | Byte |
| CCUR | Currency |
| CCUX | Extended-currency |
| CDBL | Double-precision floating-point |
| CDWD | Double-word |
| CEXT | Extended-precision floating-point |
| CINT | Integer |
| CLNG | Long-integer |
| CQUD | Quad-integer |
| CSNG | Single-precision floating-point |
| CWRD | Word |

These conversion functions are rarely needed as PowerBASIC automatically performs any necessary conversions when executing an assignment statement or passing parameters. For example:

```
e% = f#
```

is equivalent to:

```
e% = CINT(f#)
```

In the case of the functions that convert to

values, the fractional part of the number is rounded. If the fractional part is exactly .5 then it rounds to the nearest even integral value. For example, CINT(1.5) returns 2, CINT(.5) returns 0, and CLNG(-0.6) returns -1.

| | |
|---------------------|--|
| Restrictions | CSNG limit string display to 7 significant digits. |
| See also | CEIL , CVI and associated functions , FIX , INT , MKI\$ and associated functions |
| Example | <pre>' Calculate CINT for a series of values FOR I! = 2.4! TO 2.65! STEP 0.05! x\$ = FORMAT\$(I!, "0.00") + " is" + STR\$(CINT(I!)) NEXT I!</pre> |
| Result | <pre>2.40 is 2 2.45 is 2 2.50 is 2 2.55 is 3 2.60 is 3 2.65 is 3</pre> |

CHDIR statement

CHDIR statement

| | |
|---------------------|---|
| Purpose | Change the current (default) directory on the default drive, or any other drive (similar to the DOS CHDIR command). CHDIR affects only the default drive for the current program. |
| Syntax | <code>CHDIR <i>path</i></code> |
| Remarks | <p><i>path</i> is a string expression containing either a relative or an explicit directory name. The directory name can be constructed from a (DOS-Style) Short File Name (SFN) directory name, a Long File Name (LFN) directory name, or a combination of the two. Also, <i>path</i> may be prefixed with a drive letter and colon (i.e., "D:") to change the current directory on a non-default drive.</p> <p>The current directory is the location where your program will perform file operations by default. Thus:</p> <pre>CHDIR "\DATA"</pre> <p>changes to the \DATA subdirectory on the current drive, and:</p> <pre>CHDIR "..\DATA2"</pre> <p>changes the current directory to a directory whose parent is also the parent to the original directory. The double-period implies the parent directory.</p> <pre>CHDIR "J:\Program Files\Internet Explorer"</pre> <p>changes the current directory of Drive J. Drive J need not be the current default drive.</p> <p>If <i>path</i> does not specify a valid directory on the target drive, a run-time Error 76 occurs ("Path not found").</p> <p>A program that changes the current directory on the default drive also changes its active directory.</p> <p><i>path</i> may also be used with UNC names (i.e., \\server\share), but their use is subject to operating system restrictions.</p> |
| Restrictions | CHDIR is not intended to change the current default drive. Use CHDRIVE instead. |
| See also | CHDRIVE , CURDIR\$, MKDIR , RMDIR |

CHDRIVE statement

CHDRIVE statement

| | |
|-----------------|---|
| Purpose | Change the current default drive. |
| Syntax | <code>CHDRIVE <i>drive</i></code> |
| Remarks | <i>drive</i> is a string expression whose first character is a letter from A to the highest logical drive letter. The trailing colon (:) that DOS uses is optional in PowerBASIC. If <i>drive</i> does not indicate a valid drive, a run-time Error 76 occurs ("Path not found"). |
| See also | CHDIR , CURDIR\$, MKDIR , RMDIR |
| Example | <pre>SDrive\$ = "C" CHDRIVE SDrive\$ ' change to the C: drive</pre> |

CHRBYTES function

Keyword Template

| |
|-----------------|
| Purpose |
| Syntax |
| Remarks |
| See also |
| Example |

CHRBYTES function **New!**

| | |
|-----------------|---|
| Purpose | Determine the size of a single character in a variable. |
| Syntax | <code><i>siz&</i> = CHRBYTES(<i>MyStringVar</i>)</code> |
| Remarks | This function is used to determine whether a particular string variable contains ANSI characters or Unicode (wide) characters, ANSI characters are stored in 1 byte , so the function returns 1 if the variable is a dynamic string , stringz , string*n , or field string . Unicode characters are stored in 2 bytes, so the function returns 2 if the variable is a wstring , wstringz , wstring*n , or wfield string . This function may be particularly valuable in some macros which use string variables. |
| See Also | LEN , SIZEOF |

ChrToOem\$ function

Keyword Template

| |
|-----------------|
| Purpose |
| Syntax |
| Remarks |
| See also |
| Example |

CHRTOOEM\$ function **New!**

| | |
|----------------|--------------|
| Purpose | Translates a |
|----------------|--------------|

of [ANSI/WIDE](#) characters to [OEM byte](#) characters.

| | |
|-----------------|---|
| Syntax | <code>o\$ = ChrToOem\$(AnsiOrWide\$)</code> |
| Remarks | <i>AnsiOrWide\$</i> contains a series of ANSI characters or WIDE (16-bit) characters, <code>ChrToOem\$</code> translates it into OEM byte characters. |
| See also | OemToChr\$, ChrToUtf8\$, Utf8ToChr\$ |

ChrToUtf8\$ function

Keyword Template

Purpose
Syntax
Remarks
See also
Example

ChrToUtf8\$ function New!

| | |
|-----------------|--|
| Purpose | Translates a string of ANSI/WIDE characters to UTF-8 byte characters. |
| Syntax | <code>o\$ = ChrToUtf8\$(AnsiOrWide\$)</code> |
| Remarks | <i>AnsiOrWide\$</i> contains a series of ANSI characters or WIDE (16-bit) characters, <code>ChrToUtf8\$</code> translates it into UTF-8 byte characters. |
| See also | ChrToOem\$, OemToChr\$, Utf8ToChr\$ |

CHOOSE function

CHOOSE function IMPROVED

| | |
|----------------|---|
| Purpose | Return one of several values, based upon the value of an index. |
| Syntax | <pre> y = CHOOSE(index&, choice1 [, choice2] ...[ELSE choice9]) y& = CHOOSE&(index&, choice1 [, choice2] ...[ELSE choice9]) y\$ = CHOOSE\$(index&, choice1 [, choice2] ...[ELSE choice9]) y = CHOOSE([BIT] index&, choice1 [, choice2] ...[ELSE choice9]) y& = CHOOSE&([BIT] index&, choice1 [, choice2] ...[ELSE choice9]) y\$ = CHOOSE\$([BIT] index&, choice1 [, choice2] ...[ELSE choice9]) y\$ = CHOOSE\$([BITS] index&, choice1 [, choice2] ...[ELSE choice9]) </pre> |
| Remarks | <p>These functions may take any number of choice parameters. They return one of the parameters, or a combination of them, based upon the value of <i>index&</i>. In the standard form, <i>index&</i> makes the choice based upon the sequence of the parameters. That is, if <i>index&</i> is one, <i>choice1</i> is returned. If two, <i>choice2</i> is returned, etc. If <i>index&</i> is not equal to one of the choice values, the default value is returned to the calling code.</p> <p>CHOOSE expects choices of any type. CHOOSE& expects choices optimized for an integral data type. CHOOSE\$ expects choices of type. CHOOSE% is recognized as a valid synonym for CHOOSE&.</p> |
| ELSE | <p>If no match is made with one of the choice values, the value zero (0) or an empty (zero-length) string is normally returned. However, if an ELSE clause is included as the last choice, its value is returned as the default value. For example:</p> <pre>ChoiceVar\$ = CHOOSE\$(7,"ONE", "TWO" ELSE "NUL")</pre> |

In this case, the ELSE expression "NUL" is returned.

| | |
|---------------------|---|
| BIT | If the BIT option is included, the selection is based upon the first bit set (lowest to highest) in <i>index&</i> . That is, the lowest bit (1) returns <i>choice1</i> , the next bit (2) returns <i>choice2</i> , the next bit (4) returns <i>choice3</i> , the next bit(8) returns <i>choice4</i> , etc. Evaluation of <i>index&</i> stops as soon as one set bit is found. This is particularly valuable when used with an ENUMERATION which also uses the BIT option, to describe a set of attributes for an item in your program. |
| BITS | This is similar to the BIT option, but is only available with the CHOOSE\$() version. <i>index&</i> is evaluated in the same general fashion, but the function may return multiple choices, as a concatenated string, if more than one bit is set. For example: <pre>x\$ = CHOOSE\$(BITS 5, "Computer ", "Laptop ", "Desktop ")</pre> Since the value 5 consists of 2 bits (the lowest and third-lowest) set, the first and third strings are concatenated and returned to the caller. In this case, "Computer Desktop " is the result. |
| Restrictions | PowerBASIC only evaluates the selected choice(s) at run-time, not all of them. This ensures optimum execution speed, as well as the elimination of unanticipated side effects. |
| See also | IIF , IIF& , IIF\$, MAX , MAX& , MAX\$, MIN , MIN& , MIN\$, SWITCH , SWITCH& , SWITCH\$, SELECT |
| Example | <pre>y& = 4 a\$ = CHOOSE\$(y&, "Bill", "Bob", "Bruce", "Barry")</pre> |
| Result | <pre>a\$ = "Barry"</pre> |

CHR\$ function

CHR\$/CHR\$\$ function IMPROVED

| | |
|----------------|--|
| Purpose | Converts one or more numeric character codes (ANSI or UNICODE), code ranges, and/or into a single string containing the corresponding character(s). |
| Syntax | <pre>s\$ = CHR\$(expression [,expression] [,...]) s\$ = CHR\$(string_expression [,...]) s\$\$ = CHR\$(x& TO y&, ...)</pre> |
| Remarks | <p>The CHR\$() form of the function creates a string of ANSI (1-byte) characters. Arguments must be ANSI (1-byte) characters, or codes in the range of 0 to 255. The CHR\$() form of the function creates a string of WIDE (2-byte) characters. Arguments must be WIDE (2-byte) characters, or codes in the range of 0 to 65535. Generally speaking, PowerBASIC handles ANSI/WIDE conversions for you, automatically and transparently. However, there are just a few functions (CHR\$, PEEK\$, POKE\$, STRING\$, etc.) which are ambiguous, by definition, and require that the programmer choose the appropriate result type (ANSI or WIDE). Use CHR\$ for ANSI results, or use CHR\$\$ for Unicode results. In the remainder of these remarks, CHR\$ is used to represent both CHR\$ and CHR\$\$. </p> <p>CHR\$ creates and returns a string. There are three forms of arguments available, and they may be intermixed in a single CHR\$ function. The created string may contain no characters, one character, or multiple characters, depending upon the arguments you use. You may specify any number of arguments for this function.</p> <p>If the argument is a numeric expression, it is translated into the character defined by that number. A character code of -1 is treated as a special case. If you use it as an argument, CHR\$ returns an empty (zero length) string for that character. For example, CHR\$(65, -1, 66) returns "AB".</p> <p>CHR\$(x& TO y&) returns a sequence of all characters from CHR\$(x&) through CHR\$(y&) inclusive. The characters may be ascending or descending in sequence. For example, CHR\$(65 TO 70) returns the string "ABCDEF". CHR\$(52 TO 50) returns the string "432",</p> |

and `CHR$(65 TO 65)` returns the string "A".

If the argument is a string expression, the characters are simply copied into the newly created string at the specified position. The expanded `CHR$` definition is intended to assist in the encoding of longer strings, to avoid the need for concatenation operations.

For example, the `CHR$` function can be used to create `COLLATE` strings for the [ARRAY SORT](#) and [ARRAY SCAN](#) statements at run-time, and can be used to create string equates at compile time:

```
$colstring = CHR$(0 TO 131, 97, 133 TO 255)
```

The following lines are functionally equivalent, and return the same string result:

```
a$ = CHR$("Line1", 13, 10, "Line2")
a$ = "Line1" & CHR$(13) & CHR$(10) & "Line2"
a$ = "Line1" & $CRLF & "Line2"
```

`CHR$` complements the [ASC](#) function, which returns the numeric character code of a nominated character in a string.

See also [ARRAY SCAN](#), [ARRAY SORT](#), [ASC function](#), [ASC statement](#), [NUL\\$](#), [SPACE\\$](#), [STRING\\$](#)

Example `H$ = CHR$("a$=", $DQ, 33, $DQ+$DQ, 35 TO 39, 40, $DQ)`

Result `a$="!"#$%&'("`

CHR\$\$ function

CHR\$/CHR\$\$ function

IMPROVED

Purpose Converts one or more numeric character codes ([ANSI](#) or [UNICODE](#)), code ranges, and/or into a single string containing the corresponding character(s).

Syntax

```
s$ = CHR$(expression [,expression] [,...])
s$ = CHR$(string_expression [,...])
s$$ = CHR$$(x& TO y&, ...)
```

Remarks The `CHR$()` form of the function creates a string of ANSI (1-byte) characters. Arguments must be ANSI (1-byte) characters, or codes in the range of 0 to 255. The `CHR$$()` form of the function creates a string of WIDE (2-byte) characters. Arguments must be WIDE (2-byte) characters, or codes in the range of 0 to 65535. Generally speaking, PowerBASIC handles ANSI/WIDE conversions for you, automatically and transparently. However, there are just a few functions (`CHR$`, [PEEK\\$](#), [POKE\\$](#), [STRING\\$](#), etc.) which are ambiguous, by definition, and require that the programmer choose the appropriate result type (ANSI or WIDE). Use `CHR$` for ANSI results, or use `CHR$$` for Unicode results. In the remainder of these remarks, `CHR$` is used to represent both `CHR$` and `CHR$$`.

`CHR$` creates and returns a string. There are three forms of arguments available, and they may be intermixed in a single `CHR$` function. The created string may contain no characters, one character, or multiple characters, depending upon the arguments you use. You may specify any number of arguments for this function.

If the argument is a numeric expression, it is translated into the character defined by that number. A character code of -1 is treated as a special case. If you use it as an argument, `CHR$` returns an empty (zero length) string for that character. For example, `CHR$(65, -1, 66)` returns "AB".

`CHR$(x& TO y&)` returns a sequence of all characters from `CHR$(x&)` through `CHR$(y&)` inclusive. The characters may be ascending or descending in sequence. For example, `CHR$(65 TO 70)` returns the string "ABCDEF". `CHR$(52 TO 50)` returns the string "432", and `CHR$(65 TO 65)` returns the string "A".

If the argument is a string expression, the characters are simply copied into the newly created string at the specified position. The expanded `CHR$` definition is intended to assist in the encoding of longer strings, to avoid the need for concatenation operations.

For example, the CHR\$ function can be used to create COLLATE strings for the [ARRAY SORT](#) and [ARRAY SCAN](#) statements at run-time, and can be used to create string equates at compile time:

```
$colstring = CHR$(0 TO 131, 97, 133 TO 255)
```

The following lines are functionally equivalent, and return the same string result:

```
a$ = CHR$("Line1", 13, 10, "Line2")
a$ = "Line1" & CHR$(13) & CHR$(10) & "Line2"
a$ = "Line1" & $CRLF & "Line2"
```

CHR\$ complements the [ASC](#) function, which returns the numeric character code of a nominated character in a string.

See also [ARRAY SCAN](#), [ARRAY SORT](#), [ASC function](#), [ASC statement](#), [NUL\\$](#), [SPACE\\$](#), [STRING\\$](#)

Example H\$ = CHR\$("a\$=", \$DQ, 33, \$DQ+\$DQ, 35 TO 39, 40, \$DQ)

Result a\$="!""#%&'(" "

CINT function

CBYT, CCUR, CCUX, CDBL, CDWD, CEXT, CINT, CLNG, CQUD, CSNG, and CWRD functions

Purpose Convert a value to specific [variable](#) type.

Syntax

| | |
|-----------------------------|-------------------------------------|
| <i>bytevar?</i> | = CBYT(<i>numeric_expression</i>) |
| <i>currencyvar@</i> | = CCUR(<i>numeric_expression</i>) |
| <i>currencyextvar@@</i> | = CCUX(<i>numeric_expression</i>) |
| <i>doublevar#</i> | = CDBL(<i>numeric_expression</i>) |
| <i>doublewordvar???</i> | = CDWD(<i>numeric_expression</i>) |
| <i>extendedvar##</i> | = CEXT(<i>numeric_expression</i>) |
| <i>integervar%</i> | = CINT(<i>numeric_expression</i>) |
| <i>longintvar&</i> | = CLNG(<i>numeric_expression</i>) |
| <i>quadintvar&&</i> | = CQUD(<i>numeric_expression</i>) |
| <i>singlevar!</i> | = CSNG(<i>numeric_expression</i>) |
| <i>wordvar??</i> | = CWRD(<i>numeric_expression</i>) |

Remarks Each of these functions converts a expression to a particular variable type. In each case, *numeric_expression* must be within the legal range for the result type. The *numeric_expression* will be rounded if necessary.

| Function | Result type |
|----------|---|
| CBYT | Byte |
| CCUR | Currency |
| CCUX | Extended-currency |
| CDBL | Double-precision floating-point |
| CDWD | Double-word |
| CEXT | Extended-precision floating-point |
| CINT | Integer |
| CLNG | Long-integer |
| CQUD | Quad-integer |
| CSNG | Single-precision floating-point |
| CWRD | Word |

These conversion functions are rarely needed as PowerBASIC automatically performs any necessary conversions when executing an assignment statement or passing parameters. For example:

```
e% = f#
```

is equivalent to:

```
e% = CINT(f#)
```

In the case of the functions that convert to

values, the fractional part of the number is rounded. If the fractional part is exactly .5 then it rounds to the nearest even integral value. For example, CINT(1.5) returns 2, CINT(.5) returns 0, and CLNG(-0.6) returns -1.

Restrictions CSNG limit string display to 7 significant digits.

See also [CEIL](#), [CVI](#) and associated functions, [FIX](#), [INT](#), [MKI\\$](#) and associated functions

Example

```
' Calculate CINT for a series of values
FOR I! = 2.4! TO 2.65! STEP 0.05!
  x$ = FORMAT$(I!, "0.00") + " is" + STR$(CINT(I!))
NEXT I!
```

Result

```
2.40 is 2
2.45 is 2
2.50 is 2
2.55 is 3
2.60 is 3
2.65 is 3
```

CLASS/END CLASS block

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CLASS/END CLASS Block

Purpose Create the code and data for an [object](#).

Syntax

```
CLASS name [$GUID] [COMMON] [OPTIMIZE] [AS COM | AS EVENT]
  INSTANCE className AS STRING
  Class Method code blocks...
  INTERFACE name $GUID [AS EVENT]
  INHERIT IUNKNOWN
  Method and Property code blocks...
END INTERFACE
EVENT SOURCE interface-name
END CLASS
```

Remarks CLASS / END CLASS statements enclose the Interface implementation(s) and Instance variable declarations of a [Class](#). [METHOD](#) and [PROPERTY](#) blocks contain the code to be executed on an object. [INSTANCE](#) statements define the [variables](#) which are unique to each instance of an object of this class.

The name and optional \$GUID are supplied by the programmer to identify the class. By default, a class is considered private, so that the methods are accessible only from within the EXE or DLL where it is defined. The AS COM attribute makes the class available externally, to virtually any process which is [COM](#)-aware.

With a private class, the \$GUID may be freely omitted, as PowerBASIC can readily identify the class by name. With a [published](#) COM class, you should insert a specific [GUID](#) of your choice. If omitted, a random GUID will be created by the compiler, but it will change every time you compile the program. This will be difficult to synchronize with other programs which wish to identify and access your object.

| | |
|----------|---|
| COMMON | The optional COMMON descriptor may be included to specify that this class may be freely referenced by and between linked unit modules (Host/Main or SLL). This has the added side effect of ensuring that the class will not be removed by #OPTIMIZE_CODE_ON . |
| AS EVENT | If a class is an Event Source (it generates events rather than handling events), one or more EVENT SOURCE statements are included to name the event interfaces. The event interfaces must be declared and implemented separately. An event is generated by executing a RAISEEVENT statement or an OBJECT RAISEEVENT statement in the class. If a class is an Event Handler (it contains code to handle an event generated by an Event Source), the AS EVENT attribute must appear on the CLASS statement and each INTERFACE statement. An Event Handler is also known as an "Event Sink". |
| OPTIMIZE | With code optimization enabled (#OPTIMIZE_CODE_ON), PowerBASIC removes code for subs and functions which are not called. Where possible, this technique is even applied to individual methods and property methods within classes. |

Of course, if an object variable is transferred out of the current module (to another EXE/SLL/DLL), there is no way to determine (at compile-time) which methods may be called on it at run-time, so none can be safely removed. COM, COMMON, and EVENT classes allow variables to be transferred out of the module, so they block removal of any code in the class.

The OPTIMIZE descriptor allows you to control this code optimization to a high degree. If you specify the OPTIMIZE option, you are stating that no object variables on this class will be transferred out of the module. Therefore, PowerBASIC is free to remove any code in the class which is not referenced. This is a powerful tool which can allow you to substantially reduce the size of your program.

The OPTIMIZE rules can be summarized:

1. If a class is marked COM, COMMON, or EVENT, no methods or property methods are ever removed from it.
2. If a class is marked OPTIMIZE, you state that no object variables from this class will be transferred out of the module. Methods which are not referenced are removed from the final code. OPTIMIZE may not be combined with COM, COMMON, or EVENT.
3. If no classes in the module are marked COM, COMMON, or EVENT, all classes are considered to be marked OPTIMIZE. All methods in all classes which are not referenced are extracted from the final code.

See also [#OPTIMIZE](#), [EVENT SOURCE](#), [EVENTS](#), [INSTANCE](#), [INTERFACE \(Direct\)](#), [INTERFACE \(IDBind\)](#), [Just what is COM?](#), [METHOD](#), [PROPERTY](#), [RAISEEVENT](#), [What is an object, anyway?](#)

CLIP\$ function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CLIP\$ function New!

| | |
|---------------------|--|
| Purpose | Delete characters from a |
| Syntax | <pre>s\$ = CLIP\$(LEFT <i>StringExpression</i>, <i>Count</i>&) s\$ = CLIP\$(RIGHT <i>StringExpression</i>, <i>Count</i>&) s\$ = CLIP\$(MID <i>StringExpression</i>, <i>Start</i>&, <i>Count</i>&)</pre> |
| Remarks | <p>LEFT Returns the contents of <i>StringExpression</i> with <i>Count</i>& characters removed from the left side.</p> <p>RIGHT Returns the contents of <i>StringExpression</i> with <i>Count</i>& characters removed from the right side.</p> <p>MID Returns the contents of <i>StringExpression</i> with <i>Count</i>& characters removed starting at position <i>Start</i>&. The first character is considered position 1, the second position 2...</p> <p>If <i>Count</i>& is negative, or <i>Start</i>& is less than one, the return value is undefined.</p> |
| Restrictions | If <i>Count</i> & is less than one, the entire string is returned. If <i>Start</i> & is less than one, the results are undefined. |
| See also | EXTRACT\$, LTRIM\$, MID\$, REMOVES\$, REPLACE , RTRIM\$, SHRINK\$, STRINSERT\$, STRDELETE\$, TRIM\$, UNWRAP\$ |

CLIPBOARD GET BITMAP statement

Keyword Template

Purpose
Syntax
Remarks
See also
Example

CLIPBOARD statement IMPROVED

| | |
|-------------------|--|
| Purpose | Copy data to/from the Windows ClipBoard. |
| Syntax | <pre>CLIPBOARD GET BITMAP TO <i>ClipVar</i> [, <i>ClipResult</i>] CLIPBOARD GET OEMTEXT TO <i>AnsiStrgVar</i> [, <i>ClipResult</i>] CLIPBOARD GET TEXT TO <i>StrgVar</i> [, <i>ClipResult</i>] CLIPBOARD GET UNICODE TO <i>StrgVar</i> [, <i>ClipResult</i>] CLIPBOARD RESET [, <i>ClipResult</i>] CLIPBOARD SET BITMAP <i>ClipHndl</i> [, <i>ClipResult</i>] CLIPBOARD SET OEMTEXT <i>StrgExpr</i> [, <i>ClipResult</i>] CLIPBOARD SET TEXT <i>StrgExpr</i> [, <i>ClipResult</i>] CLIPBOARD SET UNICODE <i>StrgExpr</i> [, <i>ClipResult</i>]</pre> |
| <i>ClipHndl</i> | A Long Integer or Dword value which specifies the 32-bit handle of a passed to the clipboard. |
| <i>ClipResult</i> | A Long Integer or Dword variable which receives a true result (-1) if the operation was successful, or a false result (0) if it failed. |
| <i>ClipVar</i> | A Long Integer or Dword variable which receives a 32-bit handle of a newly created GRAPHIC BITMAP. |

StrgExpr A [string expression](#) which specifies data to be passed to the clipboard.

StrgVar

A

variable which receives string data from the clipboard.

Remarks

The Windows Clipboard provides support for the transfer of various types of data between applications, or even different parts of a single application. The concept is simple -- save some data on the Clipboard and retrieve it later. In most cases, it's just used to transfer plain text, so the PowerBASIC CLIPBOARD statement concentrates on the common data formats. With text transfer, you can just read or write a string. With bitmaps, a GRAPHIC BITMAP is used for this purpose.

When you retrieve data using CLIPBOARD, the original copy always remains in the CLIPBOARD, so the operation can be repeated any number of times. When you store data on the CLIPBOARD, your original copy remains unchanged. The data is copied, with no change of ownership.

The clipboard can hold multiple data items, but only one of each data format at a time. Generally speaking, multiple data items are only used to store a single piece of data in multiple formats to ensure it can be retrieved successfully later. However, you should note that Windows automatically converts string data between [TEXT](#), [OEMTEXT](#), and [UNICODE](#). When you store data in one of those forms, it's not necessary to repeat it with the others.

You must execute a CLIPBOARD RESET to empty the clipboard before storing new data items.

Each form of the CLIPBOARD statement offers an optional ClipResult variable. If the requested operation is deemed successful by Windows, this variable is assigned the value TRUE (-1). If it fails, the value FALSE (0) is assigned instead. You should note that the success test is not a comprehensive one. It tests only the operation, not the validity of the data.

There are nine general forms of the CLIPBOARD statement:

CLIPBOARD GET BITMAP TO *ClipVar* [, *ClipResult*]

A new GRAPHIC BITMAP is automatically created. A Bitmap is copied from the Clipboard and stored in this newly created GRAPHIC BITMAP. The handle of the new GRAPHIC BITMAP is assigned to the *ClipVar*, a DWord or Long Integer variable. If the operation is not successful, the value zero (0) is assigned instead.

CLIPBOARD GET OEMTEXT TO *AnsiStrgVar* [, *ClipResult*]

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. If necessary, it is converted to OEM Text format, the format used by the Windows Console. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD GET TEXT TO *StrgVar* [, *ClipResult*]

A text string is retrieved from the CLIPBOARD, and assigned to the string variable specified by *StrgVar*, which may be ANSI or WIDE format. If necessary, the text is automatically converted to match the format of the target variable. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD RESET [, *ClipResult*]

The contents of the CLIPBOARD are deleted.

CLIPBOARD SET BITMAP *ClipHndl* [, *ClipResult*]

A GRAPHIC BITMAP, specified by *ClipHndl*, is stored on the CLIPBOARD. The GRAPHIC BITMAP may be a [GRAPHIC CONTROL](#), [GRAPHIC WINDOW](#), or GRAPHIC BITMAP. When passing a GRAPHIC CONTROL to the Clipboard, use [CONTROL HANDLE](#) to obtain the handle to the GRAPHIC CONTROL.

CLIPBOARD SET OEMTEXT *StrgExpr* [, *ClipResult*]

A text string, specified by *StrExpr*, is stored on the CLIPBOARD. The string data is assumed to use characters in the OEM character set.

CLIPBOARD SET TEXT *StrgExpr* [, *ClipResult*]

A text string, specified by *StrExpr*, is stored on the CLIPBOARD. The string data

may be in either ANSI or WIDE format.

The following two functions, with UNICODE options, were specifically designed for older versions of PowerBASIC which did not support wide Unicode strings. They may only be used with legacy programs which must store wide characters in an ANSI string variable. They should be converted to the TEXT option with wide string variables as soon as possible, as these forms of CLIPBOARD will not be supported in future versions of PowerBASIC.

CLIPBOARD GET UNICODE TO *AnsiStrgVar* [, *ClipResult*]

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. Even though the string variable uses 1-byte ANSI characters, the data is represented as 2-byte wide Unicode characters. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD SET UNICODE *AnsiStrgExpr* [, *ClipResult*]

A Unicode text string, stored in ANSI variables and constants, is stored on the CLIPBOARD.

CLIPBOARD GET OEMTEXT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CLIPBOARD statement IMPROVED

Purpose Copy data to/from the Windows ClipBoard.

Syntax

```
CLIPBOARD GET BITMAP TO ClipVar [, ClipResult]
CLIPBOARD GET OEMTEXT TO AnsiStrgVar [, ClipResult]
CLIPBOARD GET TEXT TO StrgVar [, ClipResult]
CLIPBOARD GET UNICODE TO StrgVar [, ClipResult]
CLIPBOARD RESET [, ClipResult]
CLIPBOARD SET BITMAP ClipHndl [, ClipResult]
CLIPBOARD SET OEMTEXT StrgExpr [, ClipResult]
CLIPBOARD SET TEXT StrgExpr [, ClipResult]
CLIPBOARD SET UNICODE StrgExpr [, ClipResult]
```

ClipHndl A [Long Integer](#) or [Dword](#) value which specifies the 32-bit handle of a passed to the clipboard.

ClipResult A Long Integer or Dword variable which receives a [true](#) result (-1) if the operation was successful, or a [false](#) result (0) if it failed.

ClipVar A Long Integer or Dword variable which receives a 32-bit handle of a newly created GRAPHIC BITMAP.

StrgExpr A [string expression](#) which specifies data to be passed to the clipboard.

StrgVar A variable which receives string data from the clipboard.

Remarks The Windows ClipBoard provides support for the transfer of various types of data between applications, or even different parts of a single application. The concept is simple -- save some data on the ClipBoard and retrieve it later. In most cases, it's just used to transfer

plain text, so the PowerBASIC CLIPBOARD statement concentrates on the common data formats. With text transfer, you can just read or write a string. With bitmaps, a GRAPHIC BITMAP is used for this purpose.

When you retrieve data using CLIPBOARD, the original copy always remains in the CLIPBOARD, so the operation can be repeated any number of times. When you store data on the CLIPBOARD, your original copy remains unchanged. The data is copied, with no change of ownership.

The clipboard can hold multiple data items, but only one of each data format at a time. Generally speaking, multiple data items are only used to store a single piece of data in multiple formats to ensure it can be retrieved successfully later. However, you should note that Windows automatically converts string data between [TEXT](#), [OEMTEXT](#), and [UNICODE](#). When you store data in one of those forms, it's not necessary to repeat it with the others.

You must execute a CLIPBOARD RESET to empty the clipboard before storing new data items.

Each form of the CLIPBOARD statement offers an optional ClipResult variable. If the requested operation is deemed successful by Windows, this variable is assigned the value TRUE (-1). If it fails, the value FALSE (0) is assigned instead. You should note that the success test is not a comprehensive one. It tests only the operation, not the validity of the data.

There are nine general forms of the CLIPBOARD statement:

CLIPBOARD GET BITMAP TO *ClipVar* [, *ClipResult*]

A new GRAPHIC BITMAP is automatically created. A Bitmap is copied from the ClipBoard and stored in this newly created GRAPHIC BITMAP. The handle of the new GRAPHIC BITMAP is assigned to the *ClipVar*, a DWord or Long Integer variable. If the operation is not successful, the value zero (0) is assigned instead.

CLIPBOARD GET OEMTEXT TO *AnsiStrgVar* [, *ClipResult*]

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. If necessary, it is converted to OEM Text format, the format used by the Windows Console. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD GET TEXT TO *StrgVar* [, *ClipResult*]

A text string is retrieved from the CLIPBOARD, and assigned to the string variable specified by *StrgVar*, which may be ANSI or WIDE format. If necessary, the text is automatically converted to match the format of the target variable. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD RESET [, *ClipResult*]

The contents of the CLIPBOARD are deleted.

CLIPBOARD SET BITMAP *ClipHndl* [, *ClipResult*]

A GRAPHIC BITMAP, specified by *ClipHndl*, is stored on the CLIPBOARD. The GRAPHIC BITMAP may be a [GRAPHIC CONTROL](#), [GRAPHIC WINDOW](#), or GRAPHIC BITMAP. When passing a GRAPHIC CONTROL to the Clipboard, use [CONTROL HANDLE](#) to obtain the handle to the GRAPHIC CONTROL.

CLIPBOARD SET OEMTEXT *StrgExpr* [, *ClipResult*]

A text string, specified by *StrExpr*, is stored on the CLIPBOARD. The string data is assumed to use characters in the OEM character set.

CLIPBOARD SET TEXT *StrgExpr* [, *ClipResult*]

A text string, specified by *StrExpr*, is stored on the CLIPBOARD. The string data may be in either ANSI or WIDE format.

The following two functions, with UNICODE options, were specifically designed for older versions of PowerBASIC which did not support wide Unicode strings. They may only be used with legacy programs which must store wide characters in an ANSI string variable. They should be converted to the TEXT option with wide string variables as soon as possible, as these forms

of CLIPBOARD will not be supported in future versions of PowerBASIC.

CLIPBOARD GET UNICODE TO *AnsiStrgVar* [, *ClipResult*]

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. Even though the string variable uses 1-byte ANSI characters, the data is represented as 2-byte wide Unicode characters. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD SET UNICODE *AnsiStrgExpr* [, *ClipResult*]

A UniCode text string, stored in ANSI variables and constants, is stored on the CLIPBOARD.

CLIPBOARD GET TEXT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CLIPBOARD statement IMPROVED

Purpose Copy data to/from the Windows ClipBoard.

Syntax

```
CLIPBOARD GET BITMAP TO ClipVar [, ClipResult]
CLIPBOARD GET OEMTEXT TO AnsiStrgVar [, ClipResult]
CLIPBOARD GET TEXT TO StrgVar [, ClipResult]
CLIPBOARD GET UNICODE TO StrgVar [, ClipResult]
CLIPBOARD RESET [, ClipResult]
CLIPBOARD SET BITMAP ClipHndl [, ClipResult]
CLIPBOARD SET OEMTEXT StrgExpr [, ClipResult]
CLIPBOARD SET TEXT StrgExpr [, ClipResult]
CLIPBOARD SET UNICODE StrgExpr [, ClipResult]
```

ClipHndl A [Long Integer](#) or [Dword](#) value which specifies the 32-bit handle of a passed to the clipboard.

ClipResult A Long Integer or Dword variable which receives a [true](#) result (-1) if the operation was successful, or a [false](#) result (0) if it failed.

ClipVar A Long Integer or Dword variable which receives a 32-bit handle of a newly created GRAPHIC BITMAP.

StrgExpr A [string expression](#) which specifies data to be passed to the clipboard.

StrgVar A variable which receives string data from the clipboard.

Remarks The Windows ClipBoard provides support for the transfer of various types of data between applications, or even different parts of a single application. The concept is simple -- save some data on the ClipBoard and retrieve it later. In most cases, it's just used to transfer plain text, so the PowerBASIC CLIPBOARD statement concentrates on the common data formats. With text transfer, you can just read or write a string. With bitmaps, a GRAPHIC BITMAP is used for this purpose.

When you retrieve data using CLIPBOARD, the original copy always remains in the CLIPBOARD, so the operation can be repeated any number of times. When you store

data on the CLIPBOARD, your original copy remains unchanged. The data is copied, with no change of ownership.

The clipboard can hold multiple data items, but only one of each data format at a time. Generally speaking, multiple data items are only used to store a single piece of data in multiple formats to ensure it can be retrieved successfully later. However, you should note that Windows automatically converts string data between [TEXT](#), [OEMTEXT](#), and [UNICODE](#). When you store data in one of those forms, it's not necessary to repeat it with the others.

You must execute a CLIPBOARD RESET to empty the clipboard before storing new data items.

Each form of the CLIPBOARD statement offers an optional ClipResult variable. If the requested operation is deemed successful by Windows, this variable is assigned the value TRUE (-1). If it fails, the value FALSE (0) is assigned instead. You should note that the success test is not a comprehensive one. It tests only the operation, not the validity of the data.

There are nine general forms of the CLIPBOARD statement:

CLIPBOARD GET BITMAP TO *ClipVar* [, *ClipResult*]

A new GRAPHIC BITMAP is automatically created. A Bitmap is copied from the ClipBoard and stored in this newly created GRAPHIC BITMAP. The handle of the new GRAPHIC BITMAP is assigned to the *ClipVar*, a DWord or Long Integer variable. If the operation is not successful, the value zero (0) is assigned instead.

CLIPBOARD GET OEMTEXT TO *AnsiStrgVar* [, *ClipResult*]

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. If necessary, it is converted to OEM Text format, the format used by the Windows Console. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD GET TEXT TO *StrgVar* [, *ClipResult*]

A text string is retrieved from the CLIPBOARD, and assigned to the string variable specified by *StrgVar*, which may be ANSI or WIDE format. If necessary, the text is automatically converted to match the format of the target variable. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD RESET [, *ClipResult*]

The contents of the CLIPBOARD are deleted.

CLIPBOARD SET BITMAP *ClipHndl* [, *ClipResult*]

A GRAPHIC BITMAP, specified by *ClipHndl*, is stored on the CLIPBOARD. The GRAPHIC BITMAP may be a [GRAPHIC CONTROL](#), [GRAPHIC WINDOW](#), or GRAPHIC BITMAP. When passing a GRAPHIC CONTROL to the Clipboard, use [CONTROL HANDLE](#) to obtain the handle to the GRAPHIC CONTROL.

CLIPBOARD SET OEMTEXT *StrgExpr* [, *ClipResult*]

A text string, specified by *StrExpr*, is stored on the CLIPBOARD. The string data is assumed to use characters in the OEM character set.

CLIPBOARD SET TEXT *StrgExpr* [, *ClipResult*]

A text string, specified by *StrExpr*, is stored on the CLIPBOARD. The string data may be in either ANSI or WIDE format.

The following two functions, with UNICODE options, were specifically designed for older versions of PowerBASIC which did not support wide Unicode strings. They may only be used with legacy programs which must store wide characters in an ANSI string variable. They should be converted to the TEXT option with wide string variables as soon as possible, as these forms of CLIPBOARD will not be supported in future versions of PowerBASIC.

CLIPBOARD GET UNICODE TO *AnsiStrgVar* [, *ClipResult*]

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. Even though the string variable uses 1-byte

ANSI characters, the data is represented as 2-byte wide Unicode characters. If no text can be retrieved, a nul (zero-length) string is assigned instead.

```
CLIPBOARD SET UNICODE AnsiStrgExpr [, ClipResult]
```

A UniCode text string, stored in ANSI variables and constants, is stored on the CLIPBOARD.

CLIPBOARD GET UNICODE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CLIPBOARD statement IMPROVED

Purpose Copy data to/from the Windows ClipBoard.

Syntax

```
CLIPBOARD GET BITMAP TO ClipVar [, ClipResult]
CLIPBOARD GET OEMTEXT TO AnsiStrgVar [, ClipResult]
CLIPBOARD GET TEXT TO StrgVar [, ClipResult]
CLIPBOARD GET UNICODE TO StrgVar [, ClipResult]
CLIPBOARD RESET [, ClipResult]
CLIPBOARD SET BITMAP ClipHndl [, ClipResult]
CLIPBOARD SET OEMTEXT StrgExpr [, ClipResult]
CLIPBOARD SET TEXT StrgExpr [, ClipResult]
CLIPBOARD SET UNICODE StrgExpr [, ClipResult]
```

ClipHndl A [Long Integer](#) or [Dword](#) value which specifies the 32-bit handle of a passed to the clipboard.

ClipResult A Long Integer or Dword variable which receives a [true](#) result (-1) if the operation was successful, or a [false](#) result (0) if it failed.

ClipVar A Long Integer or Dword variable which receives a 32-bit handle of a newly created GRAPHIC BITMAP.

StrgExpr A [string expression](#) which specifies data to be passed to the clipboard.

StrgVar A variable which receives string data from the clipboard.

Remarks The Windows ClipBoard provides support for the transfer of various types of data between applications, or even different parts of a single application. The concept is simple -- save some data on the ClipBoard and retrieve it later. In most cases, it's just used to transfer plain text, so the PowerBASIC CLIPBOARD statement concentrates on the common data formats. With text transfer, you can just read or write a string. With bitmaps, a GRAPHIC BITMAP is used for this purpose.

When you retrieve data using CLIPBOARD, the original copy always remains in the CLIPBOARD, so the operation can be repeated any number of times. When you store data on the CLIPBOARD, your original copy remains unchanged. The data is copied, with no change of ownership.

The clipboard can hold multiple data items, but only one of each data format at a time. Generally speaking, multiple data items are only used to store a single piece of data in multiple formats to ensure it can be retrieved successfully later. However, you should note that Windows automatically converts string data between [TEXT](#), [OEMTEXT](#), and

[UNICODE](#). When you store data in one of those forms, it's not necessary to repeat it with the others.

You must execute a CLIPBOARD RESET to empty the clipboard before storing new data items.

Each form of the CLIPBOARD statement offers an optional ClipResult variable. If the requested operation is deemed successful by Windows, this variable is assigned the value TRUE (-1). If it fails, the value FALSE (0) is assigned instead. You should note that the success test is not a comprehensive one. It tests only the operation, not the validity of the data.

There are nine general forms of the CLIPBOARD statement:

CLIPBOARD GET BITMAP TO *ClipVar* [, *ClipResult*]

A new GRAPHIC BITMAP is automatically created. A Bitmap is copied from the ClipBoard and stored in this newly created GRAPHIC BITMAP. The handle of the new GRAPHIC BITMAP is assigned to the *ClipVar*, a DWord or Long Integer variable. If the operation is not successful, the value zero (0) is assigned instead.

CLIPBOARD GET OEMTEXT TO *AnsiStrgVar* [, *ClipResult*]

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. If necessary, it is converted to OEM Text format, the format used by the Windows Console. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD GET TEXT TO *StrgVar* [, *ClipResult*]

A text string is retrieved from the CLIPBOARD, and assigned to the string variable specified by *StrgVar*, which may be ANSI or WIDE format. If necessary, the text is automatically converted to match the format of the target variable. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD RESET [, *ClipResult*]

The contents of the CLIPBOARD are deleted.

CLIPBOARD SET BITMAP *ClipHndl* [, *ClipResult*]

A GRAPHIC BITMAP, specified by *ClipHndl*, is stored on the CLIPBOARD. The GRAPHIC BITMAP may be a [GRAPHIC CONTROL](#), [GRAPHIC WINDOW](#), or GRAPHIC BITMAP. When passing a GRAPHIC CONTROL to the Clipboard, use [CONTROL HANDLE](#) to obtain the handle to the GRAPHIC CONTROL.

CLIPBOARD SET OEMTEXT *StrgExpr* [, *ClipResult*]

A text string, specified by *StrExpr*, is stored on the CLIPBOARD. The string data is assumed to use characters in the OEM character set.

CLIPBOARD SET TEXT *StrgExpr* [, *ClipResult*]

A text string, specified by *StrExpr*, is stored on the CLIPBOARD. The string data may be in either ANSI or WIDE format.

The following two functions, with UNICODE options, were specifically designed for older versions of PowerBASIC which did not support wide Unicode strings. They may only be used with legacy programs which must store wide characters in an ANSI string variable. They should be converted to the TEXT option with wide string variables as soon as possible, as these forms of CLIPBOARD will not be supported in future versions of PowerBASIC.

CLIPBOARD GET UNICODE TO *AnsiStrgVar* [, *ClipResult*]

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. Even though the string variable uses 1-byte ANSI characters, the data is represented as 2-byte wide Unicode characters. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD SET UNICODE *AnsiStrgExpr* [, *ClipResult*]

A UniCode text string, stored in ANSI variables and constants, is stored on the CLIPBOARD.

CLIPBOARD RESET statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CLIPBOARD statement IMPROVED

Purpose Copy data to/from the Windows Clipboard.

Syntax

```
CLIPBOARD GET BITMAP TO ClipVar [, ClipResult]
CLIPBOARD GET OEMTEXT TO AnsiStrgVar [, ClipResult]
CLIPBOARD GET TEXT TO StrgVar [, ClipResult]
CLIPBOARD GET UNICODE TO StrgVar [, ClipResult]
CLIPBOARD RESET [, ClipResult]
CLIPBOARD SET BITMAP ClipHndl [, ClipResult]
CLIPBOARD SET OEMTEXT StrgExpr [, ClipResult]
CLIPBOARD SET TEXT StrgExpr [, ClipResult]
CLIPBOARD SET UNICODE StrgExpr [, ClipResult]
```

ClipHndl A [Long Integer](#) or [Dword](#) value which specifies the 32-bit handle of a passed to the clipboard.

ClipResult A Long Integer or Dword variable which receives a [true](#) result (-1) if the operation was successful, or a [false](#) result (0) if it failed.

ClipVar A Long Integer or Dword variable which receives a 32-bit handle of a newly created GRAPHIC BITMAP.

StrgExpr A [string expression](#) which specifies data to be passed to the clipboard.

StrgVar A variable which receives string data from the clipboard.

Remarks The Windows Clipboard provides support for the transfer of various types of data between applications, or even different parts of a single application. The concept is simple -- save some data on the Clipboard and retrieve it later. In most cases, it's just used to transfer plain text, so the PowerBASIC CLIPBOARD statement concentrates on the common data formats. With text transfer, you can just read or write a string. With bitmaps, a GRAPHIC BITMAP is used for this purpose.

When you retrieve data using CLIPBOARD, the original copy always remains in the CLIPBOARD, so the operation can be repeated any number of times. When you store data on the CLIPBOARD, your original copy remains unchanged. The data is copied, with no change of ownership.

The clipboard can hold multiple data items, but only one of each data format at a time. Generally speaking, multiple data items are only used to store a single piece of data in multiple formats to ensure it can be retrieved successfully later. However, you should note that Windows automatically converts string data between [TEXT](#), [OEMTEXT](#), and [UNICODE](#). When you store data in one of those forms, it's not necessary to repeat it with the others.

You must execute a CLIPBOARD RESET to empty the clipboard before storing new data items.

Each form of the CLIPBOARD statement offers an optional ClipResult variable. If the

requested operation is deemed successful by Windows, this variable is assigned the value TRUE (-1). If it fails, the value FALSE (0) is assigned instead. You should note that the success test is not a comprehensive one. It tests only the operation, not the validity of the data.

There are nine general forms of the CLIPBOARD statement:

CLIPBOARD GET BITMAP TO *ClipVar* [, *ClipResult*]

A new GRAPHIC BITMAP is automatically created. A Bitmap is copied from the ClipBoard and stored in this newly created GRAPHIC BITMAP. The handle of the new GRAPHIC BITMAP is assigned to the *ClipVar*, a DWord or Long Integer variable. If the operation is not successful, the value zero (0) is assigned instead.

CLIPBOARD GET OEMTEXT TO *AnsiStrgVar* [, *ClipResult*]

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. If necessary, it is converted to OEM Text format, the format used by the Windows Console. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD GET TEXT TO *StrgVar* [, *ClipResult*]

A text string is retrieved from the CLIPBOARD, and assigned to the string variable specified by *StrgVar*, which may be ANSI or WIDE format. If necessary, the text is automatically converted to match the format of the target variable. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD RESET [, *ClipResult*]

The contents of the CLIPBOARD are deleted.

CLIPBOARD SET BITMAP *ClipHndl* [, *ClipResult*]

A GRAPHIC BITMAP, specified by *ClipHndl*, is stored on the CLIPBOARD. The GRAPHIC BITMAP may be a [GRAPHIC CONTROL](#), [GRAPHIC WINDOW](#), or GRAPHIC BITMAP. When passing a GRAPHIC CONTROL to the Clipboard, use [CONTROL HANDLE](#) to obtain the handle to the GRAPHIC CONTROL.

CLIPBOARD SET OEMTEXT *StrgExpr* [, *ClipResult*]

A text string, specified by *StrExpr*, is stored on the CLIPBOARD. The string data is assumed to use characters in the OEM character set.

CLIPBOARD SET TEXT *StrgExpr* [, *ClipResult*]

A text string, specified by *StrExpr*, is stored on the CLIPBOARD. The string data may be in either ANSI or WIDE format.

The following two functions, with UNICODE options, were specifically designed for older versions of PowerBASIC which did not support wide Unicode strings. They may only be used with legacy programs which must store wide characters in an ANSI string variable. They should be converted to the TEXT option with wide string variables as soon as possible, as these forms of CLIPBOARD will not be supported in future versions of PowerBASIC.

CLIPBOARD GET UNICODE TO *AnsiStrgVar* [, *ClipResult*]

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. Even though the string variable uses 1-byte ANSI characters, the data is represented as 2-byte wide Unicode characters. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD SET UNICODE *AnsiStrgExpr* [, *ClipResult*]

A Unicode text string, stored in ANSI variables and constants, is stored on the CLIPBOARD.

CLIPBOARD SET BITMAP statement

Keyword Template

Purpose

Syntax
Remarks
See also
Example

CLIPBOARD statement IMPROVED

Purpose Copy data to/from the Windows ClipBoard.

Syntax

```
CLIPBOARD GET BITMAP TO ClipVar [, ClipResult]
CLIPBOARD GET OEMTEXT TO AnsiStrgVar [, ClipResult]
CLIPBOARD GET TEXT TO StrgVar [, ClipResult]
CLIPBOARD GET UNICODE TO StrgVar [, ClipResult]
CLIPBOARD RESET [, ClipResult]
CLIPBOARD SET BITMAP ClipHndl [, ClipResult]
CLIPBOARD SET OEMTEXT StrgExpr [, ClipResult]
CLIPBOARD SET TEXT StrgExpr [, ClipResult]
CLIPBOARD SET UNICODE StrgExpr [, ClipResult]
```

ClipHndl A [Long Integer](#) or [Dword](#) value which specifies the 32-bit handle of a passed to the clipboard.

ClipResult A Long Integer or Dword variable which receives a [true](#) result (-1) if the operation was successful, or a [false](#) result (0) if it failed.

ClipVar A Long Integer or Dword variable which receives a 32-bit handle of a newly created GRAPHIC BITMAP.

StrgExpr A [string expression](#) which specifies data to be passed to the clipboard.

StrgVar A variable which receives string data from the clipboard.

Remarks The Windows ClipBoard provides support for the transfer of various types of data between applications, or even different parts of a single application. The concept is simple -- save some data on the ClipBoard and retrieve it later. In most cases, it's just used to transfer plain text, so the PowerBASIC CLIPBOARD statement concentrates on the common data formats. With text transfer, you can just read or write a string. With bitmaps, a GRAPHIC BITMAP is used for this purpose.

When you retrieve data using CLIPBOARD, the original copy always remains in the CLIPBOARD, so the operation can be repeated any number of times. When you store data on the CLIPBOARD, your original copy remains unchanged. The data is copied, with no change of ownership.

The clipboard can hold multiple data items, but only one of each data format at a time. Generally speaking, multiple data items are only used to store a single piece of data in multiple formats to ensure it can be retrieved successfully later. However, you should note that Windows automatically converts string data between [TEXT](#), [OEMTEXT](#), and [UNICODE](#). When you store data in one of those forms, it's not necessary to repeat it with the others.

You must execute a CLIPBOARD RESET to empty the clipboard before storing new data items.

Each form of the CLIPBOARD statement offers an optional ClipResult variable. If the requested operation is deemed successful by Windows, this variable is assigned the value TRUE (-1). If it fails, the value FALSE (0) is assigned instead. You should note that the success test is not a comprehensive one. It tests only the operation, not the validity of the data.

There are nine general forms of the CLIPBOARD statement:

```
CLIPBOARD GET BITMAP TO ClipVar [, ClipResult]
```

A new GRAPHIC BITMAP is automatically created. A Bitmap is copied from the Clipboard and stored in this newly created GRAPHIC BITMAP. The handle of the new GRAPHIC BITMAP is assigned to the *ClipVar*, a DWord or Long Integer variable. If the operation is not successful, the value zero (0) is assigned instead.

CLIPBOARD GET OEMTEXT TO *AnsiStrgVar* [, *ClipResult*]

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. If necessary, it is converted to OEM Text format, the format used by the Windows Console. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD GET TEXT TO *StrgVar* [, *ClipResult*]

A text string is retrieved from the CLIPBOARD, and assigned to the string variable specified by *StrgVar*, which may be ANSI or WIDE format. If necessary, the text is automatically converted to match the format of the target variable. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD RESET [, *ClipResult*]

The contents of the CLIPBOARD are deleted.

CLIPBOARD SET BITMAP *ClipHndl* [, *ClipResult*]

A GRAPHIC BITMAP, specified by *ClipHndl*, is stored on the CLIPBOARD. The GRAPHIC BITMAP may be a [GRAPHIC CONTROL](#), [GRAPHIC WINDOW](#), or GRAPHIC BITMAP. When passing a GRAPHIC CONTROL to the Clipboard, use [CONTROL HANDLE](#) to obtain the handle to the GRAPHIC CONTROL.

CLIPBOARD SET OEMTEXT *StrgExpr* [, *ClipResult*]

A text string, specified by *StrExpr*, is stored on the CLIPBOARD. The string data is assumed to use characters in the OEM character set.

CLIPBOARD SET TEXT *StrgExpr* [, *ClipResult*]

A text string, specified by *StrExpr*, is stored on the CLIPBOARD. The string data may be in either ANSI or WIDE format.

The following two functions, with UNICODE options, were specifically designed for older versions of PowerBASIC which did not support wide Unicode strings. They may only be used with legacy programs which must store wide characters in an ANSI string variable. They should be converted to the TEXT option with wide string variables as soon as possible, as these forms of CLIPBOARD will not be supported in future versions of PowerBASIC.

CLIPBOARD GET UNICODE TO *AnsiStrgVar* [, *ClipResult*]

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. Even though the string variable uses 1-byte ANSI characters, the data is represented as 2-byte wide Unicode characters. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD SET UNICODE *AnsiStrgExpr* [, *ClipResult*]

A Unicode text string, stored in ANSI variables and constants, is stored on the CLIPBOARD.

CLIPBOARD SET OEMTEXT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CLIPBOARD statement IMPROVED

| | |
|-------------------|--|
| Purpose | Copy data to/from the Windows ClipBoard. |
| Syntax | <pre>CLIPBOARD GET BITMAP TO ClipVar [, ClipResult] CLIPBOARD GET OEMTEXT TO AnsiStrgVar [, ClipResult] CLIPBOARD GET TEXT TO StrgVar [, ClipResult] CLIPBOARD GET UNICODE TO StrgVar [, ClipResult] CLIPBOARD RESET [, ClipResult] CLIPBOARD SET BITMAP ClipHndl [, ClipResult] CLIPBOARD SET OEMTEXT StrgExpr [, ClipResult] CLIPBOARD SET TEXT StrgExpr [, ClipResult] CLIPBOARD SET UNICODE StrgExpr [, ClipResult]</pre> |
| <i>ClipHndl</i> | A Long Integer or Dword value which specifies the 32-bit handle of a passed to the clipboard. |
| <i>ClipResult</i> | A Long Integer or Dword variable which receives a true result (-1) if the operation was successful, or a false result (0) if it failed. |
| <i>ClipVar</i> | A Long Integer or Dword variable which receives a 32-bit handle of a newly created GRAPHIC BITMAP. |
| <i>StrgExpr</i> | A string expression which specifies data to be passed to the clipboard. |
| <i>StrgVar</i> | A variable which receives string data from the clipboard. |
| Remarks | <p>The Windows ClipBoard provides support for the transfer of various types of data between applications, or even different parts of a single application. The concept is simple -- save some data on the ClipBoard and retrieve it later. In most cases, it's just used to transfer plain text, so the PowerBASIC CLIPBOARD statement concentrates on the common data formats. With text transfer, you can just read or write a string. With bitmaps, a GRAPHIC BITMAP is used for this purpose.</p> <p>When you retrieve data using CLIPBOARD, the original copy always remains in the CLIPBOARD, so the operation can be repeated any number of times. When you store data on the CLIPBOARD, your original copy remains unchanged. The data is copied, with no change of ownership.</p> <p>The clipboard can hold multiple data items, but only one of each data format at a time. Generally speaking, multiple data items are only used to store a single piece of data in multiple formats to ensure it can be retrieved successfully later. However, you should note that Windows automatically converts string data between TEXT, OEMTEXT, and UNICODE. When you store data in one of those forms, it's not necessary to repeat it with the others.</p> |

You must execute a CLIPBOARD RESET to empty the clipboard before storing new data items.

Each form of the CLIPBOARD statement offers an optional ClipResult variable. If the requested operation is deemed successful by Windows, this variable is assigned the value TRUE (-1). If it fails, the value FALSE (0) is assigned instead. You should note that the success test is not a comprehensive one. It tests only the operation, not the validity of the data.

There are nine general forms of the CLIPBOARD statement:

```
CLIPBOARD GET BITMAP TO ClipVar [, ClipResult]
```

A new GRAPHIC BITMAP is automatically created. A Bitmap is copied from the ClipBoard and stored in this newly created GRAPHIC BITMAP. The handle of the new GRAPHIC BITMAP is assigned to the *ClipVar*, a DWord or Long Integer variable. If the operation is not successful, the value zero (0) is assigned instead.

```
CLIPBOARD GET OEMTEXT TO AnsiStrgVar [, ClipResult]
```

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. If necessary, it is converted to OEM Text

format, the format used by the Windows Console. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD GET TEXT TO *StrgVar* [, *ClipResult*]

A text string is retrieved from the CLIPBOARD, and assigned to the string variable specified by *StrgVar*, which may be ANSI or WIDE format. If necessary, the text is automatically converted to match the format of the target variable. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD RESET [, *ClipResult*]

The contents of the CLIPBOARD are deleted.

CLIPBOARD SET BITMAP *ClipHndl* [, *ClipResult*]

A GRAPHIC BITMAP, specified by *ClipHndl*, is stored on the CLIPBOARD. The GRAPHIC BITMAP may be a [GRAPHIC CONTROL](#), [GRAPHIC WINDOW](#), or GRAPHIC BITMAP. When passing a GRAPHIC CONTROL to the Clipboard, use [CONTROL HANDLE](#) to obtain the handle to the GRAPHIC CONTROL.

CLIPBOARD SET OEMTEXT *StrgExpr* [, *ClipResult*]

A text string, specified by *StrExpr*, is stored on the CLIPBOARD. The string data is assumed to use characters in the OEM character set.

CLIPBOARD SET TEXT *StrgExpr* [, *ClipResult*]

A text string, specified by *StrExpr*, is stored on the CLIPBOARD. The string data may be in either ANSI or WIDE format.

The following two functions, with UNICODE options, were specifically designed for older versions of PowerBASIC which did not support wide Unicode strings. They may only be used with legacy programs which must store wide characters in an ANSI string variable. They should be converted to the TEXT option with wide string variables as soon as possible, as these forms of CLIPBOARD will not be supported in future versions of PowerBASIC.

CLIPBOARD GET UNICODE TO *AnsiStrgVar* [, *ClipResult*]

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. Even though the string variable uses 1-byte ANSI characters, the data is represented as 2-byte wide Unicode characters. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD SET UNICODE *AnsiStrgExpr* [, *ClipResult*]

A UniCode text string, stored in ANSI variables and constants, is stored on the CLIPBOARD.

CLIPBOARD SET TEXT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CLIPBOARD statement IMPROVED

Purpose Copy data to/from the Windows ClipBoard.

Syntax

CLIPBOARD GET BITMAP TO *ClipVar* [, *ClipResult*]

CLIPBOARD GET OEMTEXT TO *AnsiStrgVar* [, *ClipResult*]

CLIPBOARD GET TEXT TO *StrgVar* [, *ClipResult*]

```

CLIPBOARD GET UNICODE TO StrgVar [, ClipResult]
CLIPBOARD RESET [, ClipResult]
CLIPBOARD SET BITMAP ClipHndl [, ClipResult]
CLIPBOARD SET OEMTEXT StrgExpr [, ClipResult]
CLIPBOARD SET TEXT StrgExpr [, ClipResult]
CLIPBOARD SET UNICODE StrgExpr [, ClipResult]

```

ClipHndl A [Long Integer](#) or [Dword](#) value which specifies the 32-bit handle of a passed to the clipboard.

ClipResult A Long Integer or Dword variable which receives a [true](#) result (-1) if the operation was successful, or a [false](#) result (0) if it failed.

ClipVar A Long Integer or Dword variable which receives a 32-bit handle of a newly created GRAPHIC BITMAP.

StrgExpr A [string expression](#) which specifies data to be passed to the clipboard.

StrgVar A

variable which receives string data from the clipboard.

Remarks The Windows ClipBoard provides support for the transfer of various types of data between applications, or even different parts of a single application. The concept is simple -- save some data on the ClipBoard and retrieve it later. In most cases, it's just used to transfer plain text, so the PowerBASIC CLIPBOARD statement concentrates on the common data formats. With text transfer, you can just read or write a string. With bitmaps, a GRAPHIC BITMAP is used for this purpose.

When you retrieve data using CLIPBOARD, the original copy always remains in the CLIPBOARD, so the operation can be repeated any number of times. When you store data on the CLIPBOARD, your original copy remains unchanged. The data is copied, with no change of ownership.

The clipboard can hold multiple data items, but only one of each data format at a time. Generally speaking, multiple data items are only used to store a single piece of data in multiple formats to ensure it can be retrieved successfully later. However, you should note that Windows automatically converts string data between [TEXT](#), [OEMTEXT](#), and [UNICODE](#). When you store data in one of those forms, it's not necessary to repeat it with the others.

You must execute a CLIPBOARD RESET to empty the clipboard before storing new data items.

Each form of the CLIPBOARD statement offers an optional ClipResult variable. If the requested operation is deemed successful by Windows, this variable is assigned the value TRUE (-1). If it fails, the value FALSE (0) is assigned instead. You should note that the success test is not a comprehensive one. It tests only the operation, not the validity of the data.

There are nine general forms of the CLIPBOARD statement:

```
CLIPBOARD GET BITMAP TO ClipVar [, ClipResult]
```

A new GRAPHIC BITMAP is automatically created. A Bitmap is copied from the ClipBoard and stored in this newly created GRAPHIC BITMAP. The handle of the new GRAPHIC BITMAP is assigned to the *ClipVar*, a DWord or Long Integer variable. If the operation is not successful, the value zero (0) is assigned instead.

```
CLIPBOARD GET OEMTEXT TO AnsiStrgVar [, ClipResult]
```

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. If necessary, it is converted to OEM Text format, the format used by the Windows Console. If no text can be retrieved, a nul (zero-length) string is assigned instead.

```
CLIPBOARD GET TEXT TO StrgVar [, ClipResult]
```

A text string is retrieved from the CLIPBOARD, and assigned to the string variable specified by *StrgVar*, which may be ANSI or WIDE format. If necessary, the text is automatically converted to match the format of the target variable. If no text can

be retrieved, a nul (zero-length) string is assigned instead.

`CLIPBOARD RESET [, ClipResult]`

The contents of the CLIPBOARD are deleted.

`CLIPBOARD SET BITMAP ClipHndl [, ClipResult]`

A GRAPHIC BITMAP, specified by *ClipHndl*, is stored on the CLIPBOARD. The GRAPHIC BITMAP may be a [GRAPHIC CONTROL](#), [GRAPHIC WINDOW](#), or GRAPHIC BITMAP. When passing a GRAPHIC CONTROL to the Clipboard, use [CONTROL HANDLE](#) to obtain the handle to the GRAPHIC CONTROL.

`CLIPBOARD SET OEMTEXT StrgExpr [, ClipResult]`

A text string, specified by *StrgExpr*, is stored on the CLIPBOARD. The string data is assumed to use characters in the OEM character set.

`CLIPBOARD SET TEXT StrgExpr [, ClipResult]`

A text string, specified by *StrgExpr*, is stored on the CLIPBOARD. The string data may be in either ANSI or WIDE format.

The following two functions, with UNICODE options, were specifically designed for older versions of PowerBASIC which did not support wide Unicode strings. They may only be used with legacy programs which must store wide characters in an ANSI string variable. They should be converted to the TEXT option with wide string variables as soon as possible, as these forms of CLIPBOARD will not be supported in future versions of PowerBASIC.

`CLIPBOARD GET UNICODE TO AnsiStrgVar [, ClipResult]`

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. Even though the string variable uses 1-byte ANSI characters, the data is represented as 2-byte wide Unicode characters. If no text can be retrieved, a nul (zero-length) string is assigned instead.

`CLIPBOARD SET UNICODE AnsiStrgExpr [, ClipResult]`

A Unicode text string, stored in ANSI variables and constants, is stored on the CLIPBOARD.

CLIPBOARD SET UNICODE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CLIPBOARD statement IMPROVED

Purpose Copy data to/from the Windows ClipBoard.

Syntax

```
CLIPBOARD GET BITMAP TO ClipVar [, ClipResult]
CLIPBOARD GET OEMTEXT TO AnsiStrgVar [, ClipResult]
CLIPBOARD GET TEXT TO StrgVar [, ClipResult]
CLIPBOARD GET UNICODE TO StrgVar [, ClipResult]
CLIPBOARD RESET [, ClipResult]
CLIPBOARD SET BITMAP ClipHndl [, ClipResult]
CLIPBOARD SET OEMTEXT StrgExpr [, ClipResult]
CLIPBOARD SET TEXT StrgExpr [, ClipResult]
CLIPBOARD SET UNICODE StrgExpr [, ClipResult]
```

| | |
|-------------------|--|
| <i>ClipHndl</i> | A Long Integer or Dword value which specifies the 32-bit handle of a passed to the clipboard. |
| <i>ClipResult</i> | A Long Integer or Dword variable which receives a true result (-1) if the operation was successful, or a false result (0) if it failed. |
| <i>ClipVar</i> | A Long Integer or Dword variable which receives a 32-bit handle of a newly created GRAPHIC BITMAP. |
| <i>StrgExpr</i> | A string expression which specifies data to be passed to the clipboard. |
| <i>StrgVar</i> | A |
| Remarks | The Windows ClipBoard provides support for the transfer of various types of data between applications, or even different parts of a single application. The concept is simple -- save some data on the ClipBoard and retrieve it later. In most cases, it's just used to transfer plain text, so the PowerBASIC CLIPBOARD statement concentrates on the common data formats. With text transfer, you can just read or write a string. With bitmaps, a GRAPHIC BITMAP is used for this purpose. |

When you retrieve data using CLIPBOARD, the original copy always remains in the CLIPBOARD, so the operation can be repeated any number of times. When you store data on the CLIPBOARD, your original copy remains unchanged. The data is copied, with no change of ownership.

The clipboard can hold multiple data items, but only one of each data format at a time. Generally speaking, multiple data items are only used to store a single piece of data in multiple formats to ensure it can be retrieved successfully later. However, you should note that Windows automatically converts string data between [TEXT](#), [OEMTEXT](#), and [UNICODE](#). When you store data in one of those forms, it's not necessary to repeat it with the others.

You must execute a CLIPBOARD RESET to empty the clipboard before storing new data items.

Each form of the CLIPBOARD statement offers an optional ClipResult variable. If the requested operation is deemed successful by Windows, this variable is assigned the value TRUE (-1). If it fails, the value FALSE (0) is assigned instead. You should note that the success test is not a comprehensive one. It tests only the operation, not the validity of the data.

There are nine general forms of the CLIPBOARD statement:

CLIPBOARD GET BITMAP TO *ClipVar* [, *ClipResult*]

A new GRAPHIC BITMAP is automatically created. A Bitmap is copied from the ClipBoard and stored in this newly created GRAPHIC BITMAP. The handle of the new GRAPHIC BITMAP is assigned to the *ClipVar*, a DWord or Long Integer variable. If the operation is not successful, the value zero (0) is assigned instead.

CLIPBOARD GET OEMTEXT TO *AnsiStrgVar* [, *ClipResult*]

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. If necessary, it is converted to OEM Text format, the format used by the Windows Console. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD GET TEXT TO *StrgVar* [, *ClipResult*]

A text string is retrieved from the CLIPBOARD, and assigned to the string variable specified by *StrgVar*, which may be ANSI or WIDE format. If necessary, the text is automatically converted to match the format of the target variable. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD RESET [, *ClipResult*]

The contents of the CLIPBOARD are deleted.

CLIPBOARD SET BITMAP *ClipHndl* [, *ClipResult*]

A GRAPHIC BITMAP, specified by *ClipHndl*, is stored on the CLIPBOARD. The GRAPHIC BITMAP may be a [GRAPHIC CONTROL](#), [GRAPHIC WINDOW](#), or

GRAPHIC BITMAP. When passing a GRAPHIC CONTROL to the Clipboard, use [CONTROL HANDLE](#) to obtain the handle to the GRAPHIC CONTROL.

`CLIPBOARD SET OEMTEXT StrgExpr [, ClipResult]`

A text string, specified by *StrgExpr*, is stored on the CLIPBOARD. The string data is assumed to use characters in the OEM character set.

`CLIPBOARD SET TEXT StrgExpr [, ClipResult]`

A text string, specified by *StrgExpr*, is stored on the CLIPBOARD. The string data may be in either ANSI or WIDE format.

The following two functions, with UNICODE options, were specifically designed for older versions of PowerBASIC which did not support wide Unicode strings. They may only be used with legacy programs which must store wide characters in an ANSI string variable. They should be converted to the TEXT option with wide string variables as soon as possible, as these forms of CLIPBOARD will not be supported in future versions of PowerBASIC.

`CLIPBOARD GET UNICODE TO AnsiStrgVar [, ClipResult]`

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. Even though the string variable uses 1-byte ANSI characters, the data is represented as 2-byte wide Unicode characters. If no text can be retrieved, a nul (zero-length) string is assigned instead.

`CLIPBOARD SET UNICODE AnsiStrgExpr [, ClipResult]`

A Unicode text string, stored in ANSI variables and constants, is stored on the CLIPBOARD.

CLNG function

CBYT, CCUR, CCUX, CDBL, CDWD, CEXT, CINT, CLNG, CQUD, CSNG, and CWRD functions

Purpose Convert a value to specific [variable](#) type.

Syntax

| | | |
|-----------------------------|---|-----------------------------------|
| <i>bytevar?</i> | = | CBYT(<i>numeric_expression</i>) |
| <i>currencyvar@</i> | = | CCUR(<i>numeric_expression</i>) |
| <i>currencyextvar@@</i> | = | CCUX(<i>numeric_expression</i>) |
| <i>doublevar#</i> | = | CDBL(<i>numeric_expression</i>) |
| <i>doublewordvar???</i> | = | CDWD(<i>numeric_expression</i>) |
| <i>extendedvar##</i> | = | CEXT(<i>numeric_expression</i>) |
| <i>integervar%</i> | = | CINT(<i>numeric_expression</i>) |
| <i>longintvar&</i> | = | CLNG(<i>numeric_expression</i>) |
| <i>quadintvar&&</i> | = | CQUD(<i>numeric_expression</i>) |
| <i>singlevar!</i> | = | CSNG(<i>numeric_expression</i>) |
| <i>wordvar??</i> | = | CWRD(<i>numeric_expression</i>) |

Remarks Each of these functions converts a expression to a particular variable type. In each case, *numeric_expression* must be within the legal range for the result type. The *numeric_expression* will be rounded if necessary.

| Function | Result type |
|----------|---|
| CBYT | Byte |
| CCUR | Currency |
| CCUX | Extended-currency |
| CDBL | Double-precision floating-point |
| CDWD | Double-word |

| | |
|------|---|
| CEXT | Extended-precision floating-point |
| CINT | Integer |
| CLNG | Long-integer |
| CQUD | Quad-integer |
| CSNG | Single-precision floating-point |
| CWRD | Word |

These conversion functions are rarely needed as PowerBASIC automatically performs any necessary conversions when executing an assignment statement or passing parameters. For example:

```
e% = f#
```

is equivalent to:

```
e% = CINT(f#)
```

In the case of the functions that convert to

values, the fractional part of the number is rounded. If the fractional part is exactly .5 then it rounds to the nearest even integral value. For example, CINT(1.5) returns 2, CINT(.5) returns 0, and CLNG(-0.6) returns -1.

Restrictions CSNG limit string display to 7 significant digits.

See also [CEIL](#), [CVI](#) and associated functions, [FIX](#), [INT](#), [MKI\\$](#) and associated functions

Example

```
' Calculate CINT for a series of values
FOR I! = 2.4! TO 2.65! STEP 0.05!
  x$ = FORMAT$(I!, "0.00") + " is" + STR$(CINT(I!))
NEXT I!
```

Result

```
2.40 is 2
2.45 is 2
2.50 is 2
2.55 is 3
2.60 is 3
2.65 is 3
```

CLOSE statement

CLOSE statement

Purpose Conclude I/O (input/output) to / from a [file](#) or [device](#).

Syntax CLOSE [[#] *filename*& [, [#] *filename*&] ...]

Remarks CLOSE ends the relationship between a PowerBASIC *file number* and the disk file or device that was associated with it by an [OPEN](#) statement. Any pending I/O operations on the file/device are concluded, buffers are flushed and released, and the disk directory information (if any) for that file is updated.

If no file number is specified, CLOSE closes all open files.

If the file was opened using OPEN HANDLE, the CLOSE statement is still needed, although it does not tell the operating system to close the file. In this special case, the file was already open when OPEN HANDLE provided access to it, and will remain open after CLOSE disassociates the file from PowerBASIC.

CLOSE works with all types of files and devices (disk files, devices, , , , etc).

The number symbols (#) are optional but recommended for clarity.

See also [COMM_CLOSE](#), [FILEATTR](#), [FLUSH](#), [OPEN](#), [TCP_CLOSE](#), [UDP_CLOSE](#)

CLSID\$ function

CLSID\$ function

Purpose Return a 16-byte [GUID string](#) (128-bit GUID format string) containing a CLSID associated with a unique ProgramID string of a [COM object](#) or [component](#).

Syntax `a$ = CLSID$(ProgramID$)`

Remarks A CLSID string is a 128-bit (16-byte) binary string representing the [GUID](#) or [UUID](#) of a COM object/component. A CLSID string is not in a human-readable format.

You can convert textual ID name of a COM object/component into a CLSID string with the CLSID\$ function. CLSID examines the system registry in order to determine the CLSID string associated with the *ProgramID\$* string.

The *ProgramID\$* parameter is not case-sensitive, so "MSAGENT.CONTROL.2", "MSAgent.Control.2" and "msagent.control.2" all refer to the same COM object/component. If the *ProgramID\$* cannot be found, or if any error occurs during the lookup and conversion process, CLSID\$ will not set the [ERR](#) system variable, but will return an empty string.

To convert the binary CLSID string into human-readable GUID/UUID format, use the [GUIDTXT\\$](#) function. CLSID\$ is the complement to the [PROGID\\$](#) function.

PowerBASIC programmers rarely, if ever, need to deal with CLSID strings in order to utilize a COM object or component.

a\$ The return string may be assigned to a [dynamic string](#), [fixed-length](#) or [nul-terminated string](#) (at least 16 bytes long), or (typically) a GUID variable. See [DIM](#) for more information.

See also [DIM](#), [GUID\\$](#), [GUIDTXT\\$](#), [INTERFACE \(Direct\)](#), [INTERFACE \(IDBind\)](#), [ISNOTHING](#), [ISOBJECT](#), [LET \(with Objects\)](#), [OBJECT](#), [OBJECTIVE](#), [OBJPTR](#), [OBJRESULT](#), [PROGID\\$](#), [What does a Class look like?](#), [What is an object, anyway?](#)

Example

```
MSWordClassID$ = CLSID$("word.application.8")
IF LEN(MSWordClassID$) = 16 THEN
  ' Success getting the CLSID$ of MSWord
  a$ = PROGID$(MSWordClassID$)
  'a$ holds "Word.Application.8"
  b$ = GUIDTXT$(MSWordClassID$)
  'b$ holds "{000209FF-0000-0000-C000-000000000046}"
END IF
```

CODEPTR function

CODEPTR function IMPROVED

Purpose Obtain a 32-bit address of a [label](#), [Sub](#), [Function](#), or [Fastproc](#).

Syntax `AddrVar = CODEPTR(Label)`
`AddrVar = CODEPTR(ProcName)`

Remarks CODEPTR retrieves the address of a Label, Sub, Function, or FastProc. The first form may be used to get the address of a label located within the same procedure. The second form is used to obtain the address of a Sub, Function, or FastProc.

CODEPTR is particularly useful when it is necessary to pass the address of a SUB or FUNCTION to PowerBASIC or Windows to specify a [Callback](#) Function.

Restrictions CODEPTR cannot obtain the address of a [METHOD](#) or [PROPERTY](#) as direct access to them would constitute an illegal operation.

See also [STRPTR](#), [VARPTR](#), [CALL_DWORD](#)

Example

```
#COMPILE EXE
SUB MySub()
END SUB

FUNCTION PBMAIN
    LOCAL MySubPtr AS LONG, X AS STRING
    MySubPtr = CODEPTR(MySub) ' Address of MySub()
    X = "MySub() is located at address " + FORMAT$(MySubPtr)
END FUNCTION
```

COMBOBOX ADD statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COMBOBOX statement IMPROVED

Purpose Manipulate a [COMBOBOX](#) control in order to set/retrieve data.

Syntax

```
COMBOBOX ADD hDlg, id&, StrExpr [TO datav&]
COMBOBOX DELETE hDlg, id&, item&
COMBOBOX FIND hDlg, id&, item&, StrExpr TO datav&
COMBOBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
COMBOBOX GET COUNT hDlg, id& TO datav&
COMBOBOX GET SELCOUNT hDlg, id& TO datav&
COMBOBOX GET SELECT hDlg, id& TO datav&
COMBOBOX GET STATE hDlg, id&, item& TO datav&
COMBOBOX GET TEXT hDlg, id& [, item&] TO txtv$
COMBOBOX GET USER hDlg, id&, item& TO datav&
COMBOBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
COMBOBOX RESET hDlg, id&
COMBOBOX SELECT hDlg, id&, item&
COMBOBOX SET TEXT hDlg, id&, item&, StrExpr
COMBOBOX SET USER hDlg, id&, item&, NumExpr
COMBOBOX UNSELECT hDlg, id&
```

hDlg [Handle](#) of the [dialog](#) that owns the combobox.

id& The [control identifier](#) assigned with [CONTROL_ADD_COMBOBOX](#).

item& Position of data in the COMBOBOX. First string=1, second=2...

NumExpr A numeric expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the COMBOBOX control which is the subject of the statement is identified by the handle of the dialog that owns the COMBOBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD COMBOBOX.

COMBOBOX ADD *hDlg, id&, StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the COMBOBOX control. If the COMBOBOX has the [%CBS_SORT](#) style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

COMBOBOX DELETE *hDlg, id&, item&*

The string at the position specified by *item&* is deleted from the COMBOBOX. The item number (*item&*) is indexed to one (1=first, 2=second, and so on).

COMBOBOX FIND *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX FIND EXACT *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX.

Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX GET COUNT *hDlg, id&* TO *datav&*

The number of items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

COMBOBOX GET SELCOUNT *hDlg, id&* TO *datav&*

The number of selected items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*. Since this is a single-selection list box, the retrieved value will always be either zero or one.

COMBOBOX GET SELECT *hDlg, id&* TO *datav&*

The index of the currently selected item in the list box of the COMBOBOX is retrieved, and assigned to the variable specified by *datav&*. The index is 1 for the first item, 2 for the second item, etc. If there is no current selection, the value zero (0) is assigned.

COMBOBOX GET STATE *hDlg, id&, item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

COMBOBOX GET TEXT *hDlg, id& [,item&] TO txtv\$*

Text is retrieved from the COMBOBOX and assigned to the string variable specified by *txtv\$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc. If *item&* is missing, or contains the value zero, the selected text is returned (or an empty string if none is selected). If you wish to retrieve the text found in the edit box portion of the COMBOBOX (regardless of whether it was typed or selected), you should use the [CONTROL GET TEXT](#) statement instead.

COMBOBOX GET USER *hDlg, id&, item& TO datav&*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. COMBOBOX user values are assigned with the COMBOBOX SET USER statement. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

COMBOBOX INSERT *hDlg, id&, item&, StrExpr [TO datav&]*

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOXADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

COMBOBOX RESET *hDlg, id&*

Delete all contents of the specified COMBOBOX.

COMBOBOX SELECT *hDlg, id&, item&*

The string value specified by *item&* is chosen as selected text for the COMBOBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc.

COMBOBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX DELETE followed by COMBOBOXADD instead.

COMBOBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with COMBOBOX SET USER, and retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these COMBOBOX user

values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX UNSELECT *hDlg, id&*

All items in a COMBOBOX control are set to an unselected state.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD COMBOBOX](#), [CONTROL GET TEXT](#)

COMBOBOX DELETE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COMBOBOX statement IMPROVED

Purpose Manipulate a [COMBOBOX](#) control in order to set/retrieve data.

Syntax

```
COMBOBOX ADD hDlg, id&, StrExpr [TO datav&]
COMBOBOX DELETE hDlg, id&, item&
COMBOBOX FIND hDlg, id&, item&, StrExpr TO datav&
COMBOBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
COMBOBOX GET COUNT hDlg, id& TO datav&
COMBOBOX GET SELCOUNT hDlg, id& TO datav&
COMBOBOX GET SELECT hDlg, id& TO datav&
COMBOBOX GET STATE hDlg, id&, item& TO datav&
COMBOBOX GET TEXT hDlg, id& [,item&] TO txtv$
COMBOBOX GET USER hDlg, id&, item& TO datav&
COMBOBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
COMBOBOX RESET hDlg, id&
COMBOBOX SELECT hDlg, id&, item&
COMBOBOX SET TEXT hDlg, id&, item&, StrExpr
COMBOBOX SET USER hDlg, id&, item&, NumExpr
COMBOBOX UNSELECT hDlg, id&
```

hDlg [Handle](#) of the [dialog](#) that owns the combobox.

id& The [control identifier](#) assigned with [CONTROL ADD COMBOBOX](#).

item& Position of data in the COMBOBOX. First string=1, second=2...

NumExpr A numeric expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A
variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the COMBOBOX control which is the subject of the statement is identified by the handle of the dialog that owns the COMBOBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD COMBOBOX.

COMBOBOX ADD *hDlg, id&, StrExpr [TO *datav&*]*

The string value specified by *StrExpr* is added to the COMBOBOX control. If the COMBOBOX has the `%CBS_SORT` style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

COMBOBOX DELETE *hDlg, id&, item&*

The string at the position specified by *item&* is deleted from the COMBOBOX. The item number (*item&*) is indexed to one (1=first, 2=second, and so on).

COMBOBOX FIND *hDlg, id&, item&, StrExpr TO *datav&**

Strings in the COMBOBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX FIND EXACT *hDlg, id&, item&, StrExpr TO *datav&**

Strings in the COMBOBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX.

Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX GET COUNT *hDlg, id& TO *datav&**

The number of items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

COMBOBOX GET SELCOUNT *hDlg, id& TO *datav&**

The number of selected items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*. Since this is a single-selection list box, the retrieved value will always be either zero or one.

COMBOBOX GET SELECT *hDlg, id& TO *datav&**

The index of the currently selected item in the list box of the COMBOBOX is retrieved, and assigned to the variable specified by *datav&*. The index is 1 for the first item, 2 for the second item, etc. If there is no current selection, the value zero (0) is assigned.

COMBOBOX GET STATE *hDlg, id&, item& TO *datav&**

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc.

If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

COMBOBOX GET TEXT *hDlg, id& [,item&] TO txtv\$*

Text is retrieved from the COMBOBOX and assigned to the string variable specified by *txtv\$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc. If *item&* is missing, or contains the value zero, the selected text is returned (or an empty string if none is selected). If you wish to retrieve the text found in the edit box portion of the COMBOBOX (regardless of whether it was typed or selected), you should use the [CONTROL GET TEXT](#) statement instead.

COMBOBOX GET USER *hDlg, id&, item& TO datav&*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. COMBOBOX user values are assigned with the COMBOBOX SET USER statement. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

COMBOBOX INSERT *hDlg, id&, item&, StrExpr [TO datav&]*

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOXADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

COMBOBOX RESET *hDlg, id&*

Delete all contents of the specified COMBOBOX.

COMBOBOX SELECT *hDlg, id&, item&*

The string value specified by *item&* is chosen as selected text for the COMBOBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc.

COMBOBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX DELETE followed by COMBOBOXADD instead.

COMBOBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with COMBOBOX SET USER, and retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX UNSELECT *hDlg, id&*

All items in a COMBOBOX control are set to an unselected state.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL_ADD_COMBOBOX](#), [CONTROL_GET_TEXT](#)

COMBOBOX FIND statement**Keyword Template**

Purpose

Syntax

Remarks

See also

Example

COMBOBOX statement IMPROVED

Purpose Manipulate a [COMBOBOX](#) control in order to set/retrieve data.

Syntax

```
COMBOBOX ADD hDlg, id&, StrExpr [TO datav&]
COMBOBOX DELETE hDlg, id&, item&
COMBOBOX FIND hDlg, id&, item&, StrExpr TO datav&
COMBOBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
COMBOBOX GET COUNT hDlg, id& TO datav&
COMBOBOX GET SELCOUNT hDlg, id& TO datav&
COMBOBOX GET SELECT hDlg, id& TO datav&
COMBOBOX GET STATE hDlg, id&, item& TO datav&
COMBOBOX GET TEXT hDlg, id& [,item&] TO txtv$
COMBOBOX GET USER hDlg, id&, item& TO datav&
COMBOBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
COMBOBOX RESET hDlg, id&
COMBOBOX SELECT hDlg, id&, item&
COMBOBOX SET TEXT hDlg, id&, item&, StrExpr
COMBOBOX SET USER hDlg, id&, item&, NumExpr
COMBOBOX UNSELECT hDlg, id&
```

hDlg [Handle](#) of the [dialog](#) that owns the combobox.

id& The [control identifier](#) assigned with [CONTROL_ADD_COMBOBOX](#).

item& Position of data in the COMBOBOX. First string=1, second=2...

NumExpr A numeric expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A
variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the COMBOBOX control which is the subject of the statement is identified by the handle of the dialog that owns the COMBOBOX (*hDlg*), and the unique control identifier you gave it upon creation in

CONTROL ADD COMBOBOX

COMBOBOX ADD *hDlg, id&, StrExpr [TO *datav&]**

The string value specified by *StrExpr* is added to the COMBOBOX control. If the COMBOBOX has the [%CBS_SORT](#) style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

COMBOBOX DELETE *hDlg, id&, item&*

The string at the position specified by *item&* is deleted from the COMBOBOX. The item number (*item&*) is indexed to one (1=first, 2=second, and so on).

COMBOBOX FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the COMBOBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the COMBOBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX.

Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX GET COUNT *hDlg, id& TO datav&*

The number of items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

COMBOBOX GET SELCOUNT *hDlg, id& TO datav&*

The number of selected items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*. Since this is a single-selection list box, the retrieved value will always be either zero or one.

COMBOBOX GET SELECT *hDlg, id& TO datav&*

The index of the currently selected item in the list box of the COMBOBOX is retrieved, and assigned to the variable specified by *datav&*. The index is 1 for the first item, 2 for the second item, etc. If there is no current selection, the value zero (0) is assigned.

COMBOBOX GET STATE *hDlg, id&, item& TO datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

COMBOBOX GET TEXT *hDlg, id& [,item&] TO txtv\$*

Text is retrieved from the COMBOBOX and assigned to the string variable specified by *txtv\$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc. If *item&* is missing, or contains the value zero, the selected text is returned (or an empty string if none is selected). If you wish to retrieve the text found in the edit box portion of the COMBOBOX (regardless of whether it was typed or selected), you should use the [CONTROL GET TEXT](#) statement instead.

COMBOBOX GET USER *hDlg, id&, item& TO datav&*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. COMBOBOX user values are assigned with the COMBOBOX SET USER statement. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

COMBOBOX INSERT *hDlg, id&, item&, StrExpr [TO datav&]*

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOXADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

COMBOBOX RESET *hDlg, id&*

Delete all contents of the specified COMBOBOX.

COMBOBOX SELECT *hDlg, id&, item&*

The string value specified by *item&* is chosen as selected text for the COMBOBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc.

COMBOBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX DELETE followed by COMBOBOXADD instead.

COMBOBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with COMBOBOX SET USER, and retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX UNSELECT *hDlg, id&*

All items in a COMBOBOX control are set to an unselected state.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL_ADD_COMBOBOX](#), [CONTROL_GET_TEXT](#)

COMBOBOX FIND EXACT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COMBOBOX statement IMPROVED

Purpose Manipulate a [COMBOBOX](#) control in order to set/retrieve data.

Syntax

```
COMBOBOX ADD hDlg, id&, StrExpr [TO datav&]
COMBOBOX DELETE hDlg, id&, item&
COMBOBOX FIND hDlg, id&, item&, StrExpr TO datav&
COMBOBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
COMBOBOX GET COUNT hDlg, id& TO datav&
COMBOBOX GET SELCOUNT hDlg, id& TO datav&
COMBOBOX GET SELECT hDlg, id& TO datav&
COMBOBOX GET STATE hDlg, id&, item& TO datav&
COMBOBOX GET TEXT hDlg, id& [,item&] TO txtv$
COMBOBOX GET USER hDlg, id&, item& TO datav&
COMBOBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
COMBOBOX RESET hDlg, id&
COMBOBOX SELECT hDlg, id&, item&
COMBOBOX SET TEXT hDlg, id&, item&, StrExpr
COMBOBOX SET USER hDlg, id&, item&, NumExpr
COMBOBOX UNSELECT hDlg, id&
```

hDlg [Handle](#) of the [dialog](#) that owns the combobox.

id& The [control identifier](#) assigned with [CONTROL_ADD_COMBOBOX](#).

item& Position of data in the COMBOBOX. First string=1, second=2...

NumExpr A numeric expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A
variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the COMBOBOX control which is the subject of the statement is identified by the handle of the dialog that owns the COMBOBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL_ADD_COMBOBOX.

COMBOBOX ADD *hDlg, id&, StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the COMBOBOX control. If the COMBOBOX has the [%CBS_SORT](#) style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

COMBOBOX DELETE *hDlg, id&, item&*

The string at the position specified by *item&* is deleted from the COMBOBOX. The item number (*item&*) is indexed to one (1=first, 2=second, and so on).

COMBOBOX FIND *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX FIND EXACT *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX.

Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX GET COUNT *hDlg, id&* TO *datav&*

The number of items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

COMBOBOX GET SELCOUNT *hDlg, id&* TO *datav&*

The number of selected items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*. Since this is a single-selection list box, the retrieved value will always be either zero or one.

COMBOBOX GET SELECT *hDlg, id&* TO *datav&*

The index of the currently selected item in the list box of the COMBOBOX is retrieved, and assigned to the variable specified by *datav&*. The index is 1 for the first item, 2 for the second item, etc. If there is no current selection, the value zero (0) is assigned.

COMBOBOX GET STATE *hDlg, id&, item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

COMBOBOX GET TEXT *hDlg, id&* [,*item&*] TO *txtv\$*

Text is retrieved from the COMBOBOX and assigned to the string variable specified by *txtv\$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc. If *item&* is missing, or contains the value zero, the selected text is returned (or an empty string if none is selected). If you wish to retrieve the text found in the edit box portion of the COMBOBOX (regardless of whether it was typed or selected), you should use the [CONTROL GET TEXT](#) statement instead.

COMBOBOX GET USER *hDlg, id&, item& TO datav&*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. COMBOBOX user values are assigned with the COMBOBOX SET USER statement. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

COMBOBOX INSERT *hDlg, id&, item&, StrExpr [TO datav&]*

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOXADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

COMBOBOX RESET *hDlg, id&*

Delete all contents of the specified COMBOBOX.

COMBOBOX SELECT *hDlg, id&, item&*

The string value specified by *item&* is chosen as selected text for the COMBOBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc.

COMBOBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX DELETE followed by COMBOBOXADD instead.

COMBOBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with COMBOBOX SET USER, and retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX UNSELECT *hDlg, id&*

All items in a COMBOBOX control are set to an unselected state.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of

Windows, the actual string data contained by the list box is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD COMBOBOX](#), [CONTROL GET TEXT](#)

COMBOBOX GET COUNT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COMBOBOX statement IMPROVED

Purpose Manipulate a [COMBOBOX](#) control in order to set/retrieve data.

Syntax

```
COMBOBOX ADD hDlg, id&, StrExpr [TO datav&]
COMBOBOX DELETE hDlg, id&, item&
COMBOBOX FIND hDlg, id&, item&, StrExpr TO datav&
COMBOBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
COMBOBOX GET COUNT hDlg, id& TO datav&
COMBOBOX GET SELCOUNT hDlg, id& TO datav&
COMBOBOX GET SELECT hDlg, id& TO datav&
COMBOBOX GET STATE hDlg, id&, item& TO datav&
COMBOBOX GET TEXT hDlg, id& [,item&] TO txtv$
COMBOBOX GET USER hDlg, id&, item& TO datav&
COMBOBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
COMBOBOX RESET hDlg, id&
COMBOBOX SELECT hDlg, id&, item&
COMBOBOX SET TEXT hDlg, id&, item&, StrExpr
COMBOBOX SET USER hDlg, id&, item&, NumExpr
COMBOBOX UNSELECT hDlg, id&
```

hDlg [Handle](#) of the [dialog](#) that owns the combobox.

id& The [control identifier](#) assigned with [CONTROL ADD COMBOBOX](#).

item& Position of data in the COMBOBOX. First string=1, second=2...

NumExpr A numeric expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$
A
variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the COMBOBOX control which is the subject of the statement is identified by the handle of the dialog that owns the COMBOBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD COMBOBOX.

COMBOBOX ADD *hDlg*, *id*&, *StrExpr* [TO *datav*&]

The string value specified by *StrExpr* is added to the COMBOBOX control. If the

COMBOBOX has the [%CBS_SORT](#) style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

COMBOBOX DELETE *hDlg, id&, item&*

The string at the position specified by *item&* is deleted from the COMBOBOX. The item number (*item&*) is indexed to one (1=first, 2=second, and so on).

COMBOBOX FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the COMBOBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the COMBOBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX GET COUNT *hDlg, id& TO datav&*

The number of items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

COMBOBOX GET SELCOUNT *hDlg, id& TO datav&*

The number of selected items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*. Since this is a single-selection list box, the retrieved value will always be either zero or one.

COMBOBOX GET SELECT *hDlg, id& TO datav&*

The index of the currently selected item in the list box of the COMBOBOX is retrieved, and assigned to the variable specified by *datav&*. The index is 1 for the first item, 2 for the second item, etc. If there is no current selection, the value zero (0) is assigned.

COMBOBOX GET STATE *hDlg, id&, item& TO datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

COMBOBOX GET TEXT *hDlg, id& [,item&] TO txtv\$*

Text is retrieved from the COMBOBOX and assigned to the string variable specified by *txtv\$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc. If *item&* is missing, or contains

the value zero, the selected text is returned (or an empty string if none is selected). If you wish to retrieve the text found in the edit box portion of the COMBOBOX (regardless of whether it was typed or selected), you should use the [CONTROL_GET_TEXT](#) statement instead.

COMBOBOX GET USER *hDlg, id&, item& TO datav&*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with COMBOBOX GET USER.

The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. COMBOBOX user values are assigned with the COMBOBOX SET USER statement. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with [CONTROL_GET_USER](#) and [CONTROL_SET_USER](#).

COMBOBOX INSERT *hDlg, id&, item&, StrExpr [TO datav&]*

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOXADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

COMBOBOX RESET *hDlg, id&*

Delete all contents of the specified COMBOBOX.

COMBOBOX SELECT *hDlg, id&, item&*

The string value specified by *item&* is chosen as selected text for the COMBOBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc.

COMBOBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX DELETE followed by COMBOBOXADD instead.

COMBOBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with COMBOBOX SET USER, and retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX UNSELECT *hDlg, id&*

All items in a COMBOBOX control are set to an unselected state.

Restrictions

Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL_ADD_COMBOBOX](#), [CONTROL_GET_TEXT](#)

COMBOBOX GET SELCOUNT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COMBOBOX statement IMPROVED

Purpose Manipulate a [COMBOBOX](#) control in order to set/retrieve data.

Syntax

```
COMBOBOX ADD hDlg, id&, StrExpr [TO datav&]
COMBOBOX DELETE hDlg, id&, item&
COMBOBOX FIND hDlg, id&, item&, StrExpr TO datav&
COMBOBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
COMBOBOX GET COUNT hDlg, id& TO datav&
COMBOBOX GET SELCOUNT hDlg, id& TO datav&
COMBOBOX GET SELECT hDlg, id& TO datav&
COMBOBOX GET STATE hDlg, id&, item& TO datav&
COMBOBOX GET TEXT hDlg, id& [,item&] TO txtv$
COMBOBOX GET USER hDlg, id&, item& TO datav&
COMBOBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
COMBOBOX RESET hDlg, id&
COMBOBOX SELECT hDlg, id&, item&
COMBOBOX SET TEXT hDlg, id&, item&, StrExpr
COMBOBOX SET USER hDlg, id&, item&, NumExpr
COMBOBOX UNSELECT hDlg, id&
```

hDlg [Handle](#) of the [dialog](#) that owns the combobox.

id& The [control identifier](#) assigned with [CONTROL_ADD_COMBOBOX](#).

item& Position of data in the COMBOBOX. First string=1, second=2...

NumExpr A numeric expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A
variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the COMBOBOX control which is the subject of the statement is identified by the handle of the dialog that owns the COMBOBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD COMBOBOX.

COMBOBOX ADD *hDlg*, *id*&, *StrExpr* [TO *datav*&]

The string value specified by *StrExpr* is added to the COMBOBOX control. If the COMBOBOX has the [%CBS_SORT](#) style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by

datav&. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

COMBOBOX DELETE *hDlg, id&, item&*

The string at the position specified by *item&* is deleted from the COMBOBOX. The item number (*item&*) is indexed to one (1=first, 2=second, and so on).

COMBOBOX FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the COMBOBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the COMBOBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX.

Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX GET COUNT *hDlg, id& TO datav&*

The number of items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

COMBOBOX GET SELCOUNT *hDlg, id& TO datav&*

The number of selected items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*. Since this is a single-selection list box, the retrieved value will always be either zero or one.

COMBOBOX GET SELECT *hDlg, id& TO datav&*

The index of the currently selected item in the list box of the COMBOBOX is retrieved, and assigned to the variable specified by *datav&*. The index is 1 for the first item, 2 for the second item, etc. If there is no current selection, the value zero (0) is assigned.

COMBOBOX GET STATE *hDlg, id&, item& TO datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

COMBOBOX GET TEXT *hDlg, id& [,item&] TO txtv\$*

Text is retrieved from the COMBOBOX and assigned to the string variable specified by *txtv\$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc. If *item&* is missing, or contains the value zero, the selected text is returned (or an empty string if none is selected). If you wish to retrieve the text found in the edit box portion of the COMBOBOX (regardless of whether it was typed or selected), you should use the [CONTROL GET TEXT](#) statement

instead.

COMBOBOX GET USER *hDlg, id&, item& TO datav&*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with COMBOBOX GET USER.

The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. COMBOBOX user values are assigned with the COMBOBOX SET USER statement. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

COMBOBOX INSERT *hDlg, id&, item&, StrExpr [TO datav&]*

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOXADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

COMBOBOX RESET *hDlg, id&*

Delete all contents of the specified COMBOBOX.

COMBOBOX SELECT *hDlg, id&, item&*

The string value specified by *item&* is chosen as selected text for the COMBOBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc.

COMBOBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX DELETE followed by COMBOBOXADD instead.

COMBOBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with COMBOBOX SET USER, and retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX UNSELECT *hDlg, id&*

All items in a COMBOBOX control are set to an unselected state.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD COMBOBOX](#), [CONTROL GET TEXT](#)

COMBOBOX GET SELECT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COMBOBOX statement IMPROVED

Purpose Manipulate a [COMBOBOX](#) control in order to set/retrieve data.

Syntax

```
COMBOBOX ADD hDlg, id&, StrExpr [TO datav&]
COMBOBOX DELETE hDlg, id&, item&
COMBOBOX FIND hDlg, id&, item&, StrExpr TO datav&
COMBOBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
COMBOBOX GET COUNT hDlg, id& TO datav&
COMBOBOX GET SELCOUNT hDlg, id& TO datav&
COMBOBOX GET SELECT hDlg, id& TO datav&
COMBOBOX GET STATE hDlg, id&, item& TO datav&
COMBOBOX GET TEXT hDlg, id& [, item&] TO txtv$
COMBOBOX GET USER hDlg, id&, item& TO datav&
COMBOBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
COMBOBOX RESET hDlg, id&
COMBOBOX SELECT hDlg, id&, item&
COMBOBOX SET TEXT hDlg, id&, item&, StrExpr
COMBOBOX SET USER hDlg, id&, item&, NumExpr
COMBOBOX UNSELECT hDlg, id&
```

hDlg [Handle](#) of the [dialog](#) that owns the combobox.

id& The [control identifier](#) assigned with [CONTROL ADD COMBOBOX](#).

item& Position of data in the COMBOBOX. First string=1, second=2...

NumExpr A numeric expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A
variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the COMBOBOX control which is the subject of the statement is identified by the handle of the dialog that owns the COMBOBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD COMBOBOX.

COMBOBOX ADD *hDlg*, *id*&, *StrExpr* [TO *datav*&]

The string value specified by *StrExpr* is added to the COMBOBOX control. If the COMBOBOX has the [%CBS_SORT](#) style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav*&. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

COMBOBOX DELETE *hDlg, id&, item&*

The string at the position specified by *item&* is deleted from the COMBOBOX. The item number (*item&*) is indexed to one (1=first, 2=second, and so on).

COMBOBOX FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the COMBOBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the COMBOBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX.

Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX GET COUNT *hDlg, id& TO datav&*

The number of items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

COMBOBOX GET SELCOUNT *hDlg, id& TO datav&*

The number of selected items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*. Since this is a single-selection list box, the retrieved value will always be either zero or one.

COMBOBOX GET SELECT *hDlg, id& TO datav&*

The index of the currently selected item in the list box of the COMBOBOX is retrieved, and assigned to the variable specified by *datav&*. The index is 1 for the first item, 2 for the second item, etc. If there is no current selection, the value zero (0) is assigned.

COMBOBOX GET STATE *hDlg, id&, item& TO datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

COMBOBOX GET TEXT *hDlg, id& [,item&] TO txtv\$*

Text is retrieved from the COMBOBOX and assigned to the string variable specified by *txtv\$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc. If *item&* is missing, or contains the value zero, the selected text is returned (or an empty string if none is selected). If you wish to retrieve the text found in the edit box portion of the COMBOBOX (regardless of whether it was typed or selected), you should use the [CONTROL GET TEXT](#) statement instead.

COMBOBOX GET USER *hDlg, id&, item& TO datav&*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with COMBOBOX GET USER.

The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. COMBOBOX user values are assigned with the COMBOBOX SET USER statement. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

COMBOBOX INSERT *hDlg, id&, item&, StrExpr [TO datav&]*

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOXADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

COMBOBOX RESET *hDlg, id&*

Delete all contents of the specified COMBOBOX.

COMBOBOX SELECT *hDlg, id&, item&*

The string value specified by *item&* is chosen as selected text for the COMBOBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc.

COMBOBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX DELETE followed by COMBOBOXADD instead.

COMBOBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with COMBOBOX SET USER, and retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX UNSELECT *hDlg, id&*

All items in a COMBOBOX control are set to an unselected state.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD COMBOBOX](#), [CONTROL GET TEXT](#)

COMBOBOX GET STATE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COMBOBOX statement IMPROVED

Purpose Manipulate a [COMBOBOX](#) control in order to set/retrieve data.

Syntax

```
COMBOBOX ADD hDlg, id&, StrExpr [TO datav&]
COMBOBOX DELETE hDlg, id&, item&
COMBOBOX FIND hDlg, id&, item&, StrExpr TO datav&
COMBOBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
COMBOBOX GET COUNT hDlg, id& TO datav&
COMBOBOX GET SELCOUNT hDlg, id& TO datav&
COMBOBOX GET SELECT hDlg, id& TO datav&
COMBOBOX GET STATE hDlg, id&, item& TO datav&
COMBOBOX GET TEXT hDlg, id& [,item&] TO txtv$
COMBOBOX GET USER hDlg, id&, item& TO datav&
COMBOBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
COMBOBOX RESET hDlg, id&
COMBOBOX SELECT hDlg, id&, item&
COMBOBOX SET TEXT hDlg, id&, item&, StrExpr
COMBOBOX SET USER hDlg, id&, item&, NumExpr
COMBOBOX UNSELECT hDlg, id&
```

hDlg [Handle](#) of the [dialog](#) that owns the combobox.

id& The [control identifier](#) assigned with [CONTROL.ADD.COMBOBOX](#).

item& Position of data in the COMBOBOX. First string=1, second=2...

NumExpr A numeric expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A
variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the COMBOBOX control which is the subject of the statement is identified by the handle of the dialog that owns the COMBOBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL.ADD.COMBOBOX.

COMBOBOX ADD *hDlg*, *id*&, *StrExpr* [TO *datav*&]

The string value specified by *StrExpr* is added to the COMBOBOX control. If the COMBOBOX has the [%CBS_SORT](#) style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav*&. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

COMBOBOX DELETE *hDlg*, *id*&, *item*&

The string at the position specified by *item&* is deleted from the COMBOBOX. The item number (*item&*) is indexed to one (1=first, 2=second, and so on).

COMBOBOX FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the COMBOBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the COMBOBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX.

Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX GET COUNT *hDlg, id& TO datav&*

The number of items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

COMBOBOX GET SELCOUNT *hDlg, id& TO datav&*

The number of selected items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*. Since this is a single-selection list box, the retrieved value will always be either zero or one.

COMBOBOX GET SELECT *hDlg, id& TO datav&*

The index of the currently selected item in the list box of the COMBOBOX is retrieved, and assigned to the variable specified by *datav&*. The index is 1 for the first item, 2 for the second item, etc. If there is no current selection, the value zero (0) is assigned.

COMBOBOX GET STATE *hDlg, id&, item& TO datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

COMBOBOX GET TEXT *hDlg, id& [,item&] TO txtv\$*

Text is retrieved from the COMBOBOX and assigned to the string variable specified by *txtv\$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc. If *item&* is missing, or contains the value zero, the selected text is returned (or an empty string if none is selected). If you wish to retrieve the text found in the edit box portion of the COMBOBOX (regardless of whether it was typed or selected), you should use the [CONTROL GET TEXT](#) statement instead.

COMBOBOX GET USER *hDlg, id&, item& TO datav&*

Each item in a COMBOBOX may have a long integer user value associated with it at the

discretion of the programmer. This user value is retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. COMBOBOX user values are assigned with the COMBOBOX SET USER statement. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with [CONTROL_GET_USER](#) and [CONTROL_SET_USER](#).

COMBOBOX INSERT *hDlg, id&, item&, StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOXADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

COMBOBOX RESET *hDlg, id&*

Delete all contents of the specified COMBOBOX.

COMBOBOX SELECT *hDlg, id&, item&*

The string value specified by *item&* is chosen as selected text for the COMBOBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc.

COMBOBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX DELETE followed by COMBOBOXADD instead.

COMBOBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with COMBOBOX SET USER, and retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX UNSELECT *hDlg, id&*

All items in a COMBOBOX control are set to an unselected state.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL_ADD_COMBOBOX](#), [CONTROL_GET_TEXT](#)

COMBOBOX GET TEXT statement

Keyword Template

Purpose
Syntax
Remarks
See also
Example

COMBOBOX statement IMPROVED

Purpose Manipulate a [COMBOBOX](#) control in order to set/retrieve data.

Syntax

```

COMBOBOX ADD hDlg, id&, StrExpr [TO datav&]
COMBOBOX DELETE hDlg, id&, item&
COMBOBOX FIND hDlg, id&, item&, StrExpr TO datav&
COMBOBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
COMBOBOX GET COUNT hDlg, id& TO datav&
COMBOBOX GET SELCOUNT hDlg, id& TO datav&
COMBOBOX GET SELECT hDlg, id& TO datav&
COMBOBOX GET STATE hDlg, id&, item& TO datav&
COMBOBOX GET TEXT hDlg, id& [,item&] TO txtv$
COMBOBOX GET USER hDlg, id&, item& TO datav&
COMBOBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
COMBOBOX RESET hDlg, id&
COMBOBOX SELECT hDlg, id&, item&
COMBOBOX SET TEXT hDlg, id&, item&, StrExpr
COMBOBOX SET USER hDlg, id&, item&, NumExpr
COMBOBOX UNSELECT hDlg, id&

```

hDlg [Handle](#) of the [dialog](#) that owns the combobox.

id& The [control identifier](#) assigned with [CONTROL ADD COMBOBOX](#).

item& Position of data in the COMBOBOX. First string=1, second=2...

NumExpr A numeric expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A
variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the COMBOBOX control which is the subject of the statement is identified by the handle of the dialog that owns the COMBOBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD COMBOBOX.

COMBOBOX ADD *hDlg, id&, StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the COMBOBOX control. If the COMBOBOX has the [%CBS_SORT](#) style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

COMBOBOX DELETE *hDlg, id&, item&*

The string at the position specified by *item&* is deleted from the COMBOBOX. The item number (*item&*) is indexed to one (1=first, 2=second, and so on).

COMBOBOX FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the COMBOBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the COMBOBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX.

Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX GET COUNT *hDlg, id& TO datav&*

The number of items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

COMBOBOX GET SELCOUNT *hDlg, id& TO datav&*

The number of selected items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*. Since this is a single-selection list box, the retrieved value will always be either zero or one.

COMBOBOX GET SELECT *hDlg, id& TO datav&*

The index of the currently selected item in the list box of the COMBOBOX is retrieved, and assigned to the variable specified by *datav&*. The index is 1 for the first item, 2 for the second item, etc. If there is no current selection, the value zero (0) is assigned.

COMBOBOX GET STATE *hDlg, id&, item& TO datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

COMBOBOX GET TEXT *hDlg, id& [,item&] TO txtv\$*

Text is retrieved from the COMBOBOX and assigned to the string variable specified by *txtv\$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc. If *item&* is missing, or contains the value zero, the selected text is returned (or an empty string if none is selected). If you wish to retrieve the text found in the edit box portion of the COMBOBOX (regardless of whether it was typed or selected), you should use the [CONTROL GET TEXT](#) statement instead.

COMBOBOX GET USER *hDlg, id&, item& TO datav&*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for

the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. COMBOBOX user values are assigned with the COMBOBOX SET USER statement. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with [CONTROL_GET_USER](#) and [CONTROL_SET_USER](#).

COMBOBOX INSERT *hDlg, id&, item&, StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOXADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

COMBOBOX RESET *hDlg, id&*

Delete all contents of the specified COMBOBOX.

COMBOBOX SELECT *hDlg, id&, item&*

The string value specified by *item&* is chosen as selected text for the COMBOBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc.

COMBOBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX DELETE followed by COMBOBOXADD instead.

COMBOBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with COMBOBOX SET USER, and retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX UNSELECT *hDlg, id&*

All items in a COMBOBOX control are set to an unselected state.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL_ADD_COMBOBOX](#), [CONTROL_GET_TEXT](#)

COMBOBOX GET USER statement

Keyword Template

Purpose

Syntax

Remarks
See also
Example

COMBOBOX statement IMPROVED

Purpose Manipulate a [COMBOBOX](#) control in order to set/retrieve data.

Syntax

```
COMBOBOX ADD hDlg, id&, StrExpr [TO datav&]
COMBOBOX DELETE hDlg, id&, item&
COMBOBOX FIND hDlg, id&, item&, StrExpr TO datav&
COMBOBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
COMBOBOX GET COUNT hDlg, id& TO datav&
COMBOBOX GET SELCOUNT hDlg, id& TO datav&
COMBOBOX GET SELECT hDlg, id& TO datav&
COMBOBOX GET STATE hDlg, id&, item& TO datav&
COMBOBOX GET TEXT hDlg, id& [,item&] TO txtv$
COMBOBOX GET USER hDlg, id&, item& TO datav&
COMBOBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
COMBOBOX RESET hDlg, id&
COMBOBOX SELECT hDlg, id&, item&
COMBOBOX SET TEXT hDlg, id&, item&, StrExpr
COMBOBOX SET USER hDlg, id&, item&, NumExpr
COMBOBOX UNSELECT hDlg, id&
```

hDlg [Handle](#) of the [dialog](#) that owns the combobox.

id& The [control identifier](#) assigned with [CONTROL ADD COMBOBOX](#).

item& Position of data in the COMBOBOX. First string=1, second=2...

NumExpr A numeric expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A
variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the COMBOBOX control which is the subject of the statement is identified by the handle of the dialog that owns the COMBOBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD COMBOBOX.

COMBOBOX ADD *hDlg*, *id&*, *StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the COMBOBOX control. If the COMBOBOX has the [%CBS_SORT](#) style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

COMBOBOX DELETE *hDlg*, *id&*, *item&*

The string at the position specified by *item&* is deleted from the COMBOBOX. The item number (*item&*) is indexed to one (1=first, 2=second, and so on).

COMBOBOX FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which begins with the data

in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the COMBOBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX.

Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX GET COUNT *hDlg, id& TO datav&*

The number of items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

COMBOBOX GET SELCOUNT *hDlg, id& TO datav&*

The number of selected items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*. Since this is a single-selection list box, the retrieved value will always be either zero or one.

COMBOBOX GET SELECT *hDlg, id& TO datav&*

The index of the currently selected item in the list box of the COMBOBOX is retrieved, and assigned to the variable specified by *datav&*. The index is 1 for the first item, 2 for the second item, etc. If there is no current selection, the value zero (0) is assigned.

COMBOBOX GET STATE *hDlg, id&, item& TO datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

COMBOBOX GET TEXT *hDlg, id& [,item&] TO txtv\$*

Text is retrieved from the COMBOBOX and assigned to the string variable specified by *txtv\$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc. If *item&* is missing, or contains the value zero, the selected text is returned (or an empty string if none is selected). If you wish to retrieve the text found in the edit box portion of the COMBOBOX (regardless of whether it was typed or selected), you should use the [CONTROL GET TEXT](#) statement instead.

COMBOBOX GET USER *hDlg, id&, item& TO datav&*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with COMBOBOX GET USER.

The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. COMBOBOX user values are assigned with the COMBOBOX SET USER statement. In addition to these COMBOBOX user values, every DDT control offers

an additional eight user values which can be accessed with [CONTROL_GET_USER](#) and [CONTROL_SET_USER](#).

COMBOBOX INSERT *hDlg, id&, item&, StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOXADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

COMBOBOX RESET *hDlg, id&*

Delete all contents of the specified COMBOBOX.

COMBOBOX SELECT *hDlg, id&, item&*

The string value specified by *item&* is chosen as selected text for the COMBOBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc.

COMBOBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX DELETE followed by COMBOBOXADD instead.

COMBOBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with COMBOBOX SET USER, and retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX UNSELECT *hDlg, id&*

All items in a COMBOBOX control are set to an unselected state.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL_ADD_COMBOBOX](#), [CONTROL_GET_TEXT](#)

COMBOBOX INSERT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COMBOBOX statement IMPROVED

Purpose Manipulate a [COMBOBOX](#) control in order to set/retrieve data.

Syntax

```
COMBOBOX ADD hDlg, id&, StrExpr [TO datav&]
COMBOBOX DELETE hDlg, id&, item&
COMBOBOX FIND hDlg, id&, item&, StrExpr TO datav&
COMBOBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
COMBOBOX GET COUNT hDlg, id& TO datav&
COMBOBOX GET SELCOUNT hDlg, id& TO datav&
COMBOBOX GET SELECT hDlg, id& TO datav&
COMBOBOX GET STATE hDlg, id&, item& TO datav&
COMBOBOX GET TEXT hDlg, id& [,item&] TO txtv$
COMBOBOX GET USER hDlg, id&, item& TO datav&
COMBOBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
COMBOBOX RESET hDlg, id&
COMBOBOX SELECT hDlg, id&, item&
COMBOBOX SET TEXT hDlg, id&, item&, StrExpr
COMBOBOX SET USER hDlg, id&, item&, NumExpr
COMBOBOX UNSELECT hDlg, id&
```

hDlg [Handle](#) of the [dialog](#) that owns the combobox.

id& The [control identifier](#) assigned with [CONTROL.ADD.COMBOBOX](#).

item& Position of data in the COMBOBOX. First string=1, second=2...

NumExpr A numeric expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A
variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the COMBOBOX control which is the subject of the statement is identified by the handle of the dialog that owns the COMBOBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL.ADD.COMBOBOX.

COMBOBOX ADD *hDlg*, *id&*, *StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the COMBOBOX control. If the COMBOBOX has the [%CBS_SORT](#) style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

COMBOBOX DELETE *hDlg*, *id&*, *item&*

The string at the position specified by *item&* is deleted from the COMBOBOX. The item number (*item&*) is indexed to one (1=first, 2=second, and so on).

COMBOBOX FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the

list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the COMBOBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX.

Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX GET COUNT *hDlg, id& TO datav&*

The number of items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

COMBOBOX GET SELCOUNT *hDlg, id& TO datav&*

The number of selected items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*. Since this is a single-selection list box, the retrieved value will always be either zero or one.

COMBOBOX GET SELECT *hDlg, id& TO datav&*

The index of the currently selected item in the list box of the COMBOBOX is retrieved, and assigned to the variable specified by *datav&*. The index is 1 for the first item, 2 for the second item, etc. If there is no current selection, the value zero (0) is assigned.

COMBOBOX GET STATE *hDlg, id&, item& TO datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

COMBOBOX GET TEXT *hDlg, id& [,item&] TO txtv\$*

Text is retrieved from the COMBOBOX and assigned to the string variable specified by *txtv\$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc. If *item&* is missing, or contains the value zero, the selected text is returned (or an empty string if none is selected). If you wish to retrieve the text found in the edit box portion of the COMBOBOX (regardless of whether it was typed or selected), you should use the [CONTROL GET TEXT](#) statement instead.

COMBOBOX GET USER *hDlg, id&, item& TO datav&*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with COMBOBOX GET USER.

The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. COMBOBOX user values are assigned with the COMBOBOX SET USER statement. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

COMBOBOX INSERT *hDlg, id&, item&, StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOXADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

COMBOBOX RESET *hDlg, id&*

Delete all contents of the specified COMBOBOX.

COMBOBOX SELECT *hDlg, id&, item&*

The string value specified by *item&* is chosen as selected text for the COMBOBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc.

COMBOBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX DELETE followed by COMBOBOXADD instead.

COMBOBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with COMBOBOX SET USER, and retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX UNSELECT *hDlg, id&*

All items in a COMBOBOX control are set to an unselected state.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD COMBOBOX](#), [CONTROL GET TEXT](#)

COMBOBOX RESET statement**Keyword Template**

Purpose

Syntax

Remarks

See also

Example

COMBOBOX statement IMPROVED

Purpose Manipulate a [COMBOBOX](#) control in order to set/retrieve data.

Syntax

```
COMBOBOX ADD hDlg, id&, StrExpr [TO datav&]
COMBOBOX DELETE hDlg, id&, item&
COMBOBOX FIND hDlg, id&, item&, StrExpr TO datav&
COMBOBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
COMBOBOX GET COUNT hDlg, id& TO datav&
COMBOBOX GET SELCOUNT hDlg, id& TO datav&
COMBOBOX GET SELECT hDlg, id& TO datav&
COMBOBOX GET STATE hDlg, id&, item& TO datav&
COMBOBOX GET TEXT hDlg, id& [,item&] TO txtv$
COMBOBOX GET USER hDlg, id&, item& TO datav&
COMBOBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
COMBOBOX RESET hDlg, id&
COMBOBOX SELECT hDlg, id&, item&
COMBOBOX SET TEXT hDlg, id&, item&, StrExpr
COMBOBOX SET USER hDlg, id&, item&, NumExpr
COMBOBOX UNSELECT hDlg, id&
```

hDlg [Handle](#) of the [dialog](#) that owns the combobox.

id& The [control identifier](#) assigned with [CONTROL.ADD.COMBOBOX](#).

item& Position of data in the COMBOBOX. First string=1, second=2...

NumExpr A numeric expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A
variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the COMBOBOX control which is the subject of the statement is identified by the handle of the dialog that owns the COMBOBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL.ADD.COMBOBOX.

COMBOBOX ADD *hDlg, id&, StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the COMBOBOX control. If the COMBOBOX has the [%CBS_SORT](#) style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

COMBOBOX DELETE *hDlg, id&, item&*

The string at the position specified by *item&* is deleted from the COMBOBOX. The item number (*item&*) is indexed to one (1=first, 2=second, and so on).

COMBOBOX FIND *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified

by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the COMBOBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX.

Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX GET COUNT *hDlg, id& TO datav&*

The number of items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

COMBOBOX GET SELCOUNT *hDlg, id& TO datav&*

The number of selected items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*. Since this is a single-selection list box, the retrieved value will always be either zero or one.

COMBOBOX GET SELECT *hDlg, id& TO datav&*

The index of the currently selected item in the list box of the COMBOBOX is retrieved, and assigned to the variable specified by *datav&*. The index is 1 for the first item, 2 for the second item, etc. If there is no current selection, the value zero (0) is assigned.

COMBOBOX GET STATE *hDlg, id&, item& TO datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

COMBOBOX GET TEXT *hDlg, id& [,item&] TO txtv\$*

Text is retrieved from the COMBOBOX and assigned to the string variable specified by *txtv\$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc. If *item&* is missing, or contains the value zero, the selected text is returned (or an empty string if none is selected). If you wish to retrieve the text found in the edit box portion of the COMBOBOX (regardless of whether it was typed or selected), you should use the [CONTROL GET TEXT](#) statement instead.

COMBOBOX GET USER *hDlg, id&, item& TO datav&*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with COMBOBOX GET USER.

The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. COMBOBOX user values are assigned with the COMBOBOX SET USER statement. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

COMBOBOX INSERT *hDlg, id&, item&, StrExpr [TO datav&]*

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of

data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOXADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

COMBOBOX RESET *hDlg, id&*

Delete all contents of the specified COMBOBOX.

COMBOBOX SELECT *hDlg, id&, item&*

The string value specified by *item&* is chosen as selected text for the COMBOBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc.

COMBOBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX DELETE followed by COMBOBOXADD instead.

COMBOBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with COMBOBOX SET USER, and retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX UNSELECT *hDlg, id&*

All items in a COMBOBOX control are set to an unselected state.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD COMBOBOX](#), [CONTROL GET TEXT](#)

COMBOBOX SELECT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COMBOBOX statement IMPROVED

Purpose Manipulate a [COMBOBOX](#) control in order to set/retrieve data.

Syntax

```

COMBOBOX ADD hDlg, id&, StrExpr [TO datav&]
COMBOBOX DELETE hDlg, id&, item&
COMBOBOX FIND hDlg, id&, item&, StrExpr TO datav&
COMBOBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
COMBOBOX GET COUNT hDlg, id& TO datav&
COMBOBOX GET SELCOUNT hDlg, id& TO datav&
COMBOBOX GET SELECT hDlg, id& TO datav&
COMBOBOX GET STATE hDlg, id&, item& TO datav&
COMBOBOX GET TEXT hDlg, id& [,item&] TO txtv$
COMBOBOX GET USER hDlg, id&, item& TO datav&
COMBOBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
COMBOBOX RESET hDlg, id&
COMBOBOX SELECT hDlg, id&, item&
COMBOBOX SET TEXT hDlg, id&, item&, StrExpr
COMBOBOX SET USER hDlg, id&, item&, NumExpr
COMBOBOX UNSELECT hDlg, id&

```

*hDlg*Handle of the [dialog](#) that owns the combobox.*id&*The [control identifier](#) assigned with [CONTROL ADD COMBOBOX](#).*item&*

Position of data in the COMBOBOX. First string=1, second=2...

NumExpr

A numeric expression passed as a parameter.

*StrExpr*A [string expression](#) passed as a parameter.*txtv\$*

A

variable to which result text is assigned.

*datav&*A [long integer](#) variable to which result data is assigned.**Remarks**

In each of the following samples and descriptions, the COMBOBOX control which is the subject of the statement is identified by the handle of the dialog that owns the COMBOBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD COMBOBOX.

COMBOBOX ADD *hDlg, id&, StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the COMBOBOX control. If the COMBOBOX has the [%CBS_SORT](#) style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

COMBOBOX DELETE *hDlg, id&, item&*

The string at the position specified by *item&* is deleted from the COMBOBOX. The item number (*item&*) is indexed to one (1=first, 2=second, and so on).

COMBOBOX FIND *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX FIND EXACT *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX.

Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX GET COUNT *hDlg, id& TO datav&*

The number of items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

COMBOBOX GET SELCOUNT *hDlg, id& TO datav&*

The number of selected items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*. Since this is a single-selection list box, the retrieved value will always be either zero or one.

COMBOBOX GET SELECT *hDlg, id& TO datav&*

The index of the currently selected item in the list box of the COMBOBOX is retrieved, and assigned to the variable specified by *datav&*. The index is 1 for the first item, 2 for the second item, etc. If there is no current selection, the value zero (0) is assigned.

COMBOBOX GET STATE *hDlg, id&, item& TO datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

COMBOBOX GET TEXT *hDlg, id& [,item&] TO txtv\$*

Text is retrieved from the COMBOBOX and assigned to the string variable specified by *txtv\$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc. If *item&* is missing, or contains the value zero, the selected text is returned (or an empty string if none is selected). If you wish to retrieve the text found in the edit box portion of the COMBOBOX (regardless of whether it was typed or selected), you should use the [CONTROL GET TEXT](#) statement instead.

COMBOBOX GET USER *hDlg, id&, item& TO datav&*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. COMBOBOX user values are assigned with the COMBOBOX SET USER statement. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

COMBOBOX INSERT *hDlg, id&, item&, StrExpr [TO datav&]*

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style % CBS_SORT. If you wish to sort all of the items, use COMBOBOXADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the

variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

COMBOBOX RESET *hDlg, id&*

Delete all contents of the specified COMBOBOX.

COMBOBOX SELECT *hDlg, id&, item&*

The string value specified by *item&* is chosen as selected text for the COMBOBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc.

COMBOBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX DELETE followed by COMBOBOX ADD instead.

COMBOBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with COMBOBOX SET USER, and retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX UNSELECT *hDlg, id&*

All items in a COMBOBOX control are set to an unselected state.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD COMBOBOX](#), [CONTROL GET TEXT](#)

COMBOBOX SET TEXT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COMBOBOX statement IMPROVED

Purpose Manipulate a [COMBOBOX](#) control in order to set/retrieve data.

Syntax

```
COMBOBOX ADD hDlg, id&, StrExpr [TO datav&]
COMBOBOX DELETE hDlg, id&, item&
```

```

COMBOBOX FIND hDlg, id&, item&, StrExpr TO datav&
COMBOBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
COMBOBOX GET COUNT hDlg, id& TO datav&
COMBOBOX GET SELCOUNT hDlg, id& TO datav&
COMBOBOX GET SELECT hDlg, id& TO datav&
COMBOBOX GET STATE hDlg, id&, item& TO datav&
COMBOBOX GET TEXT hDlg, id& [,item&] TO txtv$
COMBOBOX GET USER hDlg, id&, item& TO datav&
COMBOBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
COMBOBOX RESET hDlg, id&
COMBOBOX SELECT hDlg, id&, item&
COMBOBOX SET TEXT hDlg, id&, item&, StrExpr
COMBOBOX SET USER hDlg, id&, item&, NumExpr
COMBOBOX UNSELECT hDlg, id&

```

| | |
|-------------------|--|
| <i>hDlg</i> | Handle of the dialog that owns the combobox. |
| <i>id&</i> | The control identifier assigned with CONTROL ADD COMBOBOX . |
| <i>item&</i> | Position of data in the COMBOBOX. First string=1, second=2... |
| <i>NumExpr</i> | A numeric expression passed as a parameter. |
| <i>StrExpr</i> | A string expression passed as a parameter. |
| <i>txtv\$</i> | A variable to which result text is assigned. |
| <i>datav&</i> | A long integer variable to which result data is assigned. |
| Remarks | In each of the following samples and descriptions, the COMBOBOX control which is the subject of the statement is identified by the handle of the dialog that owns the COMBOBOX (<i>hDlg</i>), and the unique control identifier you gave it upon creation in CONTROL ADD COMBOBOX. |

COMBOBOX ADD *hDlg, id&, StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the COMBOBOX control. If the COMBOBOX has the [%CBS_SORT](#) style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

COMBOBOX DELETE *hDlg, id&, item&*

The string at the position specified by *item&* is deleted from the COMBOBOX. The item number (*item&*) is indexed to one (1=first, 2=second, and so on).

COMBOBOX FIND *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX FIND EXACT *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with

the string specified by *item&*, and ending with the last string in the COMBOBOX.

Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX GET COUNT *hDlg, id& TO datav&*

The number of items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

COMBOBOX GET SELCOUNT *hDlg, id& TO datav&*

The number of selected items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*. Since this is a single-selection list box, the retrieved value will always be either zero or one.

COMBOBOX GET SELECT *hDlg, id& TO datav&*

The index of the currently selected item in the list box of the COMBOBOX is retrieved, and assigned to the variable specified by *datav&*. The index is 1 for the first item, 2 for the second item, etc. If there is no current selection, the value zero (0) is assigned.

COMBOBOX GET STATE *hDlg, id&, item& TO datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

COMBOBOX GET TEXT *hDlg, id& [,item&] TO txtv\$*

Text is retrieved from the COMBOBOX and assigned to the string variable specified by *txtv\$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc. If *item&* is missing, or contains the value zero, the selected text is returned (or an empty string if none is selected). If you wish to retrieve the text found in the edit box portion of the COMBOBOX (regardless of whether it was typed or selected), you should use the [CONTROL GET TEXT](#) statement instead.

COMBOBOX GET USER *hDlg, id&, item& TO datav&*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. COMBOBOX user values are assigned with the COMBOBOX SET USER statement. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

COMBOBOX INSERT *hDlg, id&, item&, StrExpr [TO datav&]*

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style % CBS_SORT. If you wish to sort all of the items, use COMBOBOXADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

COMBOBOX RESET *hDlg, id&*

Delete all contents of the specified COMBOBOX.

COMBOBOX SELECT *hDlg, id&, item&*

The string value specified by *item&* is chosen as selected text for the COMBOBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc.

COMBOBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX DELETE followed by COMBOBOXADD instead.

COMBOBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with COMBOBOX SET USER, and retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX UNSELECT *hDlg, id&*

All items in a COMBOBOX control are set to an unselected state.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL_ADD COMBOBOX](#), [CONTROL_GET TEXT](#)

COMBOBOX SET USER statement**Keyword Template**

Purpose

Syntax

Remarks

See also

Example

COMBOBOX statement IMPROVED

Purpose Manipulate a [COMBOBOX](#) control in order to set/retrieve data.

Syntax

```
COMBOBOX ADD hDlg, id&, StrExpr [TO datav&]
COMBOBOX DELETE hDlg, id&, item&
COMBOBOX FIND hDlg, id&, item&, StrExpr TO datav&
COMBOBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
COMBOBOX GET COUNT hDlg, id& TO datav&
```

```

COMBOBOX GET SELCOUNT hDlg, id& TO datav&
COMBOBOX GET SELECT hDlg, id& TO datav&
COMBOBOX GET STATE hDlg, id&, item& TO datav&
COMBOBOX GET TEXT hDlg, id& [,item&] TO txtv$
COMBOBOX GET USER hDlg, id&, item& TO datav&
COMBOBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
COMBOBOX RESET hDlg, id&
COMBOBOX SELECT hDlg, id&, item&
COMBOBOX SET TEXT hDlg, id&, item&, StrExpr
COMBOBOX SET USER hDlg, id&, item&, NumExpr
COMBOBOX UNSELECT hDlg, id&

```

| | |
|-------------------|--|
| <i>hDlg</i> | Handle of the dialog that owns the combobox. |
| <i>id&</i> | The control identifier assigned with CONTROL ADD COMBOBOX . |
| <i>item&</i> | Position of data in the COMBOBOX. First string=1, second=2... |
| <i>NumExpr</i> | A numeric expression passed as a parameter. |
| <i>StrExpr</i> | A string expression passed as a parameter. |
| <i>txtv\$</i> | A variable to which result text is assigned. |
| <i>datav&</i> | A long integer variable to which result data is assigned. |
| Remarks | In each of the following samples and descriptions, the COMBOBOX control which is the subject of the statement is identified by the handle of the dialog that owns the COMBOBOX (<i>hDlg</i>), and the unique control identifier you gave it upon creation in CONTROL ADD COMBOBOX. |

COMBOBOX ADD *hDlg*, *id&*, *StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the COMBOBOX control. If the COMBOBOX has the [%CBS_SORT](#) style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

COMBOBOX DELETE *hDlg*, *id&*, *item&*

The string at the position specified by *item&* is deleted from the COMBOBOX. The item number (*item&*) is indexed to one (1=first, 2=second, and so on).

COMBOBOX FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first

string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX GET COUNT *hDlg, id& TO datav&*

The number of items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

COMBOBOX GET SELCOUNT *hDlg, id& TO datav&*

The number of selected items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*. Since this is a single-selection list box, the retrieved value will always be either zero or one.

COMBOBOX GET SELECT *hDlg, id& TO datav&*

The index of the currently selected item in the list box of the COMBOBOX is retrieved, and assigned to the variable specified by *datav&*. The index is 1 for the first item, 2 for the second item, etc. If there is no current selection, the value zero (0) is assigned.

COMBOBOX GET STATE *hDlg, id&, item& TO datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

COMBOBOX GET TEXT *hDlg, id& [,item&] TO txtv\$*

Text is retrieved from the COMBOBOX and assigned to the string variable specified by *txtv\$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc. If *item&* is missing, or contains the value zero, the selected text is returned (or an empty string if none is selected). If you wish to retrieve the text found in the edit box portion of the COMBOBOX (regardless of whether it was typed or selected), you should use the [CONTROL GET TEXT](#) statement instead.

COMBOBOX GET USER *hDlg, id&, item& TO datav&*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. COMBOBOX user values are assigned with the COMBOBOX SET USER statement. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

COMBOBOX INSERT *hDlg, id&, item&, StrExpr [TO datav&]*

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style % CBS_SORT. If you wish to sort all of the items, use COMBOBOXADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

COMBOBOX RESET *hDlg, id&*

Delete all contents of the specified COMBOBOX.

COMBOBOX SELECT *hDlg, id&, item&*

The string value specified by *item&* is chosen as selected text for the COMBOBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc.

COMBOBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX DELETE followed by COMBOBOXADD instead.

COMBOBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with COMBOBOX SET USER, and retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX UNSELECT *hDlg, id&*

All items in a COMBOBOX control are set to an unselected state.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD COMBOBOX](#), [CONTROL GET TEXT](#)

COMBOBOX UNSELECT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COMBOBOX statement IMPROVED

Purpose Manipulate a [COMBOBOX](#) control in order to set/retrieve data.

Syntax

```
COMBOBOX ADD hDlg, id&, StrExpr [TO datav&]
COMBOBOX DELETE hDlg, id&, item&
COMBOBOX FIND hDlg, id&, item&, StrExpr TO datav&
COMBOBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
COMBOBOX GET COUNT hDlg, id& TO datav&
COMBOBOX GET SELCOUNT hDlg, id& TO datav&
COMBOBOX GET SELECT hDlg, id& TO datav&
COMBOBOX GET STATE hDlg, id&, item& TO datav&
COMBOBOX GET TEXT hDlg, id& [,item&] TO txtv$
```

```

COMBOBOX GET USER hDlg, id&, item& TO datav&
COMBOBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
COMBOBOX RESET hDlg, id&
COMBOBOX SELECT hDlg, id&, item&
COMBOBOX SET TEXT hDlg, id&, item&, StrExpr
COMBOBOX SET USER hDlg, id&, item&, NumExpr
COMBOBOX UNSELECT hDlg, id&

```

| | |
|-------------------|--|
| <i>hDlg</i> | Handle of the dialog that owns the combobox. |
| <i>id&</i> | The control identifier assigned with CONTROL ADD COMBOBOX . |
| <i>item&</i> | Position of data in the COMBOBOX. First string=1, second=2... |
| <i>NumExpr</i> | A numeric expression passed as a parameter. |
| <i>StrExpr</i> | A string expression passed as a parameter. |
| <i>txtv\$</i> | A variable to which result text is assigned. |
| <i>datav&</i> | A long integer variable to which result data is assigned. |
| Remarks | In each of the following samples and descriptions, the COMBOBOX control which is the subject of the statement is identified by the handle of the dialog that owns the COMBOBOX (<i>hDlg</i>), and the unique control identifier you gave it upon creation in CONTROL ADD COMBOBOX. |

COMBOBOX ADD *hDlg*, *id&*, *StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the COMBOBOX control. If the COMBOBOX has the [%CBS_SORT](#) style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

COMBOBOX DELETE *hDlg*, *id&*, *item&*

The string at the position specified by *item&* is deleted from the COMBOBOX. The item number (*item&*) is indexed to one (1=first, 2=second, and so on).

COMBOBOX FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX.

Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX GET COUNT *hDlg, id& TO datav&*

The number of items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

COMBOBOX GET SELCOUNT *hDlg, id& TO datav&*

The number of selected items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*. Since this is a single-selection list box, the retrieved value will always be either zero or one.

COMBOBOX GET SELECT *hDlg, id& TO datav&*

The index of the currently selected item in the list box of the COMBOBOX is retrieved, and assigned to the variable specified by *datav&*. The index is 1 for the first item, 2 for the second item, etc. If there is no current selection, the value zero (0) is assigned.

COMBOBOX GET STATE *hDlg, id&, item& TO datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

COMBOBOX GET TEXT *hDlg, id& [,item&] TO txtv\$*

Text is retrieved from the COMBOBOX and assigned to the string variable specified by *txtv\$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc. If *item&* is missing, or contains the value zero, the selected text is returned (or an empty string if none is selected). If you wish to retrieve the text found in the edit box portion of the COMBOBOX (regardless of whether it was typed or selected), you should use the [CONTROL GET TEXT](#) statement instead.

COMBOBOX GET USER *hDlg, id&, item& TO datav&*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. COMBOBOX user values are assigned with the COMBOBOX SET USER statement. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

COMBOBOX INSERT *hDlg, id&, item&, StrExpr [TO datav&]*

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style % CBS_SORT. If you wish to sort all of the items, use COMBOBOXADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

COMBOBOX RESET *hDlg, id&*

Delete all contents of the specified COMBOBOX.

COMBOBOX SELECT *hDlg, id&, item&*

The string value specified by *item&* is chosen as selected text for the COMBOBOX.

control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc.

COMBOBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX DELETE followed by COMBOBOXADD instead.

COMBOBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with COMBOBOX SET USER, and retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX UNSELECT *hDlg, id&*

All items in a COMBOBOX control are set to an unselected state.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD COMBOBOX](#), [CONTROL GET TEXT](#)

COMM CLOSE statement

COMM CLOSE statement

Purpose Close an open [serial port](#).

Syntax COMM CLOSE [#] *hComm* [, [#] *hComm* ...]

Remarks Closes one or more communication ports, as specified by the PowerBASIC file number held in each *hComm* parameter. COMM CLOSE ends the relationship between a PowerBASIC file number, and the serial port device that was previously associated with it by the [COMM OPEN](#) statement.

The Number symbol (#) prefix is optional, but recommended for the purposes of clarity.

It is also recommended that you explicitly close any serial port that you have opened before your application terminates. Note that COMM CLOSE is a synonym for [CLOSE](#).

See also [Serial Communications](#), [CLOSE](#), [COMM function](#), [COMM LINE](#), [COMM OPEN](#), [COMM PRINT](#), [COMM RECV](#), [COMM RESET](#), [COMM SEND](#), [COMM SET](#), [COMM TIMEOUT](#)

Example COMM CLOSE #*hComm*, 5 ' Close *hComm* and file number 5

COMM function

COMM function IMPROVED

Purpose Retrieve the value or status of a [communications](#) parameter.

Syntax

```
lResult& = COMM([#] hComm, Comfunc)
```

Remarks

hComm is the PowerBASIC file number as was used by the [COMM OPEN](#) statement to open the communications port. Select a *Comfunc* keyword from the following table to retrieve the associated setting.

| <i>Comfunc</i> | <i>value</i> (TRUE <> 0, FALSE = 0) |
|-----------------------|---|
| BAUD | Port Baud Rate (9600, 14400, 19200, etc). |
| BREAK | TRUE/FALSE Break is asserted. Break is generally used to "get the attention" of the connected modem, terminal or system. |
| BYTE | Number of bits per byte (4, 5, 6, 7, or 8). |
| CD | TRUE/FALSE Carrier Detect state; synonym for RLSD (<i>READ-ONLY</i>). When CD is TRUE, the DCE (modem) has a suitable connection on the communications channel present. When CD is FALSE, there is no suitable connection. |
| CTS | TRUE/FALSE Clear-To-Send state is returned (<i>READ-ONLY</i>). |
| CTSFLOW | TRUE/FALSE Enable CTS output flow control (Input signal). When CTSFLOW is enabled, it causes the DTE (computer) to stop sending data whenever the CTS signal is set to logic low by the DCE (modem). Transmission continues when the DCE (modem) sets the CTS signal back to logic high. The CTS signal is usually used in response to an RTS signal. |
| DSR | TRUE/FALSE Data-Set-Ready state is returned (<i>READ-ONLY</i>). |
| DSRFLOW | TRUE/FALSE Enable DSR output flow control (Input signal). When DSRFLOW is enabled, it causes the DTE (computer) to stop sending data whenever the DSR signal is set to logic low by the DCE (modem). Transmission is enabled when the DSR signal returns to logic high. The DSR signal is often used in conjunction with CTS in response to a RTS signal. |
| DSRSENS | TRUE/FALSE Enable DSR sensitivity. When DSRSENS is enabled, data received by the DTE (computer) is placed into the receive buffer only if DSR is set to logic high. If DSR is set low, received data is discarded. Enabling DSRSENS allows DSR to enable or disable the DTE (the computer) to receive data from the DTE (the modem). DSRSENS is rarely used in practical communications situations. |
| DTRFLOW | TRUE/FALSE Enable DTR handshaking flow control (Output signal). When DTRFLOW is enabled, it signals that the DCE (modem) should prepare to connect to the communications channel. DTR is usually used for modem on-hook/off-hook control, but can also be used in conjunction with DSR for handshaking. |
| DTRLINE | TRUE/FALSE Enable DTR line. When enabled, DTRLINE leaves the DTR line active when the port is closed by the DTE (computer). This ensures that the DCE (modem) does not close the communications channel when the port is closed. |
| NULL | TRUE/FALSE Null (\$NUL) bytes are discarded when read. |
| PARITY | TRUE/FALSE Enable parity checking. This mode must be enabled for the other Parity options to be selected. |
| PARITYCHAR | Character to use for parity error replacement. PARITY must be enabled. |
| PARITYREPL | TRUE/FALSE Enable character replacement on parity error. PARITY must be enabled. |
| PARITYTYPE | 0 = None, 1 = Odd, 2 = Even, 3 = Mark, 4 = Space. PARITY must be enabled. Default = 0. |
| RING | TRUE/FALSE Ring indicator is on (<i>READ-ONLY</i>). When RING returns TRUE, a ringing signal is being received on the communications channel (by the modem). RING approximates the state of the ringing signal; however, it may not be reported accurately on all Windows platforms. |
| RLSD | Receive-line-signal-detect (<i>READ-ONLY</i>). See CD/Carrier Detect above. |
| RTSFLOW | Ready To Send (Output signal). 0 = Disable, 1 = Enable, 2 = Handshake, 3 = Toggle. Toggle is used for half-duplex (2-wire) operations to "reverse" the line. While the DTE (computer) is busy sending data, it raises the |

RTS signal and the DCE (modem) blocks its data receive channel. When RTS signal reverts to logic low, the DCE (modem) reverts to transmit mode and the DTE (computer) switches to receive mode.

Handshake mode causes the DTE (computer) to check the receive buffer (RXQUE) after each character is placed into the buffer. When the buffer is 5/6th full, the RTS signal is dropped. When the receive buffer drops to below 1/6th full, RTS is raised again

| | |
|----------|---|
| RXBUFFER | Size of the receive buffer in bytes. |
| RXQUE | Characters currently in the receive buffer (<i>READ-ONLY</i>). |
| STOP | 0 = 1 stop bits, 1 = 1.5 stop bits, 2 = 2 stop bits. |
| TXBUFFER | Size of the transmit buffer in bytes. In some cases, Windows may not be able to report the transmit size. |
| TXQUE | Characters currently in the transmit buffer (<i>READ-ONLY</i>). |
| XINPFLOW | TRUE/FALSE Enable XON/XOFF input flow control. When the DTE (computer) receive buffer is full, an XOFF character is sent to the DCE (modem) to instruct it to halt transmission. When the DCE is ready to resume transmission, an XON character is sent to the DCE. Typically, XOFF is sent when the receive buffer has less than 1/16th remaining, and XON is sent when the receive buffer drops to less than 1/16th of its maximum size. Default = FALSE. |
| XOUTFLOW | TRUE/FALSE Enable XON/XOFF out flow control. When enabled, the DCE (modem) sends an XOFF to the DTE (computer) to halt data transmission to the DCE. When the DCE is ready to receive more data, an XON character is sent. XOUTFLOW typically uses the same 1/16th rules as XINPFLOW. Default = FALSE. |

Common baud rates range from 110 to 256000. There are equates defined in the [WIN32API.INC](#) file, prefixed with %CBR_ to assist you with specifying a common baud rate, but you are not restricted to a limited set of rates.

PowerBASIC sets the [ERR](#) system variable if an error occurs when using the COMM function.

The Number symbol (#) prefix is optional, but recommended for the purposes of clarity.

Restrictions Due to differences between Win32 operating systems, parameters (such as the TXBUFFER and TXQUE) may not be *queried* successfully in all circumstances.

See also [Serial Communications](#), [COMM CLOSE](#), [COMM LINE](#), [COMM OPEN](#), [COMM PRINT](#), [COMM RECV](#), [COMM RESET](#), [COMM SEND](#), [COMM SET](#), [COMM TIMEOUT](#)

Example

```
Qty& = COMM(#hComm, RXQUE)
x$ = "The receive buffer contains " + _
      FORMAT$(Qty&) + " bytes of data."
```

```
Qty& = COMM(#hComm, TXBUFFER) - COMM(#hComm, TXQUE)
x$ = "There is room for " + FORMAT$(Qty&) + _
      " bytes in the transmit buffer."
```

COMM LINE statement

COMM LINE statement IMPROVED

Purpose Receive a CR/LF ([\\$CRLF](#)) terminated "line" of data from a [serial port](#).

Syntax COMM LINE [INPUT] [#] *hComm*, *string_var*

Remarks Read a delimited line of data from the receive buffer, where a "line" is defined as a stream of data that is terminated by a CR/LF (carriage return and linefeed, [\\$CRLF](#), or [CHRS\(13,10\)](#)). COMM LINE INPUT is ideal for retrieving modem response strings in reply to "AT" commands sent to a modem.

hComm is the file number you used with COMM OPEN, an integer in the range of 1 to

32767. The Number symbol (#) prefix is optional, but recommended for clarity.

COMM LINE reads the receive buffer up to the next \$CRLF character pair. The \$CRLF bytes are removed from the buffer but do not form part of the string data returned by COMM LINE. Note that if there is no \$CRLF pair in the receive buffer, the statement will wait indefinitely for a complete \$CRLF terminated line of data. In this sense, COMM LINE is a blocking statement. The [COMM TIMEOUT](#) statement can be used to specify COMM timeouts limits.

The data received is assigned to the *string_var*. The character mode of the *string_var* must match the CHR option in COMM OPEN (ANSI/WIDE). If not, an [error 5](#) (Illegal function call) will be generated, and no data will be received.

The [EOF](#) function may also be used with COMM LINE (and [TCP LINE](#)) to detect that an incomplete line was received. Normally, the COMM LINE statement reads data until a \$CRLF character pair is found, and in that case, EOF will return false (zero). However, if a timeout does occur, COMM LINE will return whatever data has been accumulated, and set EOF to logical TRUE (non-zero).

In many cases, it would be prudent to test EOF after every COMM LINE statement to verify that a full line has been received. In some cases, you may wish to execute the statement one or more additional times, combining the data, in order to obtain a full line of text.

See also [Serial Communications](#), [COMM CLOSE](#), [COMM function](#), [COMM OPEN](#), [COMM PRINT](#), [COMM RECV](#), [COMM RESET](#), [COMM SEND](#), [COMM SET](#), [COMM TIMEOUT](#), [EOF](#)

Example

```
COMM PRINT #hComm, "AT"
SLEEP 1000 ' delay for modem to respond
DO
  COMM LINE INPUT #hComm, a$
  CALL DisplayResponse(a$) ' display the modem echo
LOOP UNTIL LEN(a$)
```

COMM OPEN statement

COMM OPEN statement IMPROVED

Purpose Open a [serial port](#).

Syntax `COMM OPEN "COMn" AS [#] hComm [CHR = ANSI|WIDE]`

Remarks Opens a serial port to begin communications, creating a relationship between a file number and a specific serial port device.

COMn Identifies the serial port number, for example, COM1, COM4, etc. A colon must not follow the port specification. See Restrictions below.

hComm A numeric expression specifying an unused PowerBASIC file number, in the range of 1 to 32767. This is typically provided by the [FREEFILE](#) function. The Number symbol (#) prefix is optional, but recommended for clarity.

If the port was not opened successfully, the [ERR](#) system variable will contain the error code. Before actual communications through the port can commence, you must configure the communication parameters by using a [COMM SET](#) statement for each parameter.

Restrictions A colon may not be used in the port name, as was common in DOS code. COMM OPEN cannot use an operating system file handle, nor open a port that is already in use. When opening ports above COM9, Windows requires the port name to be specified using the following syntax:

```
COMM OPEN "\\.\COM15" AS #hComm
```

See also [Serial Communications](#), [COMM CLOSE](#), [COMM function](#), [COMM LINE](#), [COMM PRINT](#), [COMM RECV](#), [COMM RESET](#), [COMM SEND](#), [COMM SET](#), [COMM TIMEOUT](#),

[FREEFILE](#), [OPEN](#)

Example

```
DIM hComm AS LONG
hComm = FREEFILE
COMM OPEN "COM1" AS #hComm
COMM OPEN "COM2" AS #5
```

COMM PRINT statement**COMM PRINT statement** IMPROVED

Purpose Send a string of text through a serial port with optional CR/LF.

Syntax `COMM PRINT [#] hComm, string_expression [;] [TO CharCountVar]`

Remarks The text data contained in *string_expression* is sent to the serial port associated with the file number *hComm*. The number symbol (#) is optional.

The data is sent in the character form specified in the [COMM OPEN](#) statement. If CHR=WIDE was given, the data is sent in wide [Unicode](#) characters. Otherwise, it is sent in [ANSI](#) bytes. The data will be converted to the appropriate form automatically.

This statement is a variation of [COMM SEND](#), but is usually used with text only. Each *string_expression* sent is automatically followed by a Carriage-Return and Line-Feed pair to delimit the line. However, if a trailing semi-colon (;) is added, the CR/LF is suppressed.

If the optional "TO *CharCountVar*" clause is included, a count of the number of characters written is assigned to it. This count includes the CR/LF, if utilized. This will allow you to gauge the success of the operation. If a [TimeOut](#) occurred, this value will be less than expected, and a run-time error 24 (Device Timeout) will be generated.

COMM PRINT is ideal for sending "AT" commands to a modem. Omit the trailing semicolon for this purpose, since you would want the CR/LF to be sent along with the data.

See also [Serial Communications](#), [COMM CLOSE](#), [COMM function](#), [COMM LINE](#), [COMM OPEN](#), [COMM RECV](#), [COMM RESET](#), [COMM SEND](#), [COMM SET](#), [COMM TIMEOUT](#)

COMM RECV statement**COMM RECV statement** IMPROVED

Purpose Receive binary data from a [serial port](#).

Syntax `COMM RECV [#] hComm, count&, string_var`

Remarks Retrieve the *count*& number of bytes from the [receive buffer](#), placing the results in *string_var*. Program execution will halt until *count*& bytes are available, so it is wise to check how many bytes are available before making a COMM RECV request. You can do this by checking the RXQUE value with the [COMM function](#), as shown in the example below.

hComm is the file number you used with [COMM OPEN](#), an integer in the range of 1 to 32767. The Number symbol (#) prefix is optional, but recommended for clarity.

The data received is assigned to the *string_var*. The character mode of the *string_var* must match the CHR option in COMM OPEN (ANSI/WIDE). If not, an [error 5](#) (Illegal function call) will be generated, and no data will be received.

See also [Serial Communications](#), [COMM CLOSE](#), [COMM function](#), [COMM LINE](#), [COMM OPEN](#), [COMM PRINT](#), [COMM RESET](#), [COMM SEND](#), [COMM SET](#), [COMM TIMEOUT](#)

Example

```
Qty& = COMM(#hComm, RXQUE)
COMM RECV #hComm, Qty&, a$
```

COMM RESET statement

COMM RESET statement

| | |
|-----------------|---|
| Purpose | Disable flow control for a given serial port . |
| Syntax | <code>COMM RESET [#] hComm, FLOW</code> |
| Remarks | Switches off all flow control to the serial port as specified by the file number stored in <i>hComm</i> . The Number symbol (#) prefix is optional, but recommended for the purposes of clarity. |
| See also | Serial Communications , COMM_CLOSE , COMM function , COMM_LINE , COMM_OPEN , COMM_PRINT , COMM_RECV , COMM_SEND , COMM_SET , COMM_TIMEOUT |

COMM SEND statement

COMM SEND statement IMPROVED

| | |
|-----------------|---|
| Purpose | Send a string of data through a serial port . |
| Syntax | <code>COMM SEND [#] hComm, string_expression TO [CharCountVar]</code> |
| Remarks | The data contained in <i>string_expression</i> is sent to the serial port associated with the file number <i>hComm</i> . The number symbol (#) is optional. The data is sent in the character form specified in the COMM_OPEN statement. If CHR=WIDE was given, the data is sent in wide Unicode characters. Otherwise, it is sent in ANSI bytes. The data will be converted to the appropriate form automatically. With COMM SEND, no delimiters are added to the data. If a trailing CR/LF is needed, it's usually best to use COMM PRINT instead. If the optional "TO <i>CharCountVar</i> " clause is included, a count of the number of characters written is assigned to it. This will allow you to gauge the success of the operation. If a TimeOut occurred, this value will be less than expected, and a run-time error 24 (Device Timeout) will be generated. |
| See also | Serial Communications , COMM_CLOSE , COMM function , COMM_LINE , COMM_OPEN , COMM_PRINT , COMM_RECV , COMM_RESET , COMM_SET , COMM_TIMEOUT |
| Example | <pre>A\$ = "ATDT1,555-1234;" COMM SEND #hComm, a\$</pre> |

COMM SET statement

COMM SET statement IMPROVED

| | |
|----------------|---|
| Purpose | Set communication options for a serial port . |
| Syntax | <code>COMM SET [#] hComm, Comfunc = value</code> |
| Remarks | Set the parameters needed to communicate with a serial port. This must always be done before you can send and receive data through the port. To configure the communication parameters, use keywords from the following table to specify the <i>Comfunc</i> as well as a suitable <i>value</i> chosen from the range applicable to the <i>Comfunc</i> parameter you want to set. If an error occurs when attempting to set a parameter, PowerBASIC sets the ERR system variable to indicate the error number. While each parameter must be set individually, it is also possible to change certain |

parameters without the need to close and re-establish communications.

COMM SET keywords table

| Comfunc | value (TRUE <> 0, FALSE = 0) |
|----------------|---|
| BAUD | Port Baud Rate (9600, 14400, 19200, etc). See notes below. |
| BREAK | TRUE/FALSE Break is asserted. Break is generally used to "get the attention" of the connected modem, terminal or system. |
| BYTE | Number of bits per byte (4, 5, 6, 7, or 8). |
| CD | TRUE/FALSE Carrier Detect state; synonym for RLSD (<i>READ-ONLY</i>). When CD is TRUE, the DCE (modem) has a suitable connection on the communications channel present. When CD is FALSE, there is no suitable connection. |
| CTSFLOW | TRUE/FALSE Enable CTS output flow control (Input signal). When CTSFLOW is enabled, it causes the DTE (computer) to stop sending data whenever the CTS signal is set to logic low by the DCE (modem). Transmission continues when the DCE (modem) sets the CTS signal back to logic high. The CTS signal is usually used in response to an RTS signal. |
| DSRFLOW | TRUE/FALSE Enable DSR output flow control (Input signal). When DSRFLOW is enabled, it causes the DTE (computer) to stop sending data whenever the DSR signal is set to logic low by the DCE (modem). Transmission is enabled when the DSR signal returns to logic high. The DSR signal is often used in conjunction with CTS in response to a RTS signal. |
| DSRSENS | TRUE/FALSE Enable DSR sensitivity. When DSRSENS is enabled, data received by the DTE (computer) is placed into the receive buffer only if DSR is set to logic high. If DSR is set low, received data is discarded. Enabling DSRSENS allows DSR to enable or disable the DTE (the computer) to receive data from the DTE (the modem). DSRSENS is rarely used in practical communications situations. |
| DTRFLOW | TRUE/FALSE Enable DTR handshaking flow control (Output signal). When DTRFLOW is enabled, it signals that the DCE (modem) should prepare to connect to the communications channel. DTR is usually used for modem on-hook/off-hook control, but can also be used in conjunction with DSR for handshaking. |
| DTRLINE | TRUE/FALSE Enable DTR line. When enabled, DTRLINE leaves the DTR line active when the port is closed by the DTE (computer). This ensures that the DCE (modem) does not close the communications channel when the port is closed. |
| NULL | TRUE/FALSE Null (\$NUL) bytes are discarded when read. |
| PARITY | TRUE/FALSE Enable parity checking. This mode must be enabled for the other Parity options to be selected. |
| PARITYCHAR | Character to use for parity error replacement. PARITY must be enabled. |
| PARITYREPL | TRUE/FALSE Enable character replacement on parity error. PARITY must be enabled. |
| PARITYTYPE | 0 = None, 1 = Odd, 2 = Even, 3 = Mark, 4 = Space. PARITY must be enabled. Default = 0. |
| RING | TRUE/FALSE Ring indicator is on (<i>READ-ONLY</i>). When RING returns TRUE, a ringing signal is being received on the communications channel (by the modem). RING approximates the state of the ringing signal; however, it may not be reported accurately on all Windows platforms. |
| RLSD | Receive-line-signal-detect (<i>READ-ONLY</i>). See CD/Carrier Detect above. |

| | |
|----------|---|
| RTSFLOW | Ready To Send (Output signal). 0 = Disable, 1 = Enable, 2 = Handshake, 3 = Toggle. Toggle is used for half-duplex (2-wire) operations to "reverse" the line. While the DTE (computer) is busy sending data, it raises the RTS signal and the DCE (modem) blocks its data receive channel. When RTS signal reverts to logic low, the DCE (modem) reverts to transmit mode and the DTE (computer) switches to receive mode. Handshake mode causes the DTE (computer) to check the receive buffer (RXQUE) after each character is placed into the buffer. When the buffer is 5/6th full, the RTS signal is dropped. When the receive buffer drops to below 1/6th full, RTS is raised again. |
| RXBUFFER | Size of the receive buffer in bytes. |
| RXQUE | Characters currently in the receive buffer (<i>READ-ONLY</i>). |
| STOP | 0 = 1 stop bits, 1 = 1.5 stop bits, 2 = 2 stop bits. |
| TXBUFFER | Size of the transmit buffer in bytes. In some cases, Windows may not be able to report the transmit size. |
| TXQUE | Characters currently in the transmit buffer (<i>READ-ONLY</i>). |
| XINPFLOW | TRUE/FALSE Enable XON/XOFF input flow control. When the DTE (computer) receive buffer is full, an XOFF character is sent to the DCE (modem) to instruct it to halt transmission. When the DCE is ready to resume transmission, an XON character is sent to the DCE. Typically, XOFF is sent when the receive buffer has less than 1/16th remaining, and XON is sent when the receive buffer drops to less than 1/16th of its maximum size. Default = FALSE. |
| XOUTFLOW | TRUE/FALSE Enable XON/XOFF out flow control. When enabled, the DCE (modem) sends an XOFF to the DTE (computer) to halt data transmission to the DCE. When the DCE is ready to receive more data, an XON character is sent. XOUTFLOW typically uses the same 1/16th rules as XINPFLOW. Default = FALSE. |

Common baud rates range from 110 to 256000. There are equates defined in the [WIN32API.INC](#) file, prefixed with %CBR_ to assist you with specifying a common baud rate, but you are not restricted to a limited set of rates.

Attempting to set a READ-ONLY attribute will result in a compile-time [Error 542](#) ("May not be altered").

The Number symbol (#) prefix is optional, but recommended for the purposes of clarity.

See also

[Serial Communications](#), [COMM CLOSE](#), [COMM function](#), [COMM LINE](#), [COMM OPEN](#), [COMM PRINT](#), [COMM RECV](#), [COMM RESET](#), [COMM SEND](#), [COMM TIMEOUT](#)

Example

To [open a communication port](#) and initialize it for use, you will need to set the following parameters (the selection is typical, but is mainly for demonstration purposes - you may choose your own settings as necessary)

```
' Minimum settings
COMM SET #hComm, BAUD      = 9600   ' 9600 baud
COMM SET #hComm, BYTE      = 8       ' 8 bits
COMM SET #hComm, PARITY    = %FALSE  ' No parity
COMM SET #hComm, STOP      = 0       ' 1 stop bit
COMM SET #hComm, TXBUFFER  = 2048    ' transmit buffer
COMM SET #hComm, RXBUFFER  = 4096    ' receive buffer

' Optional settings for flow control
COMM SET #hComm, CTSFLOW   = 1       ' Enable CTS
COMM SET #hComm, RTSFLOW   = 1       ' Enable RTS
COMM SET #hComm, XINPFLOW  = 0       ' Disable XON/OFF
                                       ' Input flow control
COMM SET #hComm, XOUTFLOW  = 0       ' Disable XON/XOFF
```

COMM TIMEOUT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COMM TIMEOUT statement New!

| | |
|-----------------|--|
| Purpose | Place a limit on the time to complete a operation. |
| Syntax | <code>COMM TIMEOUT [#] hComm, TimeOutMS&</code> |
| Remarks | COMM TIMEOUT allows you to specify how long a COMM operation should wait to send or receive a byte of data. This value is measured in milliseconds. If the specified number of milliseconds elapses without a response, the COMM operation will fail and a run-time error 24 (Device Timeout) will be generated. |
| See also | Serial Communications , COMM CLOSE , COMM function , COMM LINE , COMM OPEN , COMM PRINT , COMM RECV , COMM RESET , COMM SEND , COMM SET , COMM TIMEOUT , FREEFILE , OPEN |

COMMAND\$ function

COMMAND\$ function

| | |
|----------------|---|
| Purpose | Return the command-line arguments used to start the program. |
| Syntax | <code>s\$ = COMMAND\$</code> <code>s\$ = COMMAND\$(ArgNum)</code> |
| Remarks | <p>COMMAND\$ returns everything that was typed following the program name. Some operating system manuals refer to this text as the trailer or command tail. You can use COMMAND\$ to collect run-time arguments, like filenames, and program options.</p> <p>Depending upon the optional argument number, COMMAND\$ will return either the complete trailer, or just one of the arguments. If the <i>ArgNum</i> is zero (0), or not present, the complete trailer is returned. If the <i>ArgNum</i> is greater than zero, the trailer is parsed to return an individual argument (1 = first argument. 2 = second argument, etc.). If the <i>ArgNum</i> is greater than the number of arguments, a null (zero-length) is returned.</p> <p>Arguments are delimited by one or more blank spaces. If blank spaces are significant, you should enclose the argument in double quotes ("). Any such double-quotes are stripped from the return value by COMMAND\$. If a zero-length quoted string (") is found, it is ignored entirely.</p> <p>For example, consider a program named FASTSORT.EXE that reads data from one file, sorts it, and puts the result in a new file. Using COMMAND\$ lets you specify the input and output file names when the program is invoked:</p> <pre>FASTSORT.EXE cust.dta cust.new</pre> |

When FASTSORT begins execution, COMMAND\$ or COMMAND\$(0) would return:

```
cust.dta cust.new
```

COMMAND\$(1) would return:

```
cust.dta
```

COMMAND\$(2) would return:

```
cust.new
```

Restrictions

In some recent versions of Windows, file association and drag-drop file operations cause filenames to be enclosed with double-quote marks when they are passed in COMMAND\$. It would be wise to ensure that your applications are prepared for this possibility. Some operating systems automatically enclose the command-line in double-quote marks.

PowerBASIC imposes no arbitrary limits on the length of the string returned by COMMAND\$ but, the operating system may impose limits. Such limits may become evident, for example, when attempting to Drag and Drop a large number of files onto an EXE within Windows Explorer. Usually, attempting to drop more files than the operating system permits will result in an operating system warning message.

Within the [IDE](#), a COMMAND\$ [command-line parameter](#) can be specified for the purposes of testing in both Compile and Execute and Compile and [Debug](#) modes.

See also

[JOINS](#), [PARSE](#), [PARSE\\$](#), [PARSECOUNT](#), [PATHNAME\\$](#), [PATHSCANS](#), [WINMAIN](#)

Example

```
#COMPILE EXE
FUNCTION PBMAIN
  IF TRIM$(COMMAND$) = "" THEN
    EXIT FUNCTION ' No command-line params given, just quit
  ELSEIF INSTR(COMMAND$, "/Q") THEN
    ' Process the /Q option
  ELSEIF INSTR(COMMAND$, "/W") THEN
    ' Process the /W option
  END IF
END FUNCTION
```

CONTROL ADD statement

CONTROL ADD "custom-control" statement

Purpose Add a custom control to a [DDT](#) dialog.

Syntax CONTROL ADD *classname\$*, *hDlg*, *id&*, *txt\$*, *x*, *y*, *xx*, *yy* [, [*style&*] [, [*exstyle&*]]] [,] CALL *callback*

classname\$ A registered custom control or common control class name, for example, "MSCTLS_STATUSBAR32", etc. *classname\$* may be a [string expression](#), quoted [string literal](#), or a [string equate](#).

hDlg [Handle](#) of the dialog in which the control will be created.

id& Unique [identifier](#) for the control. [Equates](#) are recommended for clarity of the source code.

txt\$ Text to be displayed in the control, if any. *txt\$* may be a string expression, , or string constant, and may be zero length.

x, *y* expressions, [variables](#), or [numeric literal](#) values, specifying the location of the control inside the dialog [client area](#). *x* is the horizontal position, and *y* is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or [dialog units](#)) as the [parent](#) dialog.

xx Integral expression, variable, or numeric literal value, specifying the width of the control. The width is given in the same terms (pixels or dialog units) as the parent dialog.

yy Integral expression, variable, or numeric literal value, specifying the height of the control

| | |
|---------------------|--|
| | The height is given in the same terms (pixels or dialog units) as the parent dialog.. |
| <i>style&</i> | Primary style of the custom control. There are no default style values for a custom control. Many standard Windows common controls require the %WS_CHILD and %WS_VISIBLE styles to be explicitly specified, or the control may not be visible or function correctly. Please consult the control's documentation for information on its primary and extended styles. |
| <i>exstyle&</i> | Extended style of the custom control. As with <i>style&</i> above, there are no default extended style values for a custom control - the statement should explicitly include all required primary and extended styles for the control. |
| <i>callback</i> | Optional name of a Callback Function that receives all %WM_COMMAND and %WM_NOTIFY messages for the custom control. See the #MESSAGES metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control. If the control Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the messages are handled by the DDT engine. |
| Remarks | When the user interacts with the control, a message is sent to the designated Callback Function. If there is no Callback Function designated, the message is sent to the callback for the dialog. The <i>style&</i> and <i>exstyle&</i> values are dependent on the type of custom control or common control being used. The notification messages sent to your callback are also dependent on the type of custom control or common control being used. When the Callback Function receives a %WM_COMMAND message, the identity of the control sending the message can be found with the CB_CTL function. Use the CB_CTLMSG function to retrieve the notification message value in your callback. However, many Windows common controls send %WM_NOTIFY messages (to the parent dialog's callback, not the control callback) rather than the more conventional %WM_COMMAND messages. In such cases, the meaning of the message parameters CB.WPARAM and CB.LPARAM will vary according to the type of notification message being processed. |
| Restrictions | Custom controls may require special handling other than the DDT generic functions (CONTROL SET COLOR , CONTROL SET FONT , etc.). Consult the controls documentation for information. |
| See also | #MESSAGES , Dynamic Dialog Tools , CONTROL HANDLE , CONTROL SEND , |

CONTROL ADD BUTTON statement

CONTROL ADD BUTTON statement

| | |
|----------------|--|
| Purpose | Add a command button to a dialog. A command button is a button that causes an action to occur when the button is clicked. A common example of a command button is the "OK" button on a message box dialog. |
| Syntax | <code>CONTROL ADD BUTTON, hDlg, id&, txt\$, x, y, xx, yy [, [style&] [, [exstyle&]]] [[,] CALL callback]</code> |
| <i>hDlg</i> | Handle of the dialog in which the button will be created. The dialog will become the parent of the command button. |
| <i>id&</i> | Unique identifier for the button in the range 1 to 65535, frequently specified with numeric equates for clarity of the code. For example, the equate <code>%NewAccount</code> is more informative than a literal value such as 497. Best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers. However, it is typical for a dialog to include an OK and/or a Cancel button, represented by |

the predefined equates `%IDOK` and `%IDCANCEL` respectively. A button with an ID of `%IDOK` is triggered (clicked) when the ENTER key is pressed by the user, and a button with the ID of `%IDCANCEL` is triggered when the ESCAPE key is pressed. These and other predefined "standard" equates can be found in the [WIN32API.INC](#) and `DDT.INC` files.

- `txt$` Text to be displayed in the button. An ampersand (&) may be included in `txt$` to specify a hot-key. See the Remarks section below. OK and Cancel/Close buttons do not usually contain accelerators, since such buttons usually respond to the ENTER and ESCAPE keystrokes, respectively.
- `x, y` expressions, [variables](#), or [numeric literal](#) values, specifying the location of the control inside the dialog [client area](#). `x` is the horizontal position, and `y` is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or [dialog units](#)) as the [parent](#) dialog.
- `xx` Integral expression, variable, or numeric literal value, specifying the width of the button. The width is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 50 dialog units.
- `yy` Integral expression, variable, or numeric literal value, specifying the height of the button. The height is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 14 dialog units.
- `style&` Primary [style](#) of the button. The default button style comprises `%BS_CENTER`, `%BS_VCENTER`, and `%WS_TABSTOP`. The default style is used if both the primary and extended style parameters are omitted from the statement. For example:

```
CONTROL ADD BUTTON, hDlg, id&, txt$, 100, 100, 150, 200, , , _
CALL ButtonCallback() ' Use default styles
```

Custom style values replace the default values. That is, they are not additional to the default style values - your code must specify all necessary primary and extended style parameters.

The primary button style value can be a combination of any values below, combined together with the [OR](#) operator to form a bitmask:

| | |
|--------------------------------|--|
| <code>%BS_BOTTOM</code> | Place the text at the bottom of the button. |
| <code>%BS_CENTER</code> | Center the text horizontally in the button. (default) |
| <code>%BS_DEFAULT</code> | Create a button with a heavy black border. The user can select this button by pressing the ENTER key. This style is useful for enabling the user to quickly select the most likely option. You can only have one Default button per dialog. It is recommended to make <code>id& = 1</code> , or <code>id& = %IDOK</code> for this control. Synonym of <code>%BS_DEFPUSHBUTTON</code> . |
| <code>%BS_DEFPUSHBUTTON</code> | Synonym of <code>%BS_DEFAULT</code> . |
| <code>%BS_FLAT</code> | Create a flat button (without the raised 3D look). |
| <code>%BS_LEFT</code> | Place the text on the left side of the button. |
| <code>%BS_MULTILINE</code> | Wrap the caption text across multiple lines, if the text string is too long to fit on a single line. To force a wrap, insert a \$CR (or \$CRLF) into the caption text at the desired wrap position. |
| <code>%BS_NOTIFY</code> | Enable a button to send the <code>%BN_KILLFOCUS</code> and <code>%BN_SETFOCUS</code> notification messages to the button Callback Function. |
| <code>%BS_PUSHLIKE</code> | Button state alternates (toggles) between normal (raised) and depressed (sunken) modes. |
| <code>%BS_RIGHT</code> | Place the text on the right side of the button. |

| | |
|---------------------|--|
| %BS_TOP | Place the text at the top edge of the button. |
| %BS_VCENTER | Center the text vertically in the button. (default) |
| %WS_BORDER | Add a thin line border around the control. |
| %WS_DISABLED | Create a control that is initially disabled. A disabled control cannot receive input from the user. Use the CONTROL_ENABLE statement to re-enable the button. |
| %WS_GROUP | Define the start of a group of controls. The first control in each group should also use %WS_TABSTOP style. The next %WS_GROUP control in the tab order defines the end of this group and the start of a new group. Groups configured this way permit the arrow keys to shift focus between the controls within the group, and focus can jump from group to group with the usual TAB and SHIFT+TAB keys. Both tab stops and groups are permitted to wrap from the end of the tab order back to the start. |
| %WS_TABSTOP | Allow button control to receive keyboard focus when the user presses the TAB and SHIFT+TAB keys. The TAB key shifts keyboard focus to the next control with the %WS_TABSTOP style, and SHIFT+TAB shifts focus to the previous control with %WS_TABSTOP. (default) |
| <i>exstyle&</i> | <p>Extended style of the button control. The default extended button style comprises %WS_EX_LEFT. The default extended style is used if both the primary and extended style parameters are omitted from the CONTROL ADD BUTTON statement, in the same manner as <i>style&</i> above.</p> <p>The extended button style value can be a combination of any values below, combined together with the OR operator to form a bitmask:</p> |
| %WS_EX_LEFT | The button has generic "left-aligned" properties. (default) |
| %WS_EX_RIGHT | The button has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment; otherwise, the style is ignored. |
| %WS_EX_TRANSPARENT | Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information. |
| <i>callback</i> | <p>Optional name of a Callback Function that receives all %WM_COMMAND and %WM_NOTIFY messages for the control. See the #MESSAGES metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control.</p> <p>If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.</p> |
| Remarks | If the ampersand (&) character appears in the <i>txt\$</i> parameter, the letter that follows will be displayed underscored. This adds a control accelerator (hot-key) to enable the user to directly "click" a control, simply by pressing and holding the ALT key while pressing the specified hot-key. For example, "E&xit" makes ALT+x the hot-key. |

On Windows XP and Windows 2000 you may need to press the ALT key before

Control Accelerators are made visible. You can set if Command Accelerators are visible when using the ALT key or all the time in the Windows Display Settings.

Unless the %BS_FLAT style is used, the button is drawn on the dialog using a 3-dimensional look. When the user clicks a button, a message is sent to the Callback Function designated for the button. If there is no Callback Function designated, the message is sent to the callback for the dialog.

In general, if the control Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE, if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.

Notification messages are sent to the Callback Function, with [CB.MSG](#) = %WM_COMMAND, [CB.CTL](#) holding the ID (id&) of the control, and [CB.CTLMSG](#) holding the following values:

| | |
|-------------------------------|---|
| %BN_CLICKED | Sent when the user clicks a mouse button, or activates the button with the hot-key (unless the button has been disabled). |
| %BN_DISABLE | Sent when a button is disabled. |
| %BN_KILLFOCUS | Sent when a button loses the keyboard focus. The button must include the %BS_NOTIFY style. |
| %BN_SETFOCUS | Sent when a button receives the keyboard focus. The button must include the %BS_NOTIFY style. |

When a Callback Function receives a %WM_COMMAND message, it should explicitly test the value of CB.CTL and CB.CTLMSG to guarantee it is responding appropriately to the notification message.

See also [Dynamic Dialog Tools](#), [CONTROL GET TEXT](#), [CONTROL SET FONT](#), [CONTROL SET TEXT](#)

CONTROL ADD CHECK3STATE statement

CONTROL ADD CHECK3STATE statement

| | |
|----------------|--|
| Purpose | Add an auto 3-state checkbox to a dialog. This is commonly used to indicate a selection that may be True (set or checked), False (unset or cleared) or Indeterminate (grayed), and is often found in dialogs that provide "multiple choice" options. |
| Syntax | <code>CONTROL ADD CHECK3STATE, hDlg, id&, txt\$, x, y, xx, yy [, [style&] [, [exstyle&]] [, [,] CALL callback]</code> |
| <i>hDlg</i> | Handle of the dialog in which the 3-state checkbox will be created. The dialog will become the parent of the control. |
| <i>id&</i> | Unique identifier for the control in the range 1 to 65535, frequently specified with numeric equates for clarity of the code. For example, the <i>%AutoLogoff</i> equate is more informative than a literal value such as 497. Best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers. |
| <i>txt\$</i> | Text to be displayed in the 3-state checkbox. An ampersand (&) may be included in <i>txt\$</i> to specify a hot-key. See the Remarks section below. |

x, y expressions, [variables](#), or [numeric literal](#) values, specifying the location of the control inside the dialog [client area](#). *x* is the horizontal position, and *y* is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or [dialog units](#)) as the parent dialog.

xx Integral expression, variable, or numeric literal value, specifying the width of the control. The width is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 40 dialog units.

yy Integral expression, variable, or numeric literal value, specifying the height of the control. The height is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 14 dialog units.

style& Primary [style](#) of the 3-state checkbox control. The default 3-state checkbox style comprises %BS_LEFT, %BS_VCENTER, and %WS_TABSTOP. The default style is used only if both the primary and extended style parameters are omitted from the statement. For example:

```
CONTROL ADD CHECK3STATE, hDlg, id&, txt$,
    100, 100, 40, 14, , , _
    CALL Check3Callback() ' Use default styles
```

Custom style values replace the default values. That is, they are not additional to the default style values - your code must specify all necessary primary and extended style parameters.

The primary 3-state checkbox style value can be a combination of any values below, combined together with the [OR](#) operator to form a bitmask:

| | |
|---------------------|---|
| %BS_BOTTOM | Place the text at the bottom of the control. |
| %BS_CENTER | Center the text horizontally in the control. |
| %BS_FLAT | Create a flat control (without the raised 3D look). |
| %BS_LEFT | Place the text on the left side of the checkbox. Also see %BS_LEFTTEXT. (default) |
| %BS_LEFTTEXT | Place the checkbox to the right of the text portion of the control. Combine with %BS_RIGHT to right-align text against the left side of the checkbox control. |

| | |
|----------------------|---|
| %BS_MULTILINE | Wrap the caption text across multiple lines, if the text string is too long to fit on a single line. To force a wrap, insert a \$CR (or \$CRLE) into the caption text at the desired wrap position. |
| %BS_NOTIFY | Enable a control to send the % BN_KILLFOCUS and % BN_SETFOCUS messages to the callback . |
| %BS_PUSHLIKE | Button state alternates (toggles) between normal (raised) and depressed (sunken) modes. |
| %BS_RIGHT | Place the text on the right side of the checkbox. Also see %BS_LEFTTEXT . |
| %BS_TOP | Place the text at the top of the control. |
| %BS_VCENTER | Center the text vertically in the control. (default) |
| %WS_DISABLED | Create a control that is initially disabled. A disabled control cannot receive input from the user. |
| %WS_GROUP | Define the start of a group of controls. The first control in each group should also use % WS_TABSTOP style. The next % WS_GROUP control in the tab order defines the end of this group and the start of a new group. Groups configured this way permit the arrow keys to shift focus between the controls within the |

group, and focus can jump from group to group with the usual TAB and SHIFT+TAB keys. Both tab stops and groups are permitted to wrap from the end of the tab order back to the start.

%WS_TABSTOP

Allow the 3-state checkbox to receive keyboard focus when the user presses the TAB and SHIFT+TAB keys. The TAB key shifts keyboard focus to the next control with the %WS_TABSTOP style, and SHIFT+TAB shifts focus to the previous control with %WS_TABSTOP. (default)

exstyle&

Extended style of the 3-state checkbox control. The default extended 3-state checkbox style comprises %WS_EX_LEFT. The default extended style is used if both the primary and extended style parameters are omitted from the CONTROL ADD CHECK3STATE statement, in the same manner as *style&* above.

The extended 3-state checkbox style value can be a combination of any values below, combined together with the [OR](#) operator to form a bitmask:

%WS_EX_CLIENTEDGE

Apply a sunken edge border to the control.

%WS_EX_LEFT

The control has generic "left-aligned" properties. (default)

%WS_EX_RIGHT

The control has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another

language that supports reading order alignment; otherwise, the style is ignored.

`%WS_EX_STATICEDGE`

Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input).

`%WS_EX_TRANSPARENT`

Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information.

`%WS_EX_WINDOWEDGE`

Apply a raised edge border to the control.

callback

Optional name of a [Callback](#) Function that receives all `%WM_COMMAND` and `%WM_NOTIFY` [messages](#) for the control. See the [#MESSAGES](#) metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control.

In general, if the control Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.

Remarks

If the ampersand (&) character appears in the *txt\$* parameter, the letter that follows will be displayed underscored. This adds a control accelerator (hot-key) to enable the user to directly "click" a control, simply by pressing and holding the ALT key while pressing the specified hot-key. For example, "Set s&tate" makes ALT+t the hot-key.

When the user clicks a 3-state checkbox, a message is sent to the Callback Function designated for the control. If there is no Callback Function designated, the message is sent to the callback for the dialog.

If the control callback processes the notification message, it should return TRUE (non-zero) to prevent the message being passed needlessly to the dialog callback, and eventually to the DDT engine itself.

Notification messages are sent to the Callback Function, with [CB.MSG](#) = %WM_COMMAND, [CB.CTL](#) holding the ID (id&) of the control, and [CB.CTLMSG](#) holding the following values:

| | |
|-------------------------------|---|
| %BN_CLICKED | Sent when the user clicks a mouse button, or activates the control with the hot-key (unless the control has been disabled). |
| %BN_DISABLE | Sent when a control is disabled. |
| %BN_KILLFOCUS | Sent when a control loses the keyboard focus. The control must include the %BS_NOTIFY style. |
| %BN_SETFOCUS | Sent when a control receives the keyboard focus. The control must include the %BS_NOTIFY style. |

When a Callback Function receives a %WM_COMMAND message, it should explicitly test the value of CB.CTL and CB.CTLMSG to guarantee it is responding appropriately to the notification message.

See also

[Dynamic Dialog Tools](#), [CONTROL ADD CHECKBOX](#), [CONTROL ADD OPTION](#), [CONTROL GET CHECK](#), [CONTROL SET CHECK](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#)

CONTROL ADD CHECKBOX statement**CONTROL ADD CHECKBOX statement**

Purpose Add an auto-checkbox to a dialog. This is typically used to indicate a True/False or on/off selection, and is common in dialogs that offer choices of options to a user.

Syntax `CONTROL ADD CHECKBOX, hDlg, id&, txt$, x, y, xx, yy [, [style&] [, [exstyle&]]] [[,] CALL callback]`

| | |
|-------------------|---|
| <i>hDlg</i> | Handle of the dialog in which the checkbox will be created. The dialog will become the parent of the control. |
| <i>id&</i> | Unique identifier for the control in the range 1 to 65535, frequently specified with numeric equates for clarity of the code. For example, the equate <code>%DisableUser</code> is more informative than a literal value such as 497. Best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers. |
| <i>txt\$</i> | Text to be displayed next to the checkbox. An ampersand (&) may be included in <i>txt\$</i> to specify a hot-key. See the Remarks section below. |
| <i>x, y</i> | expressions, variables , or numeric literal values, specifying the location of the control inside the dialog client area . <i>x</i> is the horizontal position, and <i>y</i> is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog. |
| <i>xx</i> | Integral expression, variable, or numeric literal value, specifying the width of the control. The width is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 40 dialog units. |
| <i>yy</i> | Integral expression, variable, or numeric literal value, specifying the height of the control. The height is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 14 dialog units. |
| <i>style&</i> | Primary style of the checkbox control. The default checkbox style comprises <code>%BS_LEFT</code> , <code>%BS_VCENTER</code> , and <code>%WS_TABSTOP</code> . The default style is used only if both the primary and extended parameters are omitted from the statement. For example: |

```
CONTROL ADD CHECKBOX, hDlg, id&, txt$, 100, 100, 40, 14, , , _
CALL CheckboxCallback() ' Use default styles
```

Custom style values replace the default values. That is, they are not additional to the default style values - your code must specify all necessary primary and extended style parameters.

The primary checkbox style value can be a combination of any values below, combined together with the [OR](#) operator to form a bitmask:

| | |
|---------------------------------|--|
| <code>%BS_BOTTOM</code> | Place the text at the bottom of the control. |
| <code>%BS_CENTER</code> | Center the text horizontally in the control. |
| <code>%BS_LEFT</code> | Place the text on the left side of the label portion of the control. Also see <code>%BS_LEFTTEXT</code> . (default) |
| <code>%BS_LEFTTEXT</code> | Place the checkbox to the right of the text portion of the control. Combine with <code>%BS_RIGHT</code> to right-align text against the left side of the checkbox control. |
| <code>%BS_MULTILINE</code> | Wrap the caption text across multiple lines, if the text string is too long to fit on a single line. To force a wrap, insert a \$CR (or \$CRLE) into the caption text at the desired wrap position. |
| <code>%BS_NOTIFY</code> | Enable a control to send the <code>%BN_KILLFOCUS</code> and <code>%BN_SETFOCUS</code> messages to the callback . |
| <code>%BS_PUSHLIKE</code> | Button state alternates (toggles) between normal (raised) and depressed (sunken) modes. |
| <code>%BS_RIGHT</code> | Place the text on the right side of the label portion of the control. Also see <code>%BS_LEFTTEXT</code> . |
| <code>%BS_TOP</code> | Place the text at the top of the control. |
| <code>%BS_VCENTER</code> | Center the text vertically in the control. (default) |
| <code>%WS_DISABLED</code> | Create a control that is initially disabled. A disabled control cannot receive input from the user. |
| <code>%WS_GROUP</code> | Define the start of a group of controls. The first control |

in each group should also use %WS_TABSTOP style. The next %WS_GROUP control in the tab order defines the end of this group and the start of a new group. Groups configured this way permit the arrow keys to shift focus between the controls within the group, and focus can jump from group to group with the usual TAB and SHIFT+TAB keys. Both tab stops and groups are permitted to wrap from the end of the tab order back to the start.

%WS_TABSTOP

Allow checkbox control to receive the keyboard focus when the user presses the TAB and SHIFT+TAB keys. Pressing the TAB key changes the keyboard focus to the next control with the %WS_TABSTOP style, and SHIFT+TAB moves it to the previous control with %WS_TABSTOP. (default)

exstyle&

Extended style of the checkbox control. The default extended checkbox style comprises %WS_EX_LEFT. The default extended style is used if both the primary and extended parameters are omitted from the CONTROL ADD CHECKBOX statement, in the same manner as style& above.

The extended checkbox style value can be a combination of any values below, combined together with the [OR](#) operator to form a bitmask:

| | |
|--------------------|--|
| %WS_EX_CLIENTEDGE | Apply a sunken edge border to the control. |
| %WS_EX_LEFT | The control has generic "left-aligned" properties. (default) |
| %WS_EX_RIGHT | The control has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment; otherwise, the style is ignored. |
| %WS_EX_STATICEDGE | Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input). |
| %WS_EX_TRANSPARENT | Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information. |
| %WS_EX_WINDOWEDGE | Apply a raised edge border to the control. |

callback

Optional name of a [Callback](#) Function that receives all %WM_COMMAND and %WM_NOTIFY [messages](#) for the control. See the [#MESSAGES](#) metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control.

In general, when the control Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the [DDT](#) engine processes unhandled messages.

Remarks

If the ampersand (&) character appears in the *txt\$* parameter, the letter that follows will be displayed underscored. This adds a control accelerator (hot-key) to enable the user to directly "click" a control, simply by pressing and holding the ALT key while pressing the specified hot-key. For example, "O&ption " makes ALT+p the hot-key.

When the user clicks a control, a message is sent to the Callback Function designated for the control. If there is no Callback Function designated, the message is sent to the

callback for the dialog.

If the control callback processes the notification message, it should return TRUE (non-zero) to prevent the message being passed needlessly to the dialog callback, and eventually to the DDT engine itself.

Notification messages are sent to the Callback Function, with [CB.MSG](#) = %WM_COMMAND, [CB.CTL](#) holding the ID (id&) of the control, and [CB.CTLMSG](#) holding the following values:

| | |
|-------------------------------|--|
| %BN_CLICKED | Sent when the user clicks a mouse button or activates the control with the hot-key (unless the control has been disabled). |
| %BN_DISABLE | Sent when a control is disabled. |
| %BN_KILLFOCUS | Sent when a control loses the keyboard focus. The control must include the %BS_NOTIFY style. |
| %BN_SETFOCUS | Sent when a control receives the keyboard focus. The control must include the %BS_NOTIFY style. |

When a Callback Function receives a %WM_COMMAND message, it should explicitly test the value of CB.CTL and CB.CTLMSG to guarantee it is responding appropriately to the notification message.

See also [Dynamic Dialog Tools](#), [CONTROL_ADD_CHECK3STATE](#), [CONTROL_ADD_OPTION](#), [CONTROL_GET_CHECK](#), [CONTROL_SET_CHECK](#), [CONTROL_SET_COLOR](#), [CONTROL_SET_FONT](#)

CONTROL ADD COMBOBOX statement

CONTROL ADD COMBOBOX statement

| | |
|------------------|--|
| Purpose | Add a combo box to a dialog. A combo box is often used to allow a user to select an item from a predefined list, or enter a fresh (unlisted) item. A combo box may contain only text strings. To put numbers in a combo box, convert them to with the FORMAT\$, USING\$, or STR\$ functions. |
| Syntax | <code>CONTROL ADD COMBOBOX, hDlg, id&, [items\$()], x, y, xx, yy [, [style&] [, [exstyle&]]] [[,] CALL callback]</code> |
| <i>hDlg</i> | Handle of the dialog in which the combo box will be created. The dialog will become the parent of the control. |
| <i>id&</i> | Unique identifier for the control in the range 1 to 65535, frequently specified with numeric equates for clarity of the code. For example, the equate <code>%StockNumberList</code> is more informative than a literal value such as 497. Best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers |
| <i>items\$()</i> | Optional dynamic (variable length) string array , containing the initial items to be displayed in the combo box. Items are copied from the array to the combo box, starting at the lowest subscript of the array (LBOUND), continuing on toward the end of the array, until an empty string is encountered, or the highest subscript is reached. If an array with an LBOUND of zero (the default) is specified, be sure that the 1st element (0) contains data. To create a combo box that is initially empty, either omit this parameter, or specify an array whose first element contains an empty string. If the combo box uses the %CBS_SORT style, the items are sorted alphanumerically as they are added to the combo box. |
| <i>x, y</i> | expressions, variables , or numeric literal values, specifying the location of the control inside the dialog client area . <i>x</i> is the horizontal position, and <i>y</i> is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog. |

- xx** Integral expression, variable, or numeric literal value, specifying the width of the control. The width is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is around 100 dialog units.
- yy** Integral expression, variable, or numeric literal value, specifying the height of the control. The height is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 40 dialog units.
- style&** Primary [style](#) of the control.

There are three types of combo boxes: **simple**, **dropdown**, and **dropdownlist**. A **simple** combo box consists of a text box control and a list box; the list box is always displayed. A **dropdown** combo box consists of a text box control and a list box; the list box is not displayed unless the user clicks an icon. A **dropdownlist** combo box consists of a label control (not editable) and a list box; the list box is not displayed unless the user clicks an icon.

| Combo box style | List box control | Text box control |
|---------------------------|------------------|------------------|
| Simple | No | Yes |
| Dropdown (default) | Yes | Yes |
| Dropdownlist | Yes | No |

Note that some styles of combo box are mutually exclusive. In other words, you cannot combine certain styles that may conflict with one another. For example, you cannot specify %CBS_SIMPLE and %CBS_DROPDOWN at the same time.

The default combo box style comprises %CBS_DROPDOWN, %CBS_SORT, and %WS_TABSTOP. The default style is used only if both the primary and extended style parameter values are omitted from the statement. For example:

```
CONTROL ADD COMBOBOX, hDlg, id&, txt$(), 100, 100, 100, 40, , , CALL
  ComboCallback() ' Use default styles
```

Custom style values replace the default values. That is, they are not additional to the default style values - your code must specify all necessary primary and extended style parameters.

The primary combo box style value can be a combination of any values below, combined together with the [OR](#) operator to form a bitmask:

| | |
|-----------------------|--|
| %CBS_AUTOHSCROLL | Automatically scroll the text in the text box to the right when the user types a character at the end of the line. If this style is not set, only text that fits within the rectangular boundary is allowed. |
| %CBS_DISABLENOSCROLL | Show a disabled vertical scroll bar in the list box when the box does not contain enough items to scroll. Without this style, the scroll bar is hidden when the list box does not contain enough items. |
| %CBS_DROPDOWN | Similar to %CBS_SIMPLE, except that the list box is not displayed unless the user selects the icon next to the edit control. (default) |
| %CBS_DROPDOWNLIST | Similar to %CBS_DROPDOWN, except that the text box is replaced by a (non-editable) label item that displays the current selection in the list box. |
| %CBS_HASSTRINGS | The combo box will contain strings. (persistent) |
| %CBS_LOWERCASE | Convert to lowercase any uppercase characters entered into the text box control portion of the combo box. |
| %CBS_NOINTEGRALHEIGHT | Create the list box portion of the combo box with exactly the size specified by the CONTROL ADD COMBOBOX statement. Without this style, |

| | |
|-----------------------|--|
| | Windows reduces the height of the list box portion of the combo box so that it does not display any partial (clipped) items. |
| %CBS_SIMPLE | Display the list box at all times. The current selection in the list box is displayed in the text box. |
| %CBS_SORT | Automatically sorts strings added to the combo box. (default) |
| %CBS_UPPERCASE | Convert any characters entered into the text box of a combo box into uppercase. |
| %WS_DISABLED | Create a control that is initially disabled. A disabled control cannot receive input from the user. Use the CONTROL_ENABLE statement to re-enable a disabled control. |
| %WS_GROUP | Define the start of a group of controls. The first control in each group should also use %WS_TABSTOP style. The next %WS_GROUP control in the tab order defines the end of this group and the start of a new group. |
| %WS_TABSTOP | Allow combo box control to receive keyboard focus when the user presses the TAB and SHIFT+TAB keys. The TAB key shifts keyboard focus to the next control with the %WS_TABSTOP style, and SHIFT+TAB shifts focus to the previous control with %WS_TABSTOP. (default) |
| %WS_VSCROLL | Allow the control to display a vertical scroll bar if the list is longer than the height of the combo box. Use in conjunction with %CBS_DISABLENOSCROLL to make the scroll bar visible at all times. |

Do not intermix list box styles with similarly named combo box styles as the numeric values of similar styles can produce unexpected results. For example, %LBS_SORT = &H2 and %CBS_SORT = &H100. Combo box styles are prefixed with %CBS.

exstyle&

Extended style of the combo box control. The default extended combo box style comprises %WS_EX_LEFT, and %WS_EX_CLIENTEDGE. The default extended style is only used if both the primary and extended parameters are omitted from the CONTROL ADD COMBOBOX statement, in the same manner as *style&* above.

The extended combo box style value can be a combination of any values below, combined together with the [OR](#) operator to form a bitmask:

| | |
|---------------------------|--|
| %WS_EX_CLIENTEDGE | Apply a sunken edge border to the control. (default) |
| %WS_EX_LEFT | The control has generic "left-aligned" properties. (default) |
| %WS_EX_RIGHT | The control has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment; otherwise, the style is ignored. |
| %WS_EX_STATICEDGE | Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input). |
| %WS_EX_TRANSPARENT | Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control |

have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see [MSDN](#) for more information.

`%WS_EX_WINDOWEDGE` Apply a raised edge border to the control.

callback

Optional name of a [Callback](#) Function that receives all `%WM_COMMAND` and `%WM_NOTIFY` [messages](#) for the control. See the [#MESSAGES](#) metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control.

In general, when the control Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.

Remarks

When the user selects an item or edits the text of a combo box, a message is sent to the Callback Function designated for the combo box. If there is no Callback Function designated then the message is sent to the callback for the dialog.

If the control callback processes the notification message, it should return TRUE (non-zero) to prevent the message being passed needlessly to the dialog callback, and eventually to the [DDI](#) engine itself.

Notification messages are sent to the Callback Function, with [CB.MSG](#) = `%WM_COMMAND`, [CB.CTL](#) holding the ID (id&) of the control, and [CB.CTLMSG](#) holding the following values:

| | |
|------------------------------|--|
| <code>%CBN_CLOSEUP</code> | Sent when the list box of a combo box has been closed. |
| <code>%CBN_DBLCLK</code> | Sent when the user double-clicks a string in the list box of a combo box. |
| <code>%CBN_DROPDOWN</code> | Sent when the list box of a combo box is about to be made visible. |
| <code>%CBN_EDITCHANGE</code> | Sent after the user has taken an action that may have altered the text in the text box portion of a combo box. Unlike the <code>%CBN_EDITUPDATE</code> notification message, this notification message is sent after Windows updates the screen. |
| <code>%CBN_EDITUPDATE</code> | Sent when the text box portion of a combo box is about to display altered text. This notification message is sent after the control has formatted the text, but before it displays the text. |
| <code>%CBN_ERRSPACE</code> | Sent when a combo box cannot allocate enough memory to meet a specific request. |
| <code>%CBN_KILLFOCUS</code> | Sent when a combo box loses the keyboard focus. |
| <code>%CBN_SELCHANGE</code> | Sent when the selection in the list box of a combo box is about to be changed, as a result of the user either clicking in the list box or changing the selection by using the arrow keys. |
| <code>%CBN_SELCANCEL</code> | Sent when the user selects an item, but then selects another control or closes the dialog box. It indicates the user's initial selection is to be ignored. |
| <code>%CBN_SELENDOK</code> | Sent when the user selects a list item, or selects an item and then closes the list. It indicates that the user's selection is to be processed. |
| <code>%CBN_SETFOCUS</code> | Sent when a combo box receives the keyboard focus. |

When a Callback Function receives a `%WM_COMMAND` message, it should explicitly

test the value of CB.CTL and CB.CTLMSG to guarantee it is responding appropriately to the notification message.

See also [Dynamic Dialog Tools](#), [COMBOBOX](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#)

CONTROL ADD FRAME statement

CONTROL ADD FRAME statement

Purpose Add a frame to a dialog. This is also known as a "group" control, and is typically drawn around controls to indicate a visual association between such controls. A frame control is often used around related Option controls.

Syntax `CONTROL ADD FRAME, hDlg, id&, txt$, x, y, xx, yy [, [style&] [, [exstyle&]]]`

hDlg [Handle](#) of the dialog in which the frame will be created. The dialog will become the [parent](#) of the control.

id& Unique [identifier](#) for the control in the range 1 to 65535, frequently specified with [numeric equates](#) for clarity of the code. For example, the equate `%RelatedItems` is more informative than a [literal](#) value such as 497. If you will not be changing the text in a frame control after it is created, you may use -1 for the *id&*; however, best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers.

txt\$ Text to be displayed in the frame. An ampersand (&) may be included in *txt\$* to specify a hot-key. See the Remarks section below.

x, y expressions, [variables](#), or [numeric literal](#) values, specifying the location of the control inside the dialog [client area](#). *x* is the horizontal position, and *y* is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or [dialog units](#)) as the parent dialog.

xx Integral expression, variable, or numeric literal value, specifying the width of the control. The width is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 40 dialog units.

yy Integral expression, variable, or numeric literal value, specifying the height of the control. The height is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 14 dialog units.

style& Primary [style](#) of the frame control. The default frame style comprises `%BS_LEFT`, and `%BS_TOP`. The default style is used only if both the primary and extended parameters are omitted from the statement. For example:

```
CONTROL ADD FRAME, hDlg, id&, txt$, 100, 100, 40, 14, , ' Use default
styles
```

Custom style values replace the default values. That is, they are not additional to the default style values - your code must specify all necessary primary and extended style parameters.

The primary frame style value can be a combination of any values below, combined together with the [OR](#) operator to form a bitmask:

| | |
|----------------------------|--|
| <code>%BS_CENTER</code> | Center the text horizontally in the frame. |
| <code>%BS_LEFT</code> | Place the text on the left side of the frame. (default) |
| <code>%BS_GROUPBOX</code> | Display a frame in which other controls can be positioned to infer a "visual association" or relationship between those controls. (persistent) |
| <code>%BS_MULTILINE</code> | Wrap the caption text across multiple lines if the text |

string is too long to fit on a single line. Wrapping is not automatic, but the line wrap position can be specified by inserting a [\\$SCR](#) (or [\\$SCRLE](#)) character at the desired wrap position in the caption text.

%BS_RIGHT

Place the text on the right side of the frame.

%BS_TOP

Place the text at the top of the frame. (persistent) Note: the %BS_TOP style is persistent - the frame control does not support %BS_BOTTOM alignment.

%WS_GROUP

Define the start of a group of controls. The first control in each group should also use %WS_TABSTOP style. The next %WS_GROUP control in the tab order defines the end of this group and the start of a new group. Groups configured this way permit the arrow keys to shift focus between the controls within the group, and focus can jump from group to group with the usual TAB and SHIFT+TAB keys. Both tab stops and groups are permitted to wrap from the end of the tab order back to the start.

%WS_DISABLED

Create a control that is initially disabled. A disabled frame control is displayed with grayed text.

exstyle&

Extended style of the frame control. The default extended frame style comprises %WS_EX_LEFT. The default extended style is used if both the primary and extended parameters are omitted from the CONTROL ADD FRAME statement, in the same manner as *style&* above.

The extended combo box style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

%WS_EX_CLIENTEDGE

Apply a sunken edge border to the control.

%WS_EX_LEFT

The control has generic "left-aligned" properties. (default)

%WS_EX_RIGHT

The control has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment; otherwise, the style is ignored.

%WS_EX_STATICEDGE

Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input).

%WS_EX_TRANSPARENT

Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see [MSDN](#) for more information.

%WS_EX_WINDOWEDGE

Apply a raised edge border to the control.

Remarks

A frame control does not send [messages](#) to its parent dialog and does not require or support a [Callback](#).

See also

[Dynamic Dialog Tools](#), [CONTROL GET TEXT](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [CONTROL SET TEXT](#)

CONTROL ADD HEADER statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CONTROL ADD HEADER statement **New!**

Purpose Add a header control to a [dialog](#).

Syntax `CONTROL ADD HEADER, hDlg, ID, Txt$, x, y, wide, high [,style] [,exstyle] [,CALL Callback]`

Remarks [Handle](#) of the dialog on which the header control will be placed. The dialog will become the [parent](#) of the control.

ID A unique numeric [identifier](#) for this control which is specified by the programmer. It must be an integral value in the range of 1 to 65535. This ID is usually specified with a numeric equate for clarity of the code. For example, the equate %IDC_HEADER1 is more informative than a literal value such as 497. PowerBASIC recommends that identifier values should start at 100 to avoid conflict with any of the standard predefined identifiers.

Txt\$ Text to associate with the Header control. A Header control does not display this text, so it is common to set this value to a null, empty string literal (" or \$NUL).

x, y Integral expressions which specify the location of the control within the dialog client area. X is the horizontal position, and Y is the vertical position. 0,0 refers to the upper left corner of the Dialog. Coordinates are specified in the same terms ([pixels](#) or [dialog units](#)) as the parent dialog.

wide, high Integral expressions which specify the overall width and height of the header area.

style Optional primary style of the header control. This value can be a combination of the values below, combined together with the OR operator to form a bitmask. If style is omitted, the default combination is %WS_CHILD OR %WS_VISIBLE.

%WS_CHILD The control is a child window.

%WS_VISIBLE The control is visible.

%WS_BORDER Add a thin line border around the header control.

exstyle Optional extended style of the header control.

callback Optional name of a [Callback](#) Function that receives all %WM_COMMAND and %WM_NOTIFY messages for the control. See the [#MESSAGES](#) metastatement to choose which [messages](#) will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control.

If the Callback Function processes a message, it should return [TRUE](#) (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the [DDT](#) engine processes unhandled messages.

See Also [HEADER](#)

CONTROL ADD GRAPHIC statement

CONTROL ADD GRAPHIC statement **IMPROVED**

Purpose Add a static graphic control to a dialog for drawing, pictures, text, etc.

| | | | | | | | | | |
|---------------------|--|-------------------|---|-------------------|--|------------|--|-------------|---|
| Syntax | <code>CONTROL ADD GRAPHIC, hDlg, ID, Txt\$, x, y, nWide, nHigh [,style] [,exstyle] [,CALL Callback]</code> | | | | | | | | |
| <i>hDlg</i> | Handle of the dialog in which the graphic control will be placed. The dialog will become the parent of the control. | | | | | | | | |
| <i>ID</i> | A unique numeric identifier for this control which is specified by the programmer. It must be an integral value in the range of 1 to 65535. This ID is usually specified with a numeric equate for clarity of the code. For example, the equate %IDC_GRAPHIC1 is more informative than a literal value such as 497. PowerBASIC recommends that identifier values should start at 100 to avoid conflict with any of the standard predefined identifiers. | | | | | | | | |
| <i>Txt\$</i> | Text to associate with the Graphic control. A Graphic control does not display this text, so it is common to set this value to a null, empty string literal (" or \$NUL). | | | | | | | | |
| <i>x, y</i> | Integral expressions which specify the location of the control within the dialog client area . X is the horizontal position, and Y is the vertical position. 0,0 refers to the upper left corner of the Dialog. Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog. | | | | | | | | |
| <i>nWide, nHigh</i> | Integral expressions which specify the overall width and height of the image area. If you choose a style which includes a border, the client area will be slightly smaller, in order to accommodate it. You use GRAPHIC_GET_CLIENT to determine the exact client size available to you. The width and height are given in the same terms (pixels or dialog units) as the parent dialog. | | | | | | | | |
| <i>style</i> | Optional primary style of the image control. This value can be a combination of the values below, combined together with the OR operator to form a bitmask. If <i>style</i> is omitted, the default combination is %WS_CHILD OR %WS_VISIBLE OR %SS_OWNERDRAW. <table border="0" style="margin-left: 20px;"> <tr> <td style="padding-right: 20px;">%SS_NOTIFY</td> <td>Send %STN_CLICKED and %STN_DBLCLK notification messages to the Callback Function when the user clicks or double-clicks the control.</td> </tr> <tr> <td>%SS_SUNKEN</td> <td>Draw a half-sunken border around the graphic control.</td> </tr> <tr> <td>%WS_BORDER</td> <td>Add a thin line border around the graphic control.</td> </tr> <tr> <td>%WS_DLGFRAE</td> <td>Create a graphic control that has a border of the style typically used with dialog boxes.</td> </tr> </table> | %SS_NOTIFY | Send %STN_CLICKED and %STN_DBLCLK notification messages to the Callback Function when the user clicks or double-clicks the control. | %SS_SUNKEN | Draw a half-sunken border around the graphic control. | %WS_BORDER | Add a thin line border around the graphic control. | %WS_DLGFRAE | Create a graphic control that has a border of the style typically used with dialog boxes. |
| %SS_NOTIFY | Send %STN_CLICKED and %STN_DBLCLK notification messages to the Callback Function when the user clicks or double-clicks the control. | | | | | | | | |
| %SS_SUNKEN | Draw a half-sunken border around the graphic control. | | | | | | | | |
| %WS_BORDER | Add a thin line border around the graphic control. | | | | | | | | |
| %WS_DLGFRAE | Create a graphic control that has a border of the style typically used with dialog boxes. | | | | | | | | |
| <i>exstyle</i> | Optional extended style of the graphic control. This value can be a combination of the values below, combined together with the OR operator to form a bitmask. If <i>exstyle</i> is omitted, there is no default extended style. <table border="0" style="margin-left: 20px;"> <tr> <td style="padding-right: 20px;">%WS_EX_CLIENTEDGE</td> <td>Apply a sunken edge border to the control.</td> </tr> <tr> <td>%WS_EX_STATICEDGE</td> <td>Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input).</td> </tr> </table> | %WS_EX_CLIENTEDGE | Apply a sunken edge border to the control. | %WS_EX_STATICEDGE | Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input). | | | | |
| %WS_EX_CLIENTEDGE | Apply a sunken edge border to the control. | | | | | | | | |
| %WS_EX_STATICEDGE | Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input). | | | | | | | | |
| <i>callback</i> | Optional name of a Callback Function that receives all %WM_COMMAND and %WM_NOTIFY messages for the control. See the #MESSAGES metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control. If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages. | | | | | | | | |
| Remarks | A graphic control is typically used with graphic statements to draw graphs, pictures, text, etc. After you create a graphic control, you would normally use GRAPHIC ATTACH to select it as the target of subsequent GRAPHIC statements. However, if there is no selected graphic target at the time of creation, the new Graphic Control is automatically attached and selected. A graphic control will only send notification messages to a callback if the %SS_NOTIFY style is used. Notification messages are sent to the callback function with CB.MSG = %WM_COMMAND, CB.CTL holding the ID (<i>id&</i>) of the control, and CB.CTLMSG holding | | | | | | | | |

one of the following values:

| | |
|---------------------------|---|
| <code>%STN_CLICKED</code> | Sent when the user clicks a mouse button on the graphic control (unless the image control has been disabled). |
| <code>%STN_DBLCLK</code> | Sent when the user double-clicks on a graphic control (unless the control has been disabled). |
| <code>%STN_DISABLE</code> | Sent when a graphic control has been disabled. |
| <code>%STN_ENABLE</code> | Sent when a graphic control has been enabled. |

When a callback function receives a `%WM_COMMAND` message, it should explicitly test the value of `CB.CTL` and `CB.CTLMSG` to guarantee it is responding appropriately to the notification message.

All PowerBASIC graphical displays are persistent -- they will be automatically redrawn when altered or temporarily covered by another window.

See also

[Dynamic Dialog Tools](#), [GRAPHIC ATTACH](#), [GRAPHIC COLOR](#), [GRAPHIC SCALE](#), [GRAPHIC SET FONT](#), [GRAPHIC STYLE](#), [GRAPHIC WIDTH](#), [GRAPHIC WINDOW](#)

CONTROL ADD IMAGE statement

CONTROL ADD IMAGE statement

| | |
|-------------------|--|
| Purpose | Add a (non-resizing) image control to a dialog. This is typically used to display a bitmap or icon stored in a resource file . |
| Syntax | <code>CONTROL ADD IMAGE, hDlg, id&, image\$, x, y, xx, yy [, [style&] [, [exstyle&]]] [[,] CALL callback]</code> |
| <i>hDlg</i> | Handle of the dialog in which the image will be created. The dialog will become the parent of the control. |
| <i>id&</i> | Unique identifier for the image in the range 1 to 65535, frequently specified with numeric equates for clarity of the code. For example, the equate <code>%WizardBMP</code> is more informative than a literal value such as 497. If you will not be changing the image in the control after it is created, you may use -1 for the <code>id&</code> ; however, best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers. |
| <i>image\$</i> | Name of the bitmap or icon in the resource file. If the image resource uses an integral identifier, <i>image\$</i> should begin with a Number symbol (#) followed by the identifier in an ASCII format, e.g., "#998" or <code>FORMAT\$(rcid&, "\##")</code> . Otherwise, use the text identifier name for the image. |
| <i>x, y</i> | expressions, variables , or numeric literal values, specifying the location of the control inside the dialog client area . <i>x</i> is the horizontal position, and <i>y</i> is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog. |
| <i>xx</i> | Integral expression, variable, or numeric literal value, specifying the width of the image. The width is given in the same terms (pixels or dialog units) as the parent dialog. This value is ignored unless the <code>%SS_CENTERIMAGE</code> style is specified. |
| <i>yy</i> | Integral expression, variable, or numeric literal value, specifying the height of the image. The height is given in the same terms (pixels or dialog units) as the parent dialog. This value is ignored unless the <code>%SS_CENTERIMAGE</code> style is specified. |
| <i>style&</i> | Primary style of the image control. This value can be a combination of the values below, combined together with the OR operator to form a bitmask. In addition, the initial image format may be specified explicitly as either <code>%SS_ICON</code> or <code>%SS_BITMAP</code> , or the image format may be omitted completely. If the image format is specified, it must match the format of the file specified in <i>image\$</i> . |

However, if the image format is **not** specified, PowerBASIC will examine the file to determine the correct image format to use.

| | |
|------------------------------|---|
| <code>%SS_BITMAP</code> | Display only bitmap images. Also see <code>%SS_ICON</code> . (persistent) |
| <code>%SS_CENTERIMAGE</code> | If the image is smaller than the label, fill the rest of the label with the color of the pixel in the top left corner of the image. |
| <code>%SS_ICON</code> | Display only icon images. Also see <code>%SS_ICON</code> . (persistent) |
| <code>%SS_NOTIFY</code> | Send <code>%STN_CLICKED</code> and <code>%STN_DBLCLK</code> notification messages to the Callback Function when the user clicks or double-clicks the control. |
| <code>%SS_SUNKEN</code> | Draw a half-sunken border around the image control. |
| <code>%WS_GROUP</code> | Define the start of a group of controls. The first control in each group should also use <code>%WS_TABSTOP</code> style. The next <code>%WS_GROUP</code> control in the tab order defines the end of this group and the start of a new group. Groups configured this way permit the arrow keys to shift focus between the controls within the group, and focus can jump from group to group with the usual TAB and SHIFT+TAB keys. Both tab stops and groups are permitted to wrap from the end of the tab order back to the start. |

exstyle& Extended style of the image control. The default extended image control style comprises `%WS_EX_LEFT`. The default extended style is used if both the primary and extended parameters are omitted from the CONTROL ADD IMAGE statement, in the same manner as *style&* above.

The extended image control style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

| | |
|---------------------------------|--|
| <code>%WS_EX_CLIENTEDGE</code> | Apply a sunken edge border to the control. |
| <code>%WS_EX_LEFT</code> | The control has generic "left-aligned" properties. (default) |
| <code>%WS_EX_RIGHT</code> | The control has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment. |
| <code>%WS_EX_STATICEDGE</code> | Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input). |
| <code>%WS_EX_TRANSPARENT</code> | Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information. |

callback Optional name of a Callback Function that receives all `%WM_COMMAND` and `%WM_NOTIFY` messages for the control. See the [#MESSAGES](#) metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control.

In general, when the control Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the [DDI](#) engine processes unhandled messages.

Remarks The bitmap or icon used in the image is not resized to fit the control. If your control is 64 dialog units wide and your icon or bitmap is only 32, half of the image will be blank. For best results, icons should be 32x32 pixels.

Once an image control has been created, the images it displays can be changed with the [CONTROL SET IMAGE](#) statement, but only if the images are of the same format as the original. For example, if an image control was initially created showing a bitmap file, all subsequent image changes must also be bitmap images. However, if the image format must be changed at run-time, for example, because icons are to be displayed instead of bitmaps, there are a couple of options. For example, the application could use separate controls for each image format, or the existing control could be destroyed, and a new control created with an image of the opposite format.

An image control will only send notification messages to a callback if the %SS_NOTIFY style is used. Notification messages are sent to the Callback Function with [CB.MSG](#) = %WM_COMMAND, [CB.CTL](#) holding the ID (*id&*) of the control, and [CB.CTLMSG](#) holding the following values:

| | |
|--------------|---|
| %STN_CLICKED | Sent when the user clicks a mouse button on the image control (unless the image control has been disabled). |
| %STN_DBLCLK | Sent when the user double-clicks on an image control (unless the control has been disabled). |
| %STN_DISABLE | Sent when an image control has been disabled. |
| %STN_ENABLE | Sent when an image control has been enabled. |

When a Callback Function receives a %WM_COMMAND message, it should explicitly test the value of CB.CTL and CB.CTLMSG to guarantee it is responding appropriately to the notification message.

See also [Dynamic Dialog Tools](#), [CONTROL ADD GRAPHIC](#), [CONTROL ADD IMAGEX](#), [CONTROL ADD IMGBUTTON](#), [CONTROL ADD IMGBUTTONX](#), [CONTROL SET IMAGE](#), [CONTROL SET IMAGEX](#), [CONTROL SET IMGBUTTON](#), [CONTROL SET IMGBUTTONX](#)

CONTROL ADD IMAGEX statement

CONTROL ADD IMAGEX statement

Purpose Add a stretched image control to a dialog. This is typically used to display bitmaps and icons, which are automatically stretched or condensed to fill the controls client area.

Syntax `CONTROL ADD IMAGEX, hDlg, id&, image$, x, y, xx, yy [, [style&] [, [exstyle&]]] [[,] CALL callback]`

hDlg [Handle](#) of the dialog in which the image will be created. The dialog will become the [parent](#) of the control.

id& Unique [identifier](#) for the image in the range 1 to 65535, frequently specified with [numeric equates](#) for clarity of the code. For example, the equate `%BackgroundIMG` is more informative than a [literal](#) value such as 497. If you will not be changing the image in the control after it is created, you may use -1 for the *id&*; however, best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers.

image\$ Name of the bitmap or icon in the [resource](#) file. If the image resource uses an integral identifier, *image\$* should begin with a Number symbol (#) followed by the identifier in an ASCII format, e.g., "#998" or `FORMAT$(rcid&, "\##")`. Otherwise, use the text identifier name for the image.

x, y expressions, [variables](#), or [numeric literal](#) values, specifying the location of the control inside the dialog [client area](#). *x* is the horizontal position, and *y* is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or [dialog units](#)) as the parent dialog.

| | | | | | | | | | | | |
|---------------------|---|-------------------|---|--------------------|--|--------------|---|-------------------|--|--------------------|---|
| <i>xx</i> | Integral expression, variable, or numeric literal value, specifying the width of the image. The width is given in the same terms (pixels or dialog units) as the parent dialog. | | | | | | | | | | |
| <i>yy</i> | Integral expression, variable, or numeric literal value, specifying the height of the image. The height is given in the same terms (pixels or dialog units) as the parent dialog. | | | | | | | | | | |
| <i>style&</i> | <p>Primary style of the stretched image control. In addition to the image control styles listed below, the initial image format may be specified explicitly as either %SS_ICON or %SS_BITMAP, or you may choose not to specify the image format at all.</p> <p>If the image format is specified, it must match the format of the file specified in <i>image\$</i>. However, if the image format is not specified, PowerBASIC will examine the file to determine the correct image format to use.</p> <p>This value can be a combination of any values below, combined together with the OR operator to form a bitmask:</p> <table> <tr> <td>%SS_BITMAP</td> <td>Display only bitmap images. Also see %SS_ICON. (persistent)</td> </tr> <tr> <td>%SS_ICON</td> <td>Display only icon images. Also see %SS_ICON. (persistent)</td> </tr> <tr> <td>%SS_NOTIFY</td> <td>Send %STN_CLICKED and %STN_DBLCLK notification messages to the Callback Function when the user clicks or double-clicks the control.</td> </tr> <tr> <td>%SS_SUNKEN</td> <td>Draw a half-sunken border around the image control.</td> </tr> <tr> <td>%WS_GROUP</td> <td>Define the start of a group of controls. The first control in each group should also use %WS_TABSTOP style. The next %WS_GROUP control in the tab order defines the end of this group and the start of a new group. Groups configured this way permit the arrow keys to shift focus between the controls within the group, and focus can jump from group to group with the usual TAB and SHIFT+TAB keys. Both tab stops and groups are permitted to wrap from the end of the tab order back to the start.</td> </tr> </table> | %SS_BITMAP | Display only bitmap images. Also see %SS_ICON. (persistent) | %SS_ICON | Display only icon images. Also see %SS_ICON. (persistent) | %SS_NOTIFY | Send %STN_CLICKED and %STN_DBLCLK notification messages to the Callback Function when the user clicks or double-clicks the control. | %SS_SUNKEN | Draw a half-sunken border around the image control. | %WS_GROUP | Define the start of a group of controls. The first control in each group should also use %WS_TABSTOP style. The next %WS_GROUP control in the tab order defines the end of this group and the start of a new group. Groups configured this way permit the arrow keys to shift focus between the controls within the group, and focus can jump from group to group with the usual TAB and SHIFT+TAB keys. Both tab stops and groups are permitted to wrap from the end of the tab order back to the start. |
| %SS_BITMAP | Display only bitmap images. Also see %SS_ICON. (persistent) | | | | | | | | | | |
| %SS_ICON | Display only icon images. Also see %SS_ICON. (persistent) | | | | | | | | | | |
| %SS_NOTIFY | Send %STN_CLICKED and %STN_DBLCLK notification messages to the Callback Function when the user clicks or double-clicks the control. | | | | | | | | | | |
| %SS_SUNKEN | Draw a half-sunken border around the image control. | | | | | | | | | | |
| %WS_GROUP | Define the start of a group of controls. The first control in each group should also use %WS_TABSTOP style. The next %WS_GROUP control in the tab order defines the end of this group and the start of a new group. Groups configured this way permit the arrow keys to shift focus between the controls within the group, and focus can jump from group to group with the usual TAB and SHIFT+TAB keys. Both tab stops and groups are permitted to wrap from the end of the tab order back to the start. | | | | | | | | | | |
| <i>exstyle&</i> | <p>Extended style of the stretched image control. The default extended image style comprises %WS_EX_LEFT. The default extended style is used if both the primary and extended parameters are omitted from the CONTROL ADD IMAGEX statement, in the same manner as <i>style&</i> above.</p> <p>The extended stretched image style value can be a combination of any values below, combined together with the OR operator to form a bitmask:</p> <table> <tr> <td>%WS_EX_CLIENTEDGE</td> <td>Apply a sunken edge border to the control.</td> </tr> <tr> <td>%WS_EX_LEFT</td> <td>The control has generic "left-aligned" properties. (default)</td> </tr> <tr> <td>%WS_EX_RIGHT</td> <td>The control has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment.</td> </tr> <tr> <td>%WS_EX_STATICEDGE</td> <td>Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input).</td> </tr> <tr> <td>%WS_EX_TRANSPARENT</td> <td>Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information.</td> </tr> </table> | %WS_EX_CLIENTEDGE | Apply a sunken edge border to the control. | %WS_EX_LEFT | The control has generic "left-aligned" properties. (default) | %WS_EX_RIGHT | The control has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment. | %WS_EX_STATICEDGE | Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input). | %WS_EX_TRANSPARENT | Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information. |
| %WS_EX_CLIENTEDGE | Apply a sunken edge border to the control. | | | | | | | | | | |
| %WS_EX_LEFT | The control has generic "left-aligned" properties. (default) | | | | | | | | | | |
| %WS_EX_RIGHT | The control has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment. | | | | | | | | | | |
| %WS_EX_STATICEDGE | Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input). | | | | | | | | | | |
| %WS_EX_TRANSPARENT | Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information. | | | | | | | | | | |
| <i>callback</i> | Optional name of a Callback Function that receives all %WM_COMMAND and % | | | | | | | | | | |

WM_NOTIFY [messages](#) for the control. See the [#MESSAGES](#) metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control.

In general, when the control Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.

Remarks The bitmap or icon used in the image is resized to fit the control. If your control is 64 dialog units wide and your icon or bitmap is only 32, it will be stretched to cover the entire control. For best results, icons should be 32x32 pixels.

An image control will only send notification messages to a callback if the %SS_NOTIFY style is used. Notification messages are sent to the Callback Function with [CB.MSG](#) = %WM_COMMAND, [CB.CTL](#) holding the ID (*id&*) of the control, and [CB.CTLMSG](#) holding the following values:

| | |
|------------------------------|---|
| %STN_CLICKED | Sent when the user clicks a mouse button on the image control (unless the image control has been disabled). |
| %STN_DBLCLK | Sent when the user double-clicks on an image control (unless the control has been disabled). |
| %STN_DISABLE | Sent when an image control has been disabled. |
| %STN_ENABLE | Sent when an image control has been enabled. |

When a Callback Function receives a %WM_COMMAND message, it should explicitly test the value of CB.CTL and CB.CTLMSG to guarantee it is responding appropriately to the notification message.

Restrictions Under Windows 95/98/ME, an attempt to stretch an icon significantly above 64x64 may fail due to internal limits that vary between those particular versions of Windows. Bitmaps are not affected in this manner. Windows NT/2000/XP systems do not impose any comparable limitations on either icons or bitmaps.

See also [Dynamic Dialog Tools](#), [CONTROL ADD GRAPHIC](#), [CONTROL ADD IMAGE](#), [CONTROL ADD IMGBUTTON](#), [CONTROL ADD IMGBUTTONX](#), [CONTROL SET IMAGE](#), [CONTROL SET IMAGEX](#), [CONTROL SET IMGBUTTON](#), [CONTROL SET IMGBUTTONX](#)

CONTROL ADD IMGBUTTON statement

CONTROL ADD IMGBUTTON statement

Purpose Add an image button to a dialog. Image buttons are often used to enhance the appearance of a dialog.

Syntax `CONTROL ADD IMGBUTTON, hDlg, id&, image$, x, y, xx, yy [, [style&] [, [exstyle&]]] [,] CALL callback`

hDlg [Handle](#) of the dialog in which the button will be created. The dialog will become the [parent](#) of the control.

id& Unique [identifier](#) for the button in the range 1 to 65535, frequently specified with [numeric equates](#) for clarity of the code. For example, the equate `%IconButton1` is more informative than a [literal](#) value such as 497. Best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers.

However, it is typical for a dialog to include an OK and/or a Cancel button, represented by the predefined equates %IDOK and %IDCANCEL respectively. A button with an ID of %IDOK is triggered (clicked) when the ENTER key is pressed by the user, and a button with the ID of %IDCANCEL is triggered when the ESCAPE key is pressed. These and other predefined "standard" equates can be found in the [WIN32API.INC](#) and DDT.INC files.

| | |
|-------------------|---|
| <i>image\$</i> | Name of the bitmap or icon in the resource file. If the image resource uses an integral identifier, <i>image\$</i> should begin with a Number symbol (#) followed by the identifier in an ASCII format, e.g., "#998". Otherwise, use the text identifier name for the image. |
| <i>x, y</i> | expressions, variables , or numeric literal values, specifying the location of the control inside the dialog client area . <i>x</i> is the horizontal position, and <i>y</i> is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog. |
| <i>xx</i> | Integral expression, variable, or numeric literal value, specifying the width of the control. The width is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 40 dialog units. |
| <i>yy</i> | Integral expression, variable, or numeric literal value, specifying the height of the control. The height is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 14 dialog units. |
| <i>style&</i> | Primary style of the image button control. The default image button style is %WS_TABSTOP. The default style is used only if both the primary and extended parameters are omitted from the statement. For example: |

```
CONTROL ADD IMGBUTTON, hDlg, id&, txt$, 100, 150, 200, , , _
CALL ImgButtonCallback() ' Use default styles
```

Custom style values replace the default values. That is, they are not additional to the default style values - your code must specify all necessary primary and extended style parameters.

The primary image button style value can be a combination of any values below, combined together with the [OR](#) operator to form a bitmask:

| | |
|---------------------|---|
| %BS_DEFAULT | Create the button with a heavy black border. The user can select this button by pressing the ENTER key. This style is useful for enabling the user to quickly select the most likely option. There may only be one Default button per dialog. |
| %BS_FLAT | Create a flat button (without the raised 3D look). |
| %BS_NOTIFY | Enable a button to send the %BN_KILLFOCUS and %BN_SETFOCUS notification messages to the button Callback Function. |
| %WS_DISABLED | Create a control that is initially disabled. A disabled control cannot receive input from the user. Use the CONTROL_ENABLE statement to re-enable the button. |
| %WS_GROUP | Define the start of a group of controls. The first control in each group should also use %WS_TABSTOP style. The next %WS_GROUP control in the tab order defines the end of this group and the start of a new group. Groups configured this way permit the arrow keys to shift focus between the controls within the group, and focus can jump from group to group with the usual TAB and SHIFT+TAB keys. Both tab stops and groups are permitted to wrap from the end of the tab order back to the start. |
| %WS_TABSTOP | Allow button control to receive keyboard focus when the user presses the TAB and SHIFT+TAB keys. The TAB key shifts keyboard focus to the next control with the %WS_TABSTOP style, and SHIFT+TAB shifts focus to the previous control with %WS_TABSTOP. (default) |

exstyle& Extended style of the image button control. The default extended image button style comprises %WS_EX_LEFT. The default extended style is only used if both the primary and extended parameters are omitted from the CONTROL ADD IMGBUTTON statement, in the same manner as *style&* above.

The extended image button style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

| | |
|---------------------------|--|
| %WS_EX_LEFT | The button has generic "left-aligned" properties. (default) |
| %WS_EX_RIGHT | The button has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment; otherwise, the style is ignored. |
| %WS_EX_TRANSPARENT | Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information. |

callback Optional name of a [Callback](#) Function that receives all %WM_COMMAND and %WM_NOTIFY [messages](#) for the control. See the [#MESSAGES](#) metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control.

Generally speaking, if the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.

Remarks The bitmap or icon used in the button is not resized to fit the button. If your button is 64 dialog units wide and your icon or bitmap is only 32, half of the button will be blank. For best results, icons should be 32x32 pixels.

An image button is drawn on the dialog using a 3-dimensional look, unless the %BS_FLAT style is specified. When the user clicks on the image button, a message is sent to the button's Callback Function. If there is no Callback Function designated, the message is sent to the callback for the dialog.

Notification messages are sent to the Callback Function with [CB.MSG](#) = %WM_COMMAND, [CB.CTL](#) holding the ID (*id&*) of the control, and [CB.CTLMSG](#) holding the following values:

| | |
|----------------------|---|
| %BN_CLICKED | Sent when the user clicks a mouse button, or activates the button with the hot-key (unless the button has been disabled). |
| %BN_DISABLE | Sent when a button is disabled. |
| %BN_KILLFOCUS | Sent when a button loses the keyboard focus. The button must include the %BS_NOTIFY style. |
| %BN_SETFOCUS | Sent when a button receives the keyboard focus. The button must include the %BS_NOTIFY style. |

When a Callback Function receives a %WM_COMMAND message, it should explicitly test the value of CB.CTL and CB.CTLMSG to guarantee it is responding appropriately to the notification message.

See also [Dynamic Dialog Tools](#), [CONTROL ADD GRAPHIC](#), [CONTROL ADD IMAGE](#), [CONTROL ADD IMAGEX](#), [CONTROL ADD IMGBUTTON](#), [CONTROL SET IMAGE](#), [CONTROL SET IMAGEX](#), [CONTROL SET IMGBUTTON](#), [CONTROL SET IMGBUTTONX](#)

CONTROL ADD IMGBUTTONX statement

CONTROL ADD IMGBUTTONX statement

| | |
|-------------------|---|
| Purpose | Add a stretched image button to a dialog. Stretched image buttons are often used to enhance the appearance of a dialog, with the image being automatically stretched or condensed to fill the control. |
| Syntax | <code>CONTROL ADD IMGBUTTONX, hDlg, id&, image\$, x, y, xx, yy [, [style&] [, [exstyle&]]] [[,] CALL callback]</code> |
| <i>hDlg</i> | Handle of the dialog in which the button will be created. The dialog will become the parent of the control. |
| <i>id&</i> | Unique identifier for the button in the range 1 to 65535, frequently specified with numeric equates for clarity of the code. For example, the equate <code>%IconButton2</code> is more informative than a literal value such as 497. Best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers. However, it is typical for a dialog to include an OK and/or a Cancel button, represented by the predefined equates <code>%IDOK</code> and <code>%IDCANCEL</code> respectively. A button with an ID of <code>%IDOK</code> is triggered (clicked) when the ENTER key is pressed by the user, and a button with the ID of <code>%IDCANCEL</code> is triggered when the ESCAPE key is pressed. These and other predefined "standard" equates can be found in the WIN32API.INC and <code>DDT.INC</code> files. |
| <i>image\$</i> | Name of the bitmap or icon in the resource file. If the image resource uses an integral identifier, <i>image\$</i> should begin with a Number symbol (#) followed by the identifier in an ASCII format, e.g., "#998". Otherwise, use the text identifier name for the image. |
| <i>x, y</i> | expressions, variables , or numeric literal values, specifying the location of the control inside the dialog client area . <i>x</i> is the horizontal position, and <i>y</i> is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog. |
| <i>xx</i> | Integral expression, variable, or numeric literal value, specifying the width of the control. The width is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 40 dialog units. |
| <i>yy</i> | Integral expression, variable, or numeric literal value, specifying the height of the control. The height is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 14 dialog units. |
| <i>style&</i> | Primary style of the stretched image button. The default image button style is <code>%WS_TABSTOP</code> . The default style is used if both the primary and extended style parameters are omitted from the statement. For example: |

```
CONTROL ADD IMGBUTTONX, hDlg, id&, txt$, 100, 150, 200, , , _
CALL ImgButtonxCallback() ' Use default styles
```

Custom style values replace the default values. That is, they are not additional to the default style values - your code must specify all necessary primary and extended style parameters.

The primary stretched image button style value can be a combination of any values below, combined together with the [OR](#) operator to form a bitmask:

| | |
|--------------------------|---|
| <code>%BS_DEFAULT</code> | Create the button with a heavy black border. The user can select this button by pressing the ENTER key. This style is useful for enabling the user to quickly select the most likely option. There may only be one Default button per dialog. |
| <code>%BS_FLAT</code> | Create a flat button (without the raised 3D look). |

| | | | | | | | |
|---------------------|---|--------------------|---|--------------|---|--------------------|--|
| %BS_NOTIFY | Enable a button to send the %BN_KILLFOCUS and %BN_SETFOCUS notification messages to the button Callback Function. | | | | | | |
| %WS_DISABLED | Create a control that is initially disabled. A disabled control cannot receive input from the user. Use the CONTROL_ENABLE statement to re-enable the button. | | | | | | |
| %WS_GROUP | Define the start of a group of controls. The first control in each group should also use %WS_TABSTOP style. The next %WS_GROUP control in the tab order defines the end of this group and the start of a new group. Groups configured this way permit the arrow keys to shift focus between the controls within the group, and focus can jump from group to group with the usual TAB and SHIFT+TAB keys. Both tab stops and groups are permitted to wrap from the end of the tab order back to the start. | | | | | | |
| %WS_TABSTOP | Allow button control to receive keyboard focus when the user presses the TAB and SHIFT+TAB keys. The TAB key shifts keyboard focus to the next control with the %WS_TABSTOP style, and SHIFT+TAB shifts focus to the previous control with %WS_TABSTOP. (default) | | | | | | |
| <i>exstyle&</i> | <p>Extended style of the stretched image button control. The default extended button style comprises %WS_EX_LEFT. The default extended style is used if both the primary and extended parameters are omitted from the CONTROL ADD IMGBUTTONX statement, in the same manner as <i>style&</i> above.</p> <p>The extended stretched image style value can be a combination of any values below, combined together with the OR operator to form a bitmask:</p> <table border="0" style="margin-left: 20px;"> <tr> <td style="padding-right: 20px;">%WS_EX_LEFT</td> <td>The button has generic "left-aligned" properties. (default)</td> </tr> <tr> <td style="padding-right: 20px;">%WS_EX_RIGHT</td> <td>The button has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment; otherwise, the style is ignored.</td> </tr> <tr> <td style="padding-right: 20px;">%WS_EX_TRANSPARENT</td> <td>Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information.</td> </tr> </table> | %WS_EX_LEFT | The button has generic "left-aligned" properties. (default) | %WS_EX_RIGHT | The button has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment; otherwise, the style is ignored. | %WS_EX_TRANSPARENT | Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information. |
| %WS_EX_LEFT | The button has generic "left-aligned" properties. (default) | | | | | | |
| %WS_EX_RIGHT | The button has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment; otherwise, the style is ignored. | | | | | | |
| %WS_EX_TRANSPARENT | Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information. | | | | | | |
| <i>callback</i> | <p>Optional name of a Callback Function that receives all %WM_COMMAND and %WM_NOTIFY messages for the control. See the #MESSAGES metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control.</p> <p>If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.</p> | | | | | | |
| Remarks | <p>The bitmap or icon used in the button is resized to fit the button. If your button is 64 dialog units wide and your icon or bitmap is only 32, it will be stretched to cover the entire button. For best results, icons should be 32x32 pixels.</p> <p>The image button is drawn on the dialog using a 3-dimensional look, unless the %BS_FLAT style is specified. When the user clicks a button, a message is sent to the</p> | | | | | | |

Callback Function designated for the button. If there is no Callback Function designated, the message is sent to the callback for the dialog.

Notification messages are sent to the Callback Function with [CB.MSG](#) = %WM_COMMAND, [CB.CTL](#) holding the ID (*id&*) of the control, and [CB.CTLMSG](#) holding the following values:

| | |
|-------------------------------|---|
| %BN_CLICKED | Sent when the user clicks a mouse button, or activates the button with the hot-key (unless the button has been disabled). |
| %BN_DISABLE | Sent when a button is disabled. |
| %BN_KILLFOCUS | Sent when a button loses the keyboard focus. The button must include the %BS_NOTIFY style. |
| %BN_SETFOCUS | Sent when a button receives the keyboard focus. The button must include the %BS_NOTIFY style. |

When a Callback Function receives a %WM_COMMAND message, it should explicitly test the value of CB.CTL and CB.CTLMSG to guarantee it is responding appropriately to the notification message.

See also

[Dynamic Dialog Tools](#), [CONTROL ADD GRAPHIC](#), [CONTROL ADD IMAGE](#), [CONTROL ADD IMAGEX](#), [CONTROL ADD IMGBUTTON](#), [CONTROL SET IMAGE](#), [CONTROL SET IMAGEX](#), [CONTROL SET IMGBUTTON](#), [CONTROL SET IMGBUTTONX](#)

CONTROL ADD LABEL statement

CONTROL ADD LABEL statement

| | |
|---------------------|---|
| Purpose | Add a text label to a dialog. A text label is similar to a conventional static control. |
| Syntax | <code>CONTROL ADD LABEL, <i>hDlg</i>, <i>id&</i>, <i>txt\$</i>, <i>x</i>, <i>y</i>, <i>xx</i>, <i>yy</i> [, [<i>style&</i>] [, [<i>exstyle&</i>]]] [[,] CALL <i>callback</i>]</code> |
| <i>hDlg</i> | Handle of the dialog in which the label will be created. The dialog will become the parent of the control. |
| <i>id&</i> | Unique identifier for the control in the range 1 to 65535, frequently specified with numeric equates for clarity of the code. For example, the equate <code>%BlockTitle</code> is more informative than a literal value such as 497. If you will not be changing the text in a line control after it is created, you may use -1 for the <i>id&</i> ; however, best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers. |
| <i>txt\$</i> | Text to be displayed in text label. An ampersand (&) may be included in <i>txt\$</i> to specify a hot-key. See the Remarks section below. |
| <i>x</i> , <i>y</i> | expressions, variables , or numeric literal values, specifying the location of the control inside the dialog client area . <i>x</i> is the horizontal position, and <i>y</i> is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog. |
| <i>xx</i> | Integral expression, variable, or numeric literal value, specifying the width of the control. The width is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 40 dialog units. |
| <i>yy</i> | Integral expression, variable, or numeric literal value, specifying the height of the control. The height is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 8 dialog units. |
| <i>style&</i> | Primary style of the label control. The default label style is <code>%SS_LEFT</code> . The default style is used if both the primary and extended style parameters are omitted from the statement. For example: |

```
CONTROL ADD LABEL, hDlg, id&, txt$, 100, 100, 150, 200, , , _
CALL LabelCallback() ' Use default styles
```

Custom style values replace the default values. That is, they are not additional to the default style values - your code must specify all necessary primary and extended style parameters.

The primary label style value can be a combination of any values below, combined together with the [OR](#) operator to form a bitmask:

| | |
|-------------------------|--|
| %SS_CENTER | Horizontally center the caption text. The text is formatted before it is displayed. Words that extend past the end of a line are automatically wrapped to the beginning of the next centered line. |
| %SS_CENTERIMAGE | Vertically center the caption text. The text is not wrapped even if it extends beyond the width of the control. |
| %SS_ENDELLIPSIS | Replace the end of the given text with ellipsis as needed to fit the result in the specified rectangle. Windows NT/2000/XP only. |
| %SS_ETCHEDFRAME | Draw the frame of the control using an etched edge style. |
| %SS_ETCHEDHORZ | Draw the horizontal edges of the control using an etched edge style. |
| %SS_ETCHEDVERT | Draw the vertical edges of the control using an etched edge style. |
| %SS_LEFT | Left-align the given text. The text is formatted before it is displayed. Words that extend past the end of a line are automatically wrapped to the beginning of the next left-aligned line. (default) |
| %SS_NOPREFIX | Prevent interpretation of ampersand (&) characters in the label text as control accelerator prefix characters. These are normally displayed with the ampersand removed and the next character in the string underscored. |
| %SS_NOTIFY | Send %STN_CLICKED and %STN_DBLCLK notification messages to the Callback Function when the user clicks or double-clicks the control. |
| %SS_NOWORDWRAP | Left-align the given text. Tabs are expanded but words are not wrapped. Text that extends past the end of a line is clipped. |
| %SS_PATHELLIPSIS | Replace the file path portion of the given string with ellipsis as needed to fit the result in the specified rectangle. Windows 2000/XP only. |
| %SS_RIGHT | Right-align the given text. The text is formatted before it is displayed. Words that extend past the end of a line are automatically wrapped to the beginning of the next right-aligned line. |
| %SS_SIMPLE | The caption text is left-aligned. If the control is colored, color is only applied to the region containing the caption text, and the remainder of the control is drawn in standard colors. |
| %SS_SUNKEN | Draw a half-sunken border around the label control. |
| %SS_WORDELLIPSIS | Truncate text that does not fit, adding ellipsis as needed. Windows NT/2000/XP only |
| %WS_GROUP | Define the start of a group of controls. The first control in each group should also use %WS_TABSTOP style. |

The next %WS_GROUP control in the tab order defines the end of this group and the start of a new group.

exstyle&

Extended style of the label control. The default extended label style comprises %WS_EX_LEFT. The default extended style is used if both the primary and extended parameters are omitted from the CONTROL ADD LABEL statement, in the same manner as *style&* above.

The extended label style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

| | |
|--------------------|--|
| %WS_EX_CLIENTEDGE | Apply a sunken edge border to the control. |
| %WS_EX_LEFT | The control has generic "left-aligned" properties. (default) |
| %WS_EX_RIGHT | The control has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment; otherwise, the style is ignored. |
| %WS_EX_STATICEDGE | Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input). |
| %WS_EX_TRANSPARENT | Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information. |
| %WS_EX_WINDOWEDGE | Apply a raised edge border to the control. |

callback

Optional name of a [Callback](#) Function that receives all %WM_COMMAND and %WM_NOTIFY [messages](#) for the control. See the [#MESSAGES](#) metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control.

If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the [DDT](#) engine processes unhandled messages.

Remarks

If the ampersand (&) character appears in the *txt\$* parameter, the letter that follows will be displayed underscored. This adds a control accelerator (hot-key) to enable the user to directly "click" the control that immediately follows in the Tab-Order after the Label control, simply by pressing and holding the ALT key while pressing the specified hot-key. For example, "Choose &Security Level" makes ALT+S the hot-key.

A label control will only send messages to a callback if the %SS_NOTIFY style is used. The following notifications are sent to the Callback Function:

| | |
|--------------|---|
| %STN_CLICKED | Sent when the user clicks a mouse button, or activates the button with the hot-key (unless the button has been disabled). |
| %STN_DBLCLK | Sent when the user double-clicks on a label control (unless the control has been disabled). |
| %STN_DISABLE | Sent when a button is disabled. |
| %STN_ENABLE | Sent when a label control has been enabled. |

Use the [CONTROL SET TEXT](#) statement to change the text in a label control and [CONTROL SET FONT](#) to change the font used in a label control. This is only possible if the label has a unique ID value (i.e., id& should not be -1).

When a Callback Function receives a %WM_COMMAND message, it should explicitly

test the value of [CB_CTL](#) and [CB_CTLMSG](#) to guarantee it is responding appropriately to the notification message.

See also [Dynamic Dialog Tools](#), [CONTROL_GET TEXT](#), [CONTROL_SET COLOR](#), [CONTROL_SET FONT](#), [CONTROL_SET TEXT](#)

CONTROL ADD LINE statement

CONTROL ADD LINE statement

| | |
|-------------------|---|
| Purpose | Add a line control to a dialog. A line control may also be a rectangle (empty or filled). |
| Syntax | <code>CONTROL ADD LINE, hDlg, id&, txt\$, x, y, xx, yy [, [style&] [, [exstyle&]]] [[,] CALL callback]</code> |
| <i>hDlg</i> | Handle of the dialog in which the line will be created. The dialog will become the parent of the control. |
| <i>id&</i> | Unique identifier for the control in the range 1 to 65535, frequently specified with numeric equates for clarity of the code. For example, the equate <code>%SeparatorLeft</code> is more informative than a literal value such as 497. If you will not be changing the size or location of a line control after it is created, you may use -1 for the id. Otherwise, best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers. |
| <i>txt\$</i> | Text to associate with the line control. A line control does not display text, so it is possible to use this string for your own purposes; however, an ampersand (&) may be included in <i>txt\$</i> to specify a hot-key. See the Remarks section below. |
| <i>x, y</i> | expressions, variables , or numeric literal values, specifying the location of the control inside the dialog client area . <i>x</i> is the horizontal position, and <i>y</i> is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog. |
| <i>xx</i> | Integral expression, variable, or numeric literal value, specifying the width of the control. The width is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 40 dialog units. |
| <i>yy</i> | Integral expression, variable, or numeric literal value, specifying the height of the control. The height is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 1 dialog unit. |
| <i>style&</i> | Primary style of the line control. The default line style is <code>%SS_ETCHEDFRAME</code> . The default style is used if both the primary and extended style parameters are omitted from the statement. For example: |

```
CONTROL ADD LINE, hDlg, id&, "", 100, 100, 150, 1, , , CALL
LineCallback() ' Use default styles
```

Custom style values replace the default values. That is, they are not additional to the default style values - your code must specify all necessary primary and extended style parameters.

The primary line style value can be a combination of any values below, combined together with the [OR](#) operator to form a bitmask:

| | |
|------------------------------|--|
| <code>%SS_BLACKFRAME</code> | Draw a box with the frame drawn in the same color as the window frames. This color is black in the default Windows color scheme. |
| <code>%SS_BLACKRECT</code> | Draw a rectangle filled with the current window frame color. This color is black in the default Windows color scheme. |
| <code>%SS_ETCHEDFRAME</code> | Draw the frame of the control using an etched edge |

| | |
|---------------------------------|--|
| | style. (default) |
| <code>%SS_ETCHEDHORZ</code> | Draw the horizontal edges of the control using an etched edge style. |
| <code>%SS_ETCHEDVERT</code> | Draw the vertical edges of the control using an etched edge style. |
| <code>%SS_GRAYFRAME</code> | Draw a box with the frame drawn with the same color as the screen background (desktop). This color is gray in the default Windows color scheme. |
| <code>%SS_GRAYRECT</code> | Draw a rectangle filled with the current screen background color. This color is gray in the default Windows color scheme. |
| <code>%SS_NOPREFIX</code> | Prevent interpretation of any ampersand (&) characters in the control's text as a control accelerator prefix characters. These normally are displayed with the ampersand removed and the next character in the string underscored. |
| <code>%SS_NOTIFY</code> | Sends <code>%STN_CLICKED</code> and <code>%STN_DBLCLK</code> notification messages to the line controls Callback Function when the user clicks or double-clicks the line control. |
| <code>%SS_RIGHTJUST</code> | Force the bottom-right corner of the control to remain fixed when the control is resized. Only the top and left sides are adjusted to accommodate a new image. |
| <code>%SS_WHITEFRAME</code> | Draw a box with the frame drawn with the same color as the window backgrounds. This color is white in the default Windows color scheme. |
| <code>%SS_WHITERECT</code> | Draw a rectangle filled with the current window background color. This color is white in the default Windows color scheme. |
| <i>exstyle&</i> | Extended style of the line control. The default extended line style comprises <code>%WS_EX_LEFT</code> . The default extended style is used if both the primary and extended parameters are omitted from the CONTROL ADD LINE statement, in the same manner as <i>style&</i> above. The extended line control style value can be a combination of any values below, combined together with the OR operator to form a bitmask: |
| <code>%WS_EX_CLIENTEDGE</code> | Apply a sunken edge border to the control. |
| <code>%WS_EX_LEFT</code> | The control has generic "left-aligned" properties. (default) |
| <code>%WS_EX_RIGHT</code> | The control has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment; otherwise, the style is ignored. |
| <code>%WS_EX_STATICEDGE</code> | Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input). |
| <code>%WS_EX_TRANSPARENT</code> | Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information. |
| <code>%WS_EX_WINDOWEDGE</code> | Apply a raised edge border to the control. |
| <i>callback</i> | Optional name of a Callback Function that receives all <code>%WM_COMMAND</code> and <code>%</code> |

WM_NOTIFY [messages](#) for the control. See the [#MESSAGES](#) metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control. The Callback Function will only receive messages if the %SS_NOTIFY style is used.

If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the [DDT](#) engine processes unhandled messages.

Remarks

If the ampersand (&) character appears in the *txt\$* parameter, the letter that follows will be displayed underscored. This adds a control accelerator (hot-key) to enable the user to directly "click" the control that immediately follows in the Tab-Order after the Line control, simply by pressing and holding the ALT key while pressing the specified hot-key. For example, "&Test Suite " makes ALT+T the hot-key.

A line control will only send messages to a callback if the %SS_NOTIFY style is used. The following notifications are sent to the Callback Function:

| | |
|--------------|---|
| %STN_CLICKED | Sent when the user clicks a line control (unless the control has been disabled). |
| %STN_DBLCLK | Sent when the user double-clicks a line control (unless the control has been disabled). |
| %STN_DISABLE | Sent when a line control has been disabled. |
| %STN_ENABLE | Sent when a line control has been enabled. |

When a Callback Function receives a %WM_COMMAND message, it should explicitly test the value of [CB_CTL](#) and [CB_CTLMSG](#) to guarantee it is responding appropriately to the notification message.

See also

[Dynamic Dialog Tools](#), [CONTROL_HANDLE](#), [CONTROL_SEND](#)

CONTROL ADD LISTBOX statement

CONTROL ADD LISTBOX statement

Purpose

Add a list box control to a dialog. A list box contains a set of predefined entries that permit a user to select one or more items. A list box may contain

, images, or both. To put numbers in a list box, convert them to strings with the [FORMAT\\$](#), [USING\\$](#), or [STR\\$](#) functions.

Syntax

```
CONTROL ADD LISTBOX, hDlg, id&, [items$()], x, y, xx, yy [, [style&] [, [exstyle&]]] [[,] CALL callback]
```

hDlg

[Handle](#) of the dialog in which the list box will be created. The dialog will become the [parent](#) of the control.

id&

Unique [identifier](#) for the control in the range 1 to 65535, frequently specified with [numeric equates](#) for clarity of the code. For example, the equate %PickList is more informative than a [literal](#) value such as 497. Best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers.

items\$()

Optional dynamic (variable length) [string array](#) containing the initial items to be displayed in the list box. Items are copied from the array to the list box, starting at the lowest [subscript](#) of the array ([LBOUND](#)), continuing on toward the end of the array until an empty string is encountered, or the highest subscript is reached. If an array with an [LBOUND](#) of zero (the default) is specified, be sure that the 1st element (0) contains data. Also see Restrictions below.

To create a list box that is initially empty, either omit this parameter, or specify an array whose first element contains an empty string. If the list box uses the %LBS_SORT style, the items are sorted alphanumerically as they are added to the list box.

- x, y* expressions, [variables](#), or [numeric literal](#) values, specifying the location of the control inside the dialog [client area](#). *x* is the horizontal position, and *y* is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or [dialog units](#)) as the parent dialog.
- xx* Integral expression, variable, or numeric literal value, specifying the width of the control. The width is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 100 dialog units.
- yy* Integral expression, variable, or numeric literal value, specifying the height of the control. The height is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 40 dialog units.

style& Primary [style](#) of the list box control. The default list box style comprises %LBS_SORT, %LBS_NOTIFY, %WS_TABSTOP, and %WS_VSCROLL (along with the %WS_EX_CLIENTEDGE extended style). The default list box style is used if both the primary and extended style parameters are omitted from the statement. For example:

```
CONTROL ADD LISTBOX, hDlg, id&, items$(), 100, 100, 150, 200, , , _
CALL ListboxCallback() ' Use default styles
```

Custom style values replace the default values. That is, they are not additional to the default style values - your code must specify all necessary primary and extended style parameters.

The primary list box style value can be a combination of any values below, combined together with the [OR](#) operator to form a bitmask:

| | |
|-----------------------|---|
| %LBS_DISABLENO SCROLL | Show a disabled vertical scroll bar in the list box when the box does not contain enough items to scroll. Without this style, the scroll bar is hidden when the list box does not contain enough items. Used in conjunction with the %WS_VSCROLL style. |
| %LBS_EXTENDED SEL | Allow selection of multiple items in the list box by using the SHIFT key with mouse and/or keyboard actions. |
| %LBS_MULTICOLUMN | List box has multiple columns, and can be scrolled horizontally. To set the width, send the %LB_SETCOLUMNWIDTH message to the list box control. |
| %LBS_MULTIPLESEL | Allow selection of multiple items in the list box (without needing to use the SHIFT key) with mouse and/or keyboard actions. |
| %LBS_NOINTEGRALHEIGHT | Force the size of the list box to be exactly the size specified when the control is created. Otherwise, Windows may resize the list box to ensure that items are not partially displayed (clipped). |
| %LBS_NOSEL | The list box can contain items that can be viewed but not selected. |
| %LBS_NOTIFY | Send the callback a message whenever the user clicks or double-clicks a string in the list box. |
| %LBS_SORT | Automatically sort strings added to the list box in alphanumeric order. |
| %LBS_STANDARD | Equivalent to the combination of %LBS_SORT, %LBS_NOTIFY, %WS_VSCROLL and %WS_BORDER styles. |
| %LBS_USETABSTOPS | Expand tab (\$TAB , CHRS(9)) characters. The default tab positions are for every 32 dialog units . To change the tab stop positions, send the %LB_SETTABSTOPS message to the list box control. |
| %WS_DISABLED | Create a control that is initially disabled. A disabled control cannot receive input from the user. |

| | |
|--------------------|---|
| %WS_HSCROLL | Allow the control to display a horizontal scroll bar. By default this is disabled unless the controls horizontal scroll width has been configured by sending a %LB_SETHORIZONTALEXTENT message to the control. Use in conjunction with %LBS_DISABLENOSCROLL to make the scroll bar(s) visible at all times. |
| %WS_GROUP | Define the start of a group of controls. The first control in each group should also use %WS_TABSTOP style. The next %WS_GROUP control in the tab order defines the end of this group and the start of a new group. |
| %WS_TABSTOP | Allow the control to receive keyboard focus when the user presses the TAB and SHIFT+TAB keys. The TAB key shifts keyboard focus to the next control with the %WS_TABSTOP style, and SHIFT+TAB shifts focus to the previous control with %WS_TABSTOP. (default) |
| %WS_VSCROLL | Allow the control to display a vertical scroll bar if the list is longer than the height of the list box. Use in conjunction with %LBS_DISABLENOSCROLL to make the scroll bar(s) visible at all times. |

Do not intermix list box styles with similarly named [combo box](#) styles as the numeric values of similar styles can produce unexpected results. For example, %LBS_SORT = &H2 and %CBS_SORT = &H100. List box styles are prefixed with %LBS.

exstyle&

Extended style of the list box control. The default extended list box style comprises %WS_EX_CLIENTEDGE, and %WS_EX_LEFT. The default extended style is used if both the primary and extended parameters are omitted from the CONTROL ADD LISTBOX statement, in the same manner as *style&* above.

The extended list box style value can be a combination of any values below, combined together with the [OR](#) operator to form a bitmask:

| | |
|---------------------------|--|
| %WS_EX_CLIENTEDGE | Apply a sunken edge border to the control. |
| %WS_EX_LEFT | The control has generic "left-aligned" properties. (default) |
| %WS_EX_RIGHT | The control has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment; otherwise, the style is ignored. |
| %WS_EX_STATICEDGE | Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input). |
| %WS_EX_TRANSPARENT | Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information. |
| %WS_EX_WINDOWEDGE | Apply a raised edge border to the control. |

callback

Optional name of a [Callback](#) Function that receives all %WM_COMMAND and %WM_NOTIFY [messages](#) for the control. See the [#MESSAGES](#) metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control.

If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by

that Callback Function. Otherwise, the [DDT](#) engine processes unhandled messages.

Remarks

The following notifications are sent to the Callback Function:

| | |
|-----------------------------|---|
| <code>%LBN_DBLCLK</code> | Sent when the user double-clicks a string in the list portion of a list box. |
| <code>%LBN_ERRSPACE</code> | Sent when a list box cannot allocate enough memory to meet a specific request. |
| <code>%LBN_KILLFOCUS</code> | Sent when a list box loses the keyboard focus. |
| <code>%LBN_SELCANCEL</code> | Sent when the user selects an item, but then selects another control or closes the dialog box. It indicates the user's initial selection is to be ignored. |
| <code>%LBN_SELCHANGE</code> | Sent when the selection in the list box is about to be changed as a result of the user either clicking in the list box or changing the selection by using the arrow keys. |
| <code>%LBN_SETFOCUS</code> | Sent when a list box receives the keyboard focus. |

When a Callback Function receives a `%WM_COMMAND` message, it should explicitly test the value of [CB_CTL](#) and [CB_CTLMSG](#) to guarantee it is responding appropriately to the notification message.

Restrictions

Under Windows 95/98/ME, a list box is limited to 32,736 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also

[Dynamic Dialog Tools](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [LISTBOX](#)

CONTROL ADD LISTVIEW statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CONTROL ADD LISTVIEW statement

Purpose

Add a [ListView](#) control to a [dialog](#). A ListView displays a set of predefined data items in one or more columns. The user may then view the items, selecting one or more of them for use in the program at a later time.

Syntax

```
CONTROL ADD LISTVIEW, hDlg, id&, txt$, x, y, xx, yy [, [style&] [, [exstyle&]]] [[,] CALL callback]
```

hDlg

[Handle](#) of the dialog in which the ListView will be created. The dialog will become the [parent](#) of the control.

id&

Unique [identifier](#) for the control in the range 1 to 65535, frequently specified with [numeric equates](#) for clarity of the code. For example, the equate `%PickList` is more informative than a [literal](#) value such as 497. Best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers.

txt\$

Text to associate with the ListView control. A ListView control does not display this text, so it is common to set this value to a null, empty string literal (`""`).

x,y

expressions, variables, or numeric literal values specifying the location of the control

inside the dialog client area. *x* is the horizontal position, and *y* is the vertical position. 0,0 refers to the upper left corner of the dialog box [client area](#). Coordinates are specified in the same terms ([pixels](#) or [dialog units](#)) as the [parent](#) dialog.

xx,yy Integral expressions, variable, or numeric literal values, specifying the width and height of the control. *xx* is the width and *yy* is the height, given in the same terms (pixels or dialog units) as the parent dialog.

style& Primary [style](#) of the ListView control. The default ListView style comprises %WS_TABSTOP, %LVS_REPORT, and %LVS_SHOWSELALWAYS. This default ListView style is used if the style parameters are omitted from the statement, as in the following example:

```
CONTROL ADD LISTVIEW, hDlg, id&, "", 100, 100, 150, 200, , , CALL
LVCallback()
```

If you include explicit style values, they replace the default values. That is, they are not added to the default styles values - your code must specify all necessary primary and extended style parameters.

The primary ListView style value can be a combination of any values below, combined together with the [OR](#) operator to form a bitmask:

| | |
|---------------------------|--|
| %LVS_ALIGNLEFT | Items are left-aligned in icon and small icon view. |
| %LVS_ALIGNTOP | Items are aligned with the top of the control in icon and small icon view. |
| %LVS_AUTOARRANGE | Icons are automatically kept arranged. |
| %LVS_EDITLABELS | Item text can be edited by the user. The parent window must process notification messages . |
| %LVS_ICON | This style specifies icon view. |
| %LVS_LIST | This style specifies list view. |
| %LVS_NOCOLUMNHEADER | In report view, there are no headers on the columns. |
| %LVS_NOLABELWRAP | Item text is displayed on a single line in icon view. |
| %LVS_NOSCROLL | No scroll bars are provided. Incompatible with list view and report view. |
| %LVS_NOSORTHEADER | Report view column headers are flat, not like buttons. User can not click on the header to generate a column click notification. |
| %LVS_OWNERDATA | This style specifies a virtual ListView control. |
| %LVS_OWNERDRAWFIXED | The owner window can paint items in report view. |
| %LVS_REPORT | This style specifies report view. The first column is always left-aligned and columns have headers. |
| %LVS_SHAREIMAGELISTS | The image list will not be deleted when the control is destroyed. |
| %LVS_SHOWSELALWAYS | Selections are always shown, even without the focus . |
| %LVS_SINGLESEL | Only one item at a time can be selected. By default, multiple items may be selected. |
| %LVS_SMALLICON | This style specifies small icon view. |
| %LVS_SORTASCENDING | Item indexes are sorted as added in ascending order. |
| %LVS_SORTDESCENDING | Item indexes are sorted as added in descending order. |
| %WS_DISABLED | Create a control that is initially disabled . A disabled control cannot receive input from the user. |
| %WS_GROUP | Define the start of a group of controls. The first |

| | |
|---------------------|---|
| | control in each group should also use %WS_TABSTOP style. The next %WS_GROUP control in the tab order defines the end of this group and the start of a new group. |
| %WS_TABSTOP | Allow the control to receive keyboard focus when the user presses the TAB and SHIFT+TAB keys. The TAB key shifts keyboard focus to the next control with the %WS_TABSTOP style, and SHIFT+TAB shifts focus to the previous control with %WS_TABSTOP. |
| <i>exstyle&</i> | <p>Extended style of the ListView control. The default extended style is %WS_EX_LEFT. The default extended style is used if both the primary and extended parameters are omitted from the CONTROL ADD LISTVIEW statement, in the same manner as <i>style&</i> above.</p> <p>The extended ListView style value can be a combination of any values below, combined together with the OR operator to form a bitmask:</p> <p>%WS_EX_CLIENTEDGE Apply a sunken edge border to the control.</p> <p>%WS_EX_LEFT The control has generic "left-aligned" properties. (default)</p> <p>%WS_EX_RIGHT The control has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment; otherwise, the style is ignored.</p> <p>%WS_EX_STATICEDGE Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input).</p> <p>%WS_EX_TRANSPARENT Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information.</p> <p>%WS_EX_WINDOWEDGE Apply a raised edge border to the control.</p> |
| <i>callback</i> | <p>Optional name of a Callback Function that receives all %WM_COMMAND and %WM_NOTIFY messages for the control. See the #MESSAGES metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control.</p> <p>If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDI engine processes unhandled messages.</p> |
| Remarks | When a Callback Function receives a %WM_COMMAND message, it should explicitly test the value of CB.CTL and CB.CTLMSG to guarantee it is responding appropriately to the notification messages. |
| See also | Dynamic Dialog Tools , CONTROL SET COLOR , CONTROL SET FONT , HEADER , LISTVIEW |

CONTROL ADD OPTION statement

CONTROL ADD OPTION statement

Purpose Add an option button to a dialog. An option button is just like a conventional "radio button"

control.

Syntax

```
CONTROL ADD OPTION, hDlg, id&, txt$, x, y, xx, yy [, [style&] [,
[exstyle&]]] [[,] CALL callback]
```

hDlg [Handle](#) of the dialog in which the option button will be created. The dialog will become the [parent](#) of the control.

id& Unique [identifier](#) for the control in the range 1 to 65535, frequently specified with [numeric equates](#) for clarity of the code. For example, the equate `%DefCon5` is more informative than a [literal](#) value such as 497. Best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers.

txt\$ Text to be displayed next to the option button. An ampersand (&) may be included in *txt\$* to specify a hot-key. See the Remarks section below.

x, y expressions, [variables](#), or [numeric literal](#) values, specifying the location of the control inside the dialog [client area](#). *x* is the horizontal position, and *y* is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or [dialog units](#)) as the parent dialog.

xx Integral expression, variable, or numeric literal value, specifying the width of the control. The width is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 40 dialog units.

yy Integral expression, variable, or numeric literal value, specifying the height of the control. The height is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 14 dialog units.

style& Primary [style](#) of the option button control. The default option button styles are `%WS_TABSTOP`, `%BS_LEFT`, and `%BS_VCENTER`. The default styles are used if both the primary and extended style parameters are omitted from the statement. For example:

```
CONTROL ADD OPTION, hDlg, id&, txt$, 100, 100, 150, 200, , , _
CALL OptionButtonCallback() ' Use default styles
```

Custom style values replace the default values. That is, they are not in addition to the default style values - your code must specify all necessary primary and extended style parameters.

The primary option button style value can be a combination of any values below, combined together with the [OR](#) operator to form a bitmask:

| | |
|---------------------------------|--|
| <code>%BS_BOTTOM</code> | Place the text at the bottom of the control. |
| <code>%BS_CENTER</code> | Center the text horizontally in the control. |
| <code>%BS_LEFT</code> | Place the text on the left side of the control. Also see <code>%BS_LEFTTEXT</code> . (default) |
| <code>%BS_LEFTTEXT</code> | Place the option button to the right of the text portion of the control. Combine with <code>%BS_RIGHT</code> to right-align text against the left side of the option button. |
| <code>%BS_MULTILINE</code> | Wrap the caption text across multiple lines, if the text string is too long to fit on a single line. To force a wrap, insert a \$CR (or \$CRLF) into the caption text at the desired wrap position. |
| <code>%BS_NOTIFY</code> | Enable the <code>%BN_KILLFOCUS</code> and <code>%BN_SETFOCUS</code> notification messages for the option button. |
| <code>%BS_PUSHLIKE</code> | Button state alternates (toggles) between normal (raised) and depressed (sunken) modes. |
| <code>%BS_RIGHT</code> | Place the text on the right side of the control. Also see <code>%BS_LEFTTEXT</code> . |
| <code>%BS_TOP</code> | Place the text at the top of the control. |
| <code>%BS_VCENTER</code> | Center the text vertically in the control. (default) |

| | | |
|---------------------|---------------------------|---|
| | %WS_DISABLED | Create a control that is initially disabled. A disabled control cannot receive input from the user. |
| | %WS_GROUP | Define the start of a group of controls. The first control in each group should also use %WS_TABSTOP style. The next %WS_GROUP control in the tab order defines the end of this group and the start of a new group. Groups configured this way permit the arrow keys to shift focus between the controls within the group, and focus can jump from group to group with the usual TAB and SHIFT+TAB keys. Both tab stops and groups are permitted to wrap from the end of the tab order back to the start. |
| | %WS_TABSTOP | Allow the option control to receive keyboard focus when the user presses the TAB and SHIFT+TAB keys. The TAB key shifts keyboard focus to the next control with the %WS_TABSTOP style, and SHIFT+TAB shifts focus to the previous control with %WS_TABSTOP . (default) |
| <i>exstyle&</i> | | Extended style of the option button control. The default extended option button style comprises %WS_EX_LEFT . The default extended style is used if both the primary and extended style parameters are omitted from the CONTROL ADD OPTION statement completely, in the same manner as <i>style&</i> above. The extended option button style value can be a combination of any values below, combined together with the OR operator to form a bitmask: |
| | %WS_EX_CLIENTEDGE | Apply a sunken edge border to the control. |
| | %WS_EX_LEFT | The control has generic "left-aligned" properties. (default) |
| | %WS_EX_RIGHT | The control has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment; otherwise, the style is ignored. |
| | %WS_EX_STATICEDGE | Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input). |
| | %WS_EX_TRANSPARENT | Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information. |
| | %WS_EX_WINDOWEDGE | Apply a raised edge border to the control. |
| <i>callback</i> | | Optional name of a Callback Function that receives all %WM_COMMAND and %WM_NOTIFY messages for the control. See the #MESSAGES metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control. If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages. |
| Remarks | | Option buttons are used for presenting a list of choices, only one of which may be selected. So, there is no point in having just a single option button. If what you want is to allow turning a single item on or off, use a Checkbox instead. When a group of option buttons are created, you should explicitly set the "selected" and "unselected" state of all option buttons, using the CONTROL SET OPTION statement to set the Check State of all the buttons in the group. |

In addition, the first OPTION control in a group should have the style %WS_GROUP (to mark the beginning of a group of buttons) and %WS_TABSTOP. The remainder of the OPTION controls in the group should not have %WS_GROUP or %WS_TABSTOP styles. However, the very next non-OPTION control to appear in the tab order after the group should be given the %WS_GROUP and %WS_TABSTOP styles (the latter may depend on the type of control it is). If there are no other controls after the group, add %WS_GROUP to the first control in the dialog. This ensures that keyboard navigation with the arrow keys will operate within the group of OPTION controls, and that the TAB and SHIFT+TAB keys will switch focus between whole groups of controls (instead of individual controls as is common when each group member has the %WS_TABSTOP style).

If the ampersand (&) character appears in the *txt\$* parameter, the letter that follows will be displayed underscored. This adds a control accelerator (hot-key) to enable the user to directly select the Option control, simply by pressing and holding the ALT key while pressing the specified hot-key. For example, "Level &3" makes ALT+3 the hot-key.

When the user clicks an option button, a message is sent to the Callback Function designated for the control. If there is no Callback Function designated then the message is sent to the callback for the dialog.

The following notifications are sent to the Callback Function:

| | |
|---------------|---|
| %BN_CLICKED | Sent when the user clicks a mouse button, or activates the button with the hot-key (unless the button has been disabled). |
| %BN_KILLFOCUS | Sent then the option button loses keyboard focus, provided the button has the %BS_NOTIFY style. |
| %BN_SETFOCUS | Sent when the option button receives keyboard focus, provided the option button has the %BS_NOTIFY style. |

When a Callback Function receives a %WM_COMMAND message, it should explicitly test the value of [CB.CTL](#) and [CB.CTLMSG](#) to guarantee it is responding appropriately to the notification message.

See also [Dynamic Dialog Tools](#), [CONTROL_ADD_CHECK3STATE](#), [CONTROL_ADD_CHECKBOX](#), [CONTROL_GET_CHECK](#), [CONTROL_SET_COLOR](#), [CONTROL_SET_FONT](#), [CONTROL_SET_OPTION](#)

Example Refer to the example in the [CONTROL_SET_OPTION](#) topic.

CONTROL_ADD_PROGRESSBAR statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CONTROL_ADD_PROGRESSBAR statement

Purpose Add a ProgressBar control to a [dialog](#). A ProgressBar is a rectangle that is gradually filled, left to right, as some work progresses.

Syntax `CONTROL_ADD_PROGRESSBAR, hDlg, id&, txt$, x, y, xx, yy [, [style&] [, [exstyle&]]] [[,] CALL callback]`

hDlg [Handle](#) of the dialog in which the ProgressBar will be created. The dialog will become the

| | | | | | | | |
|---------------------|---|-------------------|--|-------------------|--|-------------------|--|
| | parent of the control. | | | | | | |
| <i>id&</i> | Unique identifier for the control in the range 1 to 65535, frequently specified with numeric equates for clarity of the code. For example, the equate %PickList is more informative than a literal value such as 497. Best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers. | | | | | | |
| <i>txt\$</i> | Text to associate with the ProgressBar control. A ProgressBar control does not display this text, so it is common to set this value to a null, empty string literal (""). | | | | | | |
| <i>x,y</i> | expressions, variables, or numeric literal values specifying the location of the control inside the dialog client area. <i>x</i> is the horizontal position, and <i>y</i> is the vertical position. 0,0 refers to the upper left corner of the dialog box client area . Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog. | | | | | | |
| <i>xx,yy</i> | Integral expressions, variable, or numeric literal values, specifying the width and height of the control. <i>xx</i> is the width and <i>yy</i> is the height, given in the same terms (pixels or dialog units) as the parent dialog. | | | | | | |
| <i>style&</i> | <p>Primary style of the ProgressBar control. The default ProgressBar style is %WS_BORDER. This default style is used if both the primary and extended style parameters are omitted from the statement, as in the following example:</p> <pre>CONTROL ADD PROGRESSBAR, hDlg, id&, "",90,90,90,20, , , CALL PBCallback()</pre> <p>If you include explicit style values, they replace the default values. That is, they are not added to the default styles values - your code must specify all necessary primary and extended style parameters.</p> <p>The primary style value can be a combination of the standard window values, and the values specific to a ProgressBar (below), which are combined together with the OR operator to form a bitmask:</p> <table border="0"> <tr> <td>%PBS_SMOOTH</td> <td>The bar is smooth rather than segmented.</td> </tr> <tr> <td>%PBS_VERTICAL</td> <td>The control is advanced vertically.</td> </tr> </table> | %PBS_SMOOTH | The bar is smooth rather than segmented. | %PBS_VERTICAL | The control is advanced vertically. | | |
| %PBS_SMOOTH | The bar is smooth rather than segmented. | | | | | | |
| %PBS_VERTICAL | The control is advanced vertically. | | | | | | |
| <i>exstyle&</i> | <p>Extended style of the control. The value can be a combination of the values below, combined together with the OR operator to form a bitmask:</p> <table border="0"> <tr> <td>%WS_EX_CLIENTEDGE</td> <td>Apply a sunken edge border to the control.</td> </tr> <tr> <td>%WS_EX_STATICEDGE</td> <td>Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input).</td> </tr> <tr> <td>%WS_EX_WINDOWEDGE</td> <td>Apply a raised edge border to the control.</td> </tr> </table> | %WS_EX_CLIENTEDGE | Apply a sunken edge border to the control. | %WS_EX_STATICEDGE | Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input). | %WS_EX_WINDOWEDGE | Apply a raised edge border to the control. |
| %WS_EX_CLIENTEDGE | Apply a sunken edge border to the control. | | | | | | |
| %WS_EX_STATICEDGE | Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input). | | | | | | |
| %WS_EX_WINDOWEDGE | Apply a raised edge border to the control. | | | | | | |
| <i>callback</i> | <p>Optional name of a Callback Function that receives all %WM_COMMAND and %WM_NOTIFY messages for the control. See the #MESSAGES metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control.</p> <p>If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDI engine processes unhandled messages.</p> | | | | | | |
| Remarks | When a Callback Function receives a %WM_COMMAND message, it should explicitly test the value of CB.CTL and CB.CTLMSG to guarantee it is responding appropriately to the notification messages. | | | | | | |
| See also | Dynamic Dialog Tools , CONTROL SET COLOR , PROGRESSBAR | | | | | | |

CONTROL ADD SCROLLBAR statement

CONTROL ADD SCROLLBAR statement

| | |
|-------------------|--|
| Purpose | Add a scroll bar control to a dialog . A scroll bar allows the user to scroll information left and right, or up and down. Your program, in response to notification messages from the scroll bar control, must do the actual scrolling itself. |
| Syntax | <code>CONTROL ADD SCROLLBAR, hDlg, id&, txt\$, x, y, xx, yy [, [style&] [, [exstyle&]]] [[,] CALL callback]</code> |
| hDlg | Handle of the dialog in which the scroll bar will be created. The dialog will become the parent of the control. |
| id& | Unique identifier for the control in the range 1 to 65535, frequently specified with numeric equates for clarity of the code. For example, the equate <code>%ReportScrollUpDown</code> is more informative than a literal value such as 497. Best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers. |
| txt\$ | Text to associate with the scroll bar. A scroll bar control does not display text, so it is possible to use this for your own purposes; however, an ampersand (&) may be included in <code>txt\$</code> to specify a (hidden) hot-key. See the Remarks section below. Typically, this parameter is specified as an empty string ("") or a \$NUL string equate. |
| x, y | expressions, variables , or numeric literal values, specifying the location of the control inside the dialog client area . <code>x</code> is the horizontal position, and <code>y</code> is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog. |
| xx | Integral expression, variable, or numeric literal value, specifying the width of the control. The width is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 10 dialog units. |
| yy | Integral expression, variable, or numeric literal value, specifying the height of the control. The height is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 11 dialog units. |
| style& | Primary style of the scroll bar control. The default scroll bar style is <code>%SBS_HORZ</code> ; however, if the width is less than the height, the control is automatically switched to <code>%SBS_VERT</code> , regardless of whether <code>%SBS_HORZ</code> is specified or not. If <code>%SBS_VERT</code> is specified, the control will always be created as a vertical scroll bar regardless of the dimensions of the control. The default style is used if both the primary and extended style parameters are omitted from the statement. For example: |

```
CONTROL ADD SCROLLBAR, hDlg, id&, txt$, 100, 100, 150, 14, , , _
CALL Scrollbar1Callback() ' Use default styles
```

Custom style values replace the default values. That is, they are not additional to the default style values - your code must specify all necessary primary and extended style parameters.

The primary scroll bar style value can be a combination of any values below, combined together with the [OR](#) operator to form a bitmask:

| | |
|-------------------------------|--|
| <code>%SBS_BOTTOMALIGN</code> | Align the bottom edge of the scroll bar with the bottom edge of the dialog, and use the default height of system scroll bars. Used with <code>%SBS_HORZ</code> . |
| <code>%SBS_HORZ</code> | Make the control a horizontal scroll bar (default - see <code>style&</code> above). |
| <code>%SBS_LEFTALIGN</code> | Align the left edge of the scroll bar with the left edge of the dialog, and use the default width of system scroll bars. Used with <code>%SBS_VERT</code> . |
| <code>%SBS_RIGHTALIGN</code> | Align the right edge of the scroll bar with the right edge of the dialog, and use the default width of system scroll |

| | | |
|---------------------|-------------------|---|
| | | bars. Used with %SBS_VERT. |
| | %SBS_TOPALIGN | Align the top edge of the scroll bar with the top edge of the window, and use the default height of system scroll bars. Used with %SBS_HORZ |
| | %SBS_VERT | Make the control a vertical scroll bar (see style& above). |
| | %WS_DISABLED | Create a control that is initially disabled. A disabled control cannot receive input from the user. |
| | %WS_GROUP | Define the start of a group of controls. The first control in each group should also use %WS_TABSTOP style. The next %WS_GROUP control in the tab order defines the end of this group and the start of a new group. |
| | %WS_TABSTOP | Allow the scrollbar control to receive keyboard focus when the user presses the TAB and SHIFT+TAB keys. The TAB key shifts keyboard focus to the next control with the %WS_TABSTOP style, and SHIFT+TAB shifts focus to the previous control with %WS_TABSTOP. |
| <i>exstyle&</i> | | Extended style of the scroll bar control. The default extended scroll bar style comprises %WS_EX_LEFT. The default extended style is used if both the primary and extended style parameters are omitted from the CONTROL ADD SCROLLBAR statement, in the same manner as <i>style&</i> above. |
| | | The extended scroll bar style value can be a combination of any values below, combined together with the OR operator to form a bitmask: |
| | %WS_EX_CLIENTEDGE | Apply a sunken edge border to the control. |
| | %WS_EX_LEFT | The control has generic "left-aligned" properties. (default) |
| | %WS_EX_RIGHT | The control has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment; otherwise, the style is ignored. |
| | %WS_EX_STATICEDGE | Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input). |
| | %WS_EX_WINDOWEDGE | Apply a raised edge border to the control. |
| <i>callback</i> | | Optional name of a Callback Function that receives all %WM_COMMAND and %WM_NOTIFY messages for the control. See the #MESSAGES metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control. |
| | | If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE non-zero) if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages automatically. |
| Remarks | | If the ampersand (&) character appears in the <i>txt\$</i> parameter, the letter that follows will become a control accelerator (hot-key) to enable the user to directly select the scroll bar control, simply by pressing and holding the ALT key while pressing the specified hot-key. For example, "&9" makes ALT+9 the hot-key. The actual text in <i>txt\$</i> is not displayed in a scroll bar control. |
| | | When the user clicks on a scroll bar, drags the thumb (also called the scroll box), or initiates a scroll event with the keyboard, a message is sent to the Callback Function designated for the control. If there is no Callback Function designated, the message is sent to the callback for the dialog. |
| | | The following notifications are sent to the Callback Function: |
| | %WM_HSCROLL | Sent when the user adjusts a horizontal scroll bar. |

`%WM_VSCROLL` Sent when the user adjusts a vertical scroll bar.

When a Callback Function receives a `%WM_HSCROLL` or `%WM_VSCROLL` message, it should retrieve and set the scroll bar control settings through the `GetScrollInfo` API and [SCROLLBAR SET POS](#) function calls. Be sure to use the `%SB_CTL` flag with these API functions, rather than the `%SB_HORZ` or `%SB_VERT` flags.

See also [Dynamic Dialog Tools](#), [CONTROL HANDLE](#), [CONTROL SEND](#), [CONTROL SET COLOR](#), [SCROLLBAR](#)

CONTROL ADD STATUSBAR statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CONTROL ADD STATUSBAR statement

Purpose Add a StatusBar control to a [dialog](#). A StatusBar is a horizontal window, typically at the bottom of a dialog [client area](#), which displays various kinds of status information. It can be divided into parts to display multiple items.

Syntax `CONTROL ADD STATUSBAR, hDlg, id&, txt$, x, y, xx, yy [, [style&] [, [exstyle&]]] [[,] CALL callback]`

hDlg [Handle](#) of the dialog in which the StatusBar will be created. The dialog will become the [parent](#) of the control.

id& Unique [identifier](#) for the control in the range 1 to 65535, frequently specified with [numeric equates](#) for clarity of the code. For example, the equate `%PickList` is more informative than a [literal](#) value such as 497. Best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers.

txt\$ Text to initially display in the StatusBar control.

x,y expressions to specify control location. In the case of a StatusBar, location parameters are ignored since the control is placed on the top or the bottom of the dialog, based upon the chosen style. These location parameters are usually defined as 0, 0.

xx,yy Integral expressions to specify control size. In the case of a ToolBar, size parameters are ignored since the control is created with a default size. These size parameters are usually defined as 0, 0.

style& Primary [style](#) of the StatusBar control. The default StatusBar style is `%CCS_BOTTOM`. This default style is used if both the primary and extended style parameters are omitted from the statement, as in the following example:

```
CONTROL ADD STATUSBAR, hDlg, id&, "", 5, 5, 5, 5, , , CALL SBcallback()
```

If you include explicit style values, they replace the default values. That is, they are not added to the default styles values - your code must specify all necessary primary and extended style parameters.

`%CCS_TOP` The StatusBar is placed at the top of the dialog.

`%CCS_BOTTOM` The StatusBar is placed at the bottom of the dialog.

| | | |
|---------------------|---|--|
| | <code>%SBARS_SIZEGRIP</code> | A sizegrip is added to the StatusBar. |
| | <code>%SBARS_TOOLTIPS</code> | Use this style to enable tooltips. |
| <i>exstyle&</i> | Extended style of the StatusBar control. The extended StatusBar style value can be a combination of the values below, combined together with the OR operator to form a bitmask: | |
| | <code>%WS_EX_CLIENTEDGE</code> | Apply a sunken edge border to the control. |
| | <code>%WS_EX_STATICEDGE</code> | Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input). |
| | <code>%WS_EX_WINDOWEDGE</code> | Apply a raised edge border to the control. |
| <i>callback</i> | Optional name of a Callback Function that receives all <code>%WM_COMMAND</code> and <code>%WM_NOTIFY</code> messages for the control. See the #MESSAGES metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control. | |
| | If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDI engine processes unhandled messages. | |
| Remarks | When a Callback Function receives a <code>%WM_COMMAND</code> message, it should explicitly test the value of CB.CTL and CB.CTLMSG to guarantee it is responding appropriately to the notification messages. | |
| See also | Dynamic Dialog Tools , CONTROL SET FONT , STATUSBAR | |

CONTROL ADD TAB statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CONTROL ADD TAB statement

| | |
|----------------|--|
| Purpose | Add a Tab Control to a dialog . A Tab Control is analogous to the dividers in a notebook. It displays one particular page, selecting it from multiple pages, when the user chooses the corresponding tab. |
| Syntax | <code>CONTROL ADD TAB, hDlg, id&, txt\$, x, y, xx, yy [, [style&] [, [exstyle&]]</code> <code>[[,] CALL <i>callback</i>]</code> |
| <i>hDlg</i> | Handle of the dialog in which the Tab Control will be created. The dialog will become the parent of the control. |
| <i>id&</i> | Unique identifier for the control in the range 1 to 65535, frequently specified with numeric equates for clarity of the code. For example, the equate <code>%PickList</code> is more informative than a literal value such as 497. Best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers. |
| <i>txt\$</i> | Text to associate with the Tab Control. A Tab Control does not display this text, so it is common to set this value to a null, empty string literal (<code>""</code>). |
| <i>x,y</i> | expressions, variables, or numeric literal values specifying the location of the control |

inside the dialog client area. *x* is the horizontal position, and *y* is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms ([pixels](#) or [dialog units](#)) as the [parent](#) dialog.

xx,yy Integral expressions, variable, or numeric literal values, specifying the width and height of the control. *xx* is the width and *yy* is the height, given in the same terms (pixels or dialog units) as the parent dialog.

style& Primary [style](#) of the Tab control. The default Tab style is %WS_CHILD and %WS_TABSTOP. This default style is used if both the primary and extended style parameters are omitted from the statement, as in the following example:

```
CONTROL ADD TAB, hDlg, id&, "",90,90,200,90, , , CALL PBCallback()
```

If you include explicit style values, they replace the default values. That is, they are not added to the default styles values - your code must specify all necessary primary and extended style parameters.

The primary style value can be a combination of the standard window values, and the values specific to a Tab Control (below), which are combined together with the [OR](#) operator to form a bitmask:

| | |
|------------------------|---|
| %TCS_FORCEICONLEFT | Icons are forced to the left |
| %TCS_FORCELABELLEFT | Labels are forced to the left |
| %TCS_FIXEDWIDTH | All tabs are the same size |
| %TCS_RAGGEDRIGHT | Tabs are not stretched |
| %TCS_FOCUSONBUTTONDOWN | Tabs receive the focus when clicked |
| %TCS_OWNERDRAWFIXED | Parent window is responsible for drawing tabs |
| %TCS_TOOLTIPS | A Tooltip control is associated with the control |
| %TCS_FOCUSNEVER | Tab never receives the focus |

exstyle& Extended style of the control. The value can be a combination of the values below, combined together with the OR operator to form a bitmask:

| | |
|-------------------|--|
| %WS_EX_CLIENTEDGE | Apply a sunken edge border to the control. |
| %WS_EX_STATICEDGE | Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input). |
| %WS_EX_WINDOWEDGE | Apply a raised edge border to the control. |

callback Optional name of a [Callback](#) Function that receives all %WM_COMMAND and %WM_NOTIFY [messages](#) for the control. See the [#MESSAGES](#) metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control.

If the Callback Function processes a message, it should return [TRUE](#) (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists).

The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the [DDT](#) engine processes unhandled messages.

Remarks When a Callback Function receives a %WM_COMMAND message, it should explicitly test the value of [CB.CTL](#) and [CB.CTLMSG](#) to guarantee it is responding appropriately to the notification messages.

See also [Dynamic Dialog Tools](#), [CONTROL SET FONT](#), [TAB](#)

CONTROL ADD TEXTBOX statement

CONTROL ADD TEXTBOX statement

Purpose Add a text box control to a dialog. A text box is very similar to a conventional edit control, and it is used to enter text into an application. Text boxes support single-line and multiple-line input.

Syntax

```
CONTROL ADD TEXTBOX, hDlg, id&, txt$, x, y, xx, yy [, [style&] [,
[exstyle&]]] [[,] CALL callback]
```

- hDlg* [Handle](#) of the dialog in which the text box will be created. The dialog will become the [parent](#) of the control.
- id&* Unique [identifier](#) for the control in the range 1 to 65535, frequently specified with [numeric equates](#) for clarity of the code. For example, the equate `%CustomerName` is more informative than a [literal](#) value such as 497. Best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers.
- txt\$* Default text to be displayed in text box. *txt\$* may be a [string equate](#), or [string expression](#). *txt\$* can be empty if there is no default text.
- x, y* expressions, [variables](#), or [numeric literal](#) values, specifying the location of the control inside the dialog [client area](#). *x* is the horizontal position, and *y* is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or [dialog units](#)) as the parent dialog.
- xx* Integral expression, variable, or numeric literal value, specifying the width of the control. The width is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 100 dialog units.
- yy* Integral expression, variable, or numeric literal value, specifying the height of the control. The height is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 12 dialog units.
- style&* Primary [style](#) of the text box control. The default text box style comprises `%WS_TABSTOP`, `%WS_BORDER`, `%ES_LEFT`, and `%ES_AUTOHSCROLL`. The default style is used if both the primary and extended style parameters are omitted from the statement. For example:

```
CONTROL ADD TEXTBOX, hDlg, id&, txt$, 100, 100, 150, 200, , , _
CALL EditControlCallback() ' Use default styles
```

Custom style values replace the default values. That is, they are not additional to the default style values - your code must specify all necessary primary and extended style parameters.

The primary text box style value can be a combination of any values below, combined together with the [OR](#) operator to form a bitmask:

- | | |
|------------------------|--|
| %ES_AUTOHSCROLL | Automatically scroll text to the right by 10 characters when the user types a character at the end of the line. When the user presses the ENTER key, scroll all text back to position zero. |
| %ES_AUTOVSCROLL | Automatically scroll text up one page when the user presses the ENTER key on the last line. This must be combined with the <code>%ES_WANTRETURN</code> and <code>%ES_MULTILINE</code> styles. Also see <code>%WS_VSCROLL</code> . |
| %ES_CENTER | Center text in a multi-line edit control. |
| %ES_LEFT | Left-aligns text. (default) |
| %ES_LOWERCASE | Convert all characters to lowercase as they are typed into the edit control. |
| %ES_MULTILINE | Allow the control to accept multiple lines of input. By default, the ENTER key activates the default button on the dialog. To use the ENTER key as a carriage return in the text box control, include the <code>%ES_WANTRETURN</code> style. If the <code>%ES_AUTOHSCROLL</code> style is included, the control automatically scrolls horizontally when the caret goes past the right edge of the control. Otherwise, the control |

| | |
|-----------------------|---|
| | automatically wraps words to the beginning of the next line when necessary. The control size determines the position of the word wrap. |
| %ES_NOHIDSESEL | Negate the default behavior for a text box. The default behavior hides the selection when the control loses the input focus , and inverts the selection when the control receives the input focus. If you specify %ES_NOHIDSESEL , the selected text is inverted, even if the control does not have the focus. |
| %ES_NUMBER | Allow only digits ("0123456789") instead of characters. Although Windows does not consider the negation symbol (-) or period symbol (.) to be digits, subclassing a TextBox that does not use %ES_NUMBER and rejecting "unwanted" keystrokes is common practice among advanced programmers. |
| %ES_OEMCONVERT | Text is converted from the windows character set to OEM, then back to Windows, as it is entered. |
| %ES_PASSWORD | Display an asterisk (*) for each character typed into the control in order to obscure the password. |
| %ES_READONLY | Prevent the user from typing or editing text in the control. Text can still be selected and copied from the control to the clipboard with the mouse. |
| %ES_RIGHT | Right-align text in a multi-line text box. |
| %ES_UPPERCASE | Convert all characters to uppercase as they are typed into the control. |
| %ES_WANTRETURN | Allow the ENTER key to insert a carriage return in a multi-line text box. Otherwise, the ENTER key works as the dialog box's default push button. This style has no effect on a single-line text box. |
| %WS_BORDER | Add a thin line border around the text box control. |
| %WS_HSCROLL | Add a horizontal scroll bar to the edit control, when used in conjunction to the %ES_AUTOHSCROLL style. |
| %WS_GROUP | Define the start of a group of controls. The first control in each group should also use %WS_TABSTOP style. The next %WS_GROUP control in the tab order defines the end of this group and the start of a new group. |
| %WS_TABSTOP | Allow the textbox control to receive keyboard focus when the user presses the TAB and SHIFT+TAB keys. The TAB key shifts keyboard focus to the next control with the %WS_TABSTOP style, and SHIFT+TAB shifts focus to the previous control with %WS_TABSTOP . (default) |
| %WS_VSCROLL | Add a vertical scroll bar to the edit control. This style should be used in conjunction to the %ES_MULTILINE and %ES_AUTOVSCROLL styles. |

exstyle& Extended style of the text box control. The default extended text box style comprises **%WS_EX_CLIENTEDGE** with **%WS_EX_LEFT**. The default extended style is used if both the primary and extended parameters are omitted from the CONTROL ADD TEXTBOX statement, in the same manner as *style&* above.

The extended text box style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

| | |
|--------------------------|--|
| %WS_EX_CLIENTEDGE | Apply a sunken edge border to the control. |
| %WS_EX_LEFT | The control has generic "left-aligned" properties. (default) |
| %WS_EX_RIGHT | The control has generic "right-aligned" properties. This style has an effect only if the shell language is |

| | |
|-----------------|---|
| | Hebrew, Arabic, or another language that supports reading order alignment; otherwise, the style is ignored. |
| | %WS_EX_STATICEDGE Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input). |
| | %WS_EX_TRANSPARENT Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information. |
| | %WS_EX_WINDOWEDGE Apply a raised edge border to the control. |
| <i>callback</i> | Optional name of a Callback Function that receives all %WM_COMMAND and %WM_NOTIFY messages for the control. See the #MESSAGES metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control. If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages. |
| Remarks | If you specify the %ES_AUTOHSCROLL style, the control automatically scrolls horizontally when the caret goes past the right edge of the control. To start a new line, the user must press the ENTER key. If you do not specify %ES_AUTOHSCROLL , the control automatically wraps words to the beginning of the next line when necessary. A new line is also started if the user presses the ENTER key. The control size determines the position of the word wrap. The following notifications are sent to the Callback Function: |
| | %EN_CHANGE Sent when the user has taken an action that may have altered text in the text box. Unlike the %EN_UPDATE notification, this message is sent after Windows updates the screen. Programmatically changing the text in a control also triggers this message. |
| | %EN_ERRSPACE Sent when the text box cannot allocate enough memory to meet a specific request. |
| | %EN_HSCROLL Sent when the user clicks a multi-line text box's horizontal scroll bar. The callback is notified before the screen is updated. |
| | %EN_KILLFOCUS Sent when an edit control loses the keyboard focus. |
| | %EN_MAXTEXT Sent when the current text insertion has exceeded the specified number of characters for the text box. The text insertion is truncated. |
| | %EN_SETFOCUS Sent when an edit control receives the keyboard focus. |
| | %EN_UPDATE Sent when a text box is about to display altered text. This notification message is sent after the control has formatted the text, but before it displays the text. Also see %EN_CHANGE . |
| | %EN_VSCROLL Sent when the user clicks a text box's vertical scroll bar. The callback is notified before the screen is updated. |
| | When a Callback Function receives a %WM_COMMAND message, it should explicitly test the value of CB.CTL and CB.CTLMSG to guarantee it is responding appropriately to the notification message. Use CONTROL_GET_TEXT to retrieve the text from a text box control, and use |

[CONTROL SET TEXT](#) to change the text in a text box control. Changing the text in a text box control (in response to a %EN_CHANGE or %EN_UPDATE message) will trigger a second set of %EN_CHANGE and %EN_UPDATE messages. Unless this is compensated for, these notifications can unwittingly cause an endless loop.

For example, the following is potentially fatal:

```
CALLBACK FUNCTION EditControlCallback()
  IF CB.CTL = %ID_EDITBOX1 AND CB.CTLMSG = %EN_CHANGE THEN
    CONTROL SET TEXT CB.HNDL, CB.CTL, "New Text"
  EXIT FUNCTION
END IF
[statements]
```

As CONTROL SET TEXT is a "blocking" statement (that is, the statement does not complete until the text has been changed), it is a simple matter to block the endless loop effect:

```
CALLBACK FUNCTION EditControlCallback()
  STATIC EditBusy&
  IF CB.CTL = %ID_EDITBOX1 AND CB.CTLMSG = %EN_CHANGE THEN
    IF EditBusy& THEN EXIT FUNCTION
    EditBusy& = -1
    CONTROL SET TEXT CB.HNDL, CB.CTL, "New Text"
    RESET EditBusy&
  EXIT FUNCTION
END IF
[statements]
```

See also [Dynamic Dialog Tools](#), [CONTROL GET TEXT](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [CONTROL SET TEXT](#)

CONTROL ADD TOOLBAR statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CONTROL ADD TOOLBAR statement

- Purpose** Add a ToolBar control to a [dialog](#). A ToolBar overlays part of a dialog's [client area](#), typically at the top.
- Syntax** `CONTROL ADD TOOLBAR, hDlg, ID, Txt$, x, y, nWide, nHigh [,style] [,exstyle&] [,CALL callback]`
- hDlg** [Handle](#) of the dialog in which the ToolBar will be created. The dialog will become the [parent](#) of the control.
- ID** Unique [identifier](#) for the control in the range 1 to 65535, frequently specified with [numeric equates](#) for clarity of the code. For example, the equate %PickList is more informative than a [literal](#) value such as 497. Best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers.
- Txt\$** Text to associate with the ToolBar control. A ToolBar control does not display this text, so it is common to set this value to a null, empty string literal (" or [\\$NULL](#)).

| | | | | | | | |
|---------------------|---|-------------------|---|-------------------|--|-------------------|--|
| <i>x,y</i> | Integral expressions which specify the location of the control within the dialog client area. In the case of a ToolBar, size parameters are ignored since the control is created with a default position. These size parameters are usually omitted. | | | | | | |
| <i>nWide, nHigh</i> | Integral expressions which specify the overall width and height of the control. In the case of a ToolBar, size parameters are ignored since the control is created with a default size. These size parameters are usually omitted. | | | | | | |
| <i>style</i> | Optional primary style of the ToolBar control. The default ToolBar style is %WS_CHILD or %WS_VISIBLE or %WS_BORDER or %CCS_TOP or %TBSTYLE_FLAT. This default style is used if both the primary and extended style parameters are omitted from the statement, as in the following example: <pre>CONTROL ADD TOOLBAR, hDlg, id&, "", 1, 1, 1, 1, , , CALL TBCallback()</pre> <p>If you include explicit style values, they replace the default values. That is, they are not added to the default styles values - your code must specify all necessary primary and extended style parameters.</p> <p>The primary ToolBar style value can be a combination of the values below, combined together with the OR operator to form a bitmask:</p> <table> <tr> <td>%CCS_TOP</td> <td>The ToolBar is placed at the top of the dialog.</td> </tr> <tr> <td>%CCS_BOTTOM</td> <td>The ToolBar is placed at the bottom of the dialog.</td> </tr> </table> | %CCS_TOP | The ToolBar is placed at the top of the dialog. | %CCS_BOTTOM | The ToolBar is placed at the bottom of the dialog. | | |
| %CCS_TOP | The ToolBar is placed at the top of the dialog. | | | | | | |
| %CCS_BOTTOM | The ToolBar is placed at the bottom of the dialog. | | | | | | |
| <i>exstyle&</i> | Optional extended style of the ToolBar control. The extended ToolBar style value can be a combination of the values below, combined together with the OR operator to form a bitmask: <table> <tr> <td>%WS_EX_CLIENTEDGE</td> <td>Apply a sunken edge border to the control.</td> </tr> <tr> <td>%WS_EX_STATICEDGE</td> <td>Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input).</td> </tr> <tr> <td>%WS_EX_WINDOWEDGE</td> <td>Apply a raised edge border to the control.</td> </tr> </table> | %WS_EX_CLIENTEDGE | Apply a sunken edge border to the control. | %WS_EX_STATICEDGE | Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input). | %WS_EX_WINDOWEDGE | Apply a raised edge border to the control. |
| %WS_EX_CLIENTEDGE | Apply a sunken edge border to the control. | | | | | | |
| %WS_EX_STATICEDGE | Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input). | | | | | | |
| %WS_EX_WINDOWEDGE | Apply a raised edge border to the control. | | | | | | |
| <i>callback</i> | Optional name of a Callback Function that receives all %WM_COMMAND and %WM_NOTIFY messages for the control. See the #MESSAGES metastatement to choose which messages will be received. Generally speaking, ToolBar command messages result from clicking a ToolBar Button, so the message is sent to the callback specified in TOOLBAR ADD BUTTON or the dialog callback specified in . Message routing by button allows you to easily determine which button generated the event, and eliminates virtually all %WM_COMMAND messages here. This callback is primarily used to process %WM_NOTIFY messages. <p>If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.</p> | | | | | | |
| Remarks | When a Callback Function receives a message, it should explicitly test the value of CB_CTL and CB_CTLMSG to guarantee it is responding appropriately to the notification messages. | | | | | | |
| See also | DIALOG SHOW MODAL , DIALOG SHOW MODELESS , Dynamic Dialog Tools , CONTROL SET FONT , TOOLBAR | | | | | | |

CONTROL ADD TREEVIEW statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CONTROL ADD TREEVIEW statement

| | |
|-------------------|---|
| Purpose | Add a TreeView control to a dialog . A TreeView displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. The user may view the items, selecting them for use in the program at a later time. |
| Syntax | <code>CONTROL ADD TREEVIEW, hDlg, id&, txt\$, x, y, xx, yy [, [style&] [, [exstyle&]]] [[,] CALL callback]</code> |
| <i>hDlg</i> | Handle of the dialog in which the TreeView will be created. The dialog will become the parent of the control. |
| <i>id&</i> | Unique identifier for the control in the range 1 to 65535, frequently specified with numeric equates for clarity of the code. For example, the equate %PickList is more informative than a literal value such as 497. Best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers. |
| <i>txt\$</i> | Text to associate with the TreeView control. A TreeView control does not display this text, so it is common to set this value to a null, empty string literal (""). |
| <i>x,y</i> | expressions, variables, or numeric literal values specifying the location of the control inside the dialog client area. <i>x</i> is the horizontal position, and <i>y</i> is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog. |
| <i>xx,yy</i> | Integral expressions, variable, or numeric literal values, specifying the width and height of the control. <i>xx</i> is the width and <i>yy</i> is the height, given in the same terms (pixels or dialog units) as the parent dialog. |
| <i>style&</i> | Primary style of the TreeView control. The default TreeView style comprises %WS_TABSTOP, %TVS_HASBUTTONS, %TVS_LINESATROOT, %TVS_HASLINES, and %TVS_SHOWSELALWAYS. This default TreeView style is used if the style parameters are omitted from the statement, as in the following example: |

```
CONTROL ADD TREEVIEW, hDlg, id&, "", 100, 100, 150, 200, , , CALL
TVCallback()
```

If you include explicit style values, they replace the default values. That is, they are not added to the default styles values - your code must specify all necessary primary and extended style parameters.

The primary TreeView style value can be a combination of the values below, combined together with the [OR](#) operator to form a bitmask:

| | |
|---------------------------------|--|
| %TVS_HASBUTTONS | Displays +- signs next to parent items so the user can expand or collapse a list of child items. |
| %TVS_HASLINES | Uses lines to show the hierarchy of data items. |
| %TVS_LINESATROOT | Uses lines to link items at the root level. |
| %TVS_EDITLABELS | Allows the user to edit the labels of the data items. |
| %TVS_DISABLEDROGDRAGDROP | Prevents drag and drop |
| %TVS_SHOWSELALWAYS | A selected item remains selected when the control loses focus . |
| %TVS_NOTOOLTIPS | Disables ToolTips. |
| %TVS_CHECKBOXES | Enables check boxes for items with an image. |
| %TVS_TRACKSELECT | Enables hot tracking. |
| %TVS_SINGLEEXPAND | Only one item can be expanded at a time. |
| %TVS_INFOTIP | Obtains ToolTip information. |

| | |
|---------------------|--|
| %TVS_FULLROWSELECT | The entire row of a selected item is highlighted. |
| %TVS_NOSCROLL | Disables horizontal and vertical scrolling. |
| %TVS_NONEVENHEIGHT | Sets the height of items to an odd height. |
| %TVS_NOHSCROLL | Disables horizontal scrolling. |
| %WS_DISABLED | Create a control that is initially disabled . A disabled control cannot receive input from the user. |
| %WS_GROUP | Define the start of a group of controls. The first control in each group should also use %WS_TABSTOP style. The next %WS_GROUP control in the tab order defines the end of this group and the start of a new group. |
| %WS_TABSTOP | Allow the control to receive keyboard focus when the user presses the TAB and SHIFT+TAB keys. The TAB key shifts keyboard focus to the next control with the %WS_TABSTOP style, and SHIFT+TAB shifts focus to the previous control with %WS_TABSTOP. |
| <i>exstyle&</i> | <p>Extended style of the TreeView control. The default extended style is %WS_EX_LEFT. The default extended style is used if both the primary and extended parameters are omitted from the CONTROL ADD TREEVIEW statement, in the same manner as style& above.</p> <p>The extended TreeView style value can be a combination of any values below, combined together with the OR operator to form a bitmask:</p> |
| %WS_EX_CLIENTEDGE | Apply a sunken edge border to the control. |
| %WS_EX_LEFT | The control has generic "left-aligned" properties. (default) |
| %WS_EX_RIGHT | The control has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment; otherwise, the style is ignored. |
| %WS_EX_STATICEDGE | Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input). |
| %WS_EX_TRANSPARENT | Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information. |
| %WS_EX_WINDOWEDGE | Apply a raised edge border to the control. |
| <i>callback</i> | <p>Optional name of a Callback Function that receives all %WM_COMMAND and %WM_NOTIFY messages for the control. See the #MESSAGES metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control.</p> <p>If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.</p> |
| Remarks | When a Callback Function receives a %WM_COMMAND message, it should explicitly test the value of CB.CTL and CB.CTLMSG to guarantee it is responding appropriately to the messages. |
| See also | Dynamic Dialog Tools , CONTROL SET COLOR , CONTROL SET FONT , TREEVIEW |

CONTROL DISABLE statement

CONTROL DISABLE statement

Purpose Disable a control so that it no longer receives any [messages](#) or accepts user interaction.

Syntax `CONTROL DISABLE hDlg, id&`

Remarks *hDlg* refers to the dialog that owns the control. *id&* is the unique control identifier as assigned to the control with a statement.

A disabled control will not receive any messages when clicked with the mouse or selected with the keyboard. Most, but not all, controls will redraw themselves as "gray" when disabled.

See also [Dynamic Dialog Tools](#), [CONTROL ENABLE](#), [CONTROL KILL](#)

CONTROL ENABLE statement

CONTROL ENABLE statement

Purpose Enable a control so that it can receive messages when the user interacts with it via the mouse or keyboard.

Syntax `CONTROL ENABLE hDlg, id&`

Remarks *hDlg* refers to the dialog that owns the control. *id&* is the unique control [identifier](#) as assigned to the control with a statement.

An enabled control will receive messages when clicked with the mouse or selected with the keyboard.

See also [Dynamic Dialog Tools](#), [CONTROL DISABLE](#), [CONTROL KILL](#)

CONTROL GET CHECK statement

CONTROL GET CHECK statement

Purpose Get the [Check State](#) of a [CHECK3STATE](#), [CHECKBOX](#), or [OPTION](#) button.

Syntax `CONTROL GET CHECK hDlg, id& TO lResult&`

Remarks *hDlg* refers to the dialog that owns the control.

id& is the unique control [identifier](#) as assigned to the control with a statement.

lResult& receives the Check State of the control as follows:

| <i>lResult&</i> | Check State of control |
|---------------------|---|
| 0 (Zero) | Button is unchecked (unset, or cleared) |
| 1 (One) | Button is checked (set) |
| 2 (Two) | Button is indeterminate (grayed) (CHECK3STATE only) |

Note that a grayed (indeterminate) CHECK3STATE control does not mean the control is disabled. Rather, the Check State of the control is both checked and unchecked.

See also [Dynamic Dialog Tools](#), [CONTROL_ADD_CHECK3STATE](#), [CONTROL_ADD_CHECKBOX](#), [CONTROL_ADD_OPTION](#), [CONTROL_SET_CHECK](#), [CONTROL_SET_OPTION](#), [TREEVIEW_GET_CHECK](#), [TREEVIEW_SET_CHECK](#)

CONTROL GET CLIENT statement

CONTROL GET CLIENT statement

Purpose Return the [client size](#) of the specified child control.

Syntax CONTROL GET CLIENT *hDlg*, *id&* TO *w&*, *h&*

Remarks *hDlg* refers to the dialog that owns the control.

id& is the unique control [identifier](#) as assigned to the control with a statement.

The size of the control client area is placed in the *w&* (width) and *h&* (height) [variables](#). The size is specified in the same terms (pixels or [dialog units](#)) as the parent dialog.

See also [Dynamic Dialog Tools](#), [CONTROL_GET_LOC](#), [CONTROL_GET_SIZE](#), [CONTROL_SET_CLIENT](#), [CONTROL_SET_CLIENT](#), [CONTROL_SET_LOC](#), [CONTROL_SET_SIZE](#), [DIALOG_UNITS](#), [DIALOG_PIXELS](#), [GRAPHIC_GET_CLIENT](#)

CONTROL GET LOC statement

CONTROL GET LOC statement

Purpose Get the location of the specified control in a dialog.

Syntax CONTROL GET LOC *hDlg*, *id&* TO *x&*, *y&*

Remarks *hDlg* refers to the dialog that owns the control.

id& is the unique control [identifier](#) as assigned to the control with a statement.

The location of the top left corner of the control is placed in the *x&* (horizontal location) and *y&* (vertical location) [variables](#). The location is relative to the upper-left corner of the client area in the parent dialog. The coordinates are specified in the same terms (pixels or [dialog units](#)) as the parent dialog.

See also [Dynamic Dialog Tools](#), [CONTROL_GET_CLIENT](#), [CONTROL_GET_SIZE](#), [CONTROL_SET_LOC](#), [CONTROL_SET_SIZE](#)

CONTROL GET SIZE statement

CONTROL GET SIZE statement

Purpose Get the size of a control in the specified [dialog](#).

Syntax CONTROL GET SIZE *hDlg*, *id&* TO *nWide&*, *nHigh&*

Remarks *hDlg* refers to the dialog that owns the control.

id& is the unique control [identifier](#) as assigned to the control with a statement.

The width is placed in the *nWide&* and the height is placed in *nHigh&* [variables](#). The coordinates are specified in the same terms ([pixels](#) or [dialog units](#)) as the parent dialog.

See also [Dynamic Dialog Tools](#), [CONTROL_GET_CLIENT](#), [CONTROL_GET_LOC](#), [CONTROL_SET_LOC](#), [CONTROL_SET_SIZE](#)

CONTROL GET TEXT statement

CONTROL GET TEXT statement

Purpose Get the text from a control.

Syntax `CONTROL GET TEXT hDlg, id& TO txt$`

Remarks *hDlg* refers to the dialog that owns the control.

id& is the unique control [identifier](#) as assigned to the control with a statement. Any text in the control is placed into the *txt\$* variable.

With [combo boxes](#), CONTROL GET TEXT returns the text entered in the edit portion of the control. To retrieve the selected text from the list portion of a combo box or a list box control, use the [COMBOBOX GET TEXT](#) statement or [LISTBOX GET TEXT](#) statement respectively.

See also [Dynamic Dialog Tools](#), [COMBOBOX GET TEXT](#), [CONTROL SET TEXT](#), [LISTBOX GET TEXT](#), [LISTVIEW GET TEXT](#), [TREEVIEW GET TEXT](#)

CONTROL GET USER statement

CONTROL GET USER statement

Purpose Retrieve a value from the user data area of a [DDT](#) control.

Syntax `CONTROL GET USER hDlg, id&, index& TO retvar&`

Remarks Each DDT control has a user data area consisting of eight [Long-integer](#) values which may be used at the programmer's discretion to save relevant data. CONTROL GET USER allows one of the values to be retrieved, based upon the index parameter value (1 through 8).

hDlg refers to the dialog that owns the control.

id& is the unique control [identifier](#) as assigned to the control with a statement.

index& is the index number of the user data value to retrieve, in the range 1 to 8 inclusive.

retvar& receives the Long-integer data value store in the nominated user data index.

Restrictions Data in the user data area is lost when the control is destroyed. The data area is completely separate from the %GWL_USERDATA area maintained by Windows.

See also [Dynamic Dialog Tools](#), [COMBOBOX GET USER](#), [COMBOBOX SET USER](#), [CONTROL SET USER](#), [DIALOG GET USER](#), [DIALOG SET USER](#), [LISTBOX GET USER](#), [LISTBOX SET USER](#), [LISTVIEW GET USER](#), [LISTVIEW SET USER](#), [TREEVIEW GET USER](#), [TREEVIEW SET USER](#)

CONTROL HANDLE statement

CONTROL HANDLE statement

Purpose Return a window [handle](#) for the specified [control ID](#).

Syntax `CONTROL HANDLE hDlg, id& TO hCtl&`

| | |
|-----------------|---|
| Remarks | <i>hDlg</i> refers to the dialog that owns the control. <i>id&</i> is the unique control identifier as assigned to the control with a statement. The returned value is a window handle for the control, assigned by Windows when the control was initially created, uniquely identifying the control from all other controls. Some API functions require a window handle value rather than a control ID value. |
| See also | Dynamic Dialog Tools , CONTROL_SEND , WINDOW_GET_ID , WINDOW_GET_PARENT |

CONTROL HIDE statement

Keyword Template

| |
|-----------------|
| Purpose |
| Syntax |
| Remarks |
| See also |
| Example |

CONTROL HIDE statement New!

| | |
|-----------------|---|
| Purpose | Make a invisible. |
| Syntax | CONTROL HIDE <i>hDlg</i> , <i>ID&</i> |
| Remarks | The Control identified by the <i>hDlg/ID&</i> combination is made invisible. <i>hDlg</i> is the handle of the dialog which owns the control. <i>ID&</i> is the unique control identifier assigned to the control with CONTROL ADD. |
| See Also | CONTROL_NORMALIZE , CONTROL_SET_SIZE , DIALOG_HIDE , DIALOG_NORMALIZE |

CONTROL KILL statement

CONTROL KILL statement

| | |
|---------------------|--|
| Purpose | Remove a control from a dialog. |
| Syntax | CONTROL KILL <i>hDlg</i> , <i>id&</i> |
| Remarks | <i>hDlg</i> refers to the dialog that owns the control. <i>id&</i> is the unique control identifier as assigned to the control with a statement. The control is destroyed and removed from the dialog. The Callback Function for the control or dialog will no longer receive messages for the control. |
| Restrictions | A control should not be destroyed while processing a notification message from the same control, but it is permissible to kill a different control in the notification handler. If is absolutely necessary to kill a control while processing one of its notification messages, use the PostMessage API function (or the DIALOG_POST or CONTROL_POST statements) to post a user-defined message to the dialog callback, and kill the control when processing the user-defined message. |
| See also | Dynamic Dialog Tools , CONTROL_DISABLE , CONTROL_ENABLE |
| Example | ' How to avoid "suicide" conditions |

```

CALLBACK FUNCTION DlgCallBack() AS LONG
  SELECT CASE CB.MSG
    CASE %WM_COMMAND
      IF CB.CTLMSG = %BN_CLICKED AND CB.CTL = %MyBtn THEN
        DIALOG POST CB.HNDL, %WM_USER + 999&, 0, 0
      END IF
    CASE %WM_USER + 999&
      CONTROL KILL CB.HNDL, %MyBtn
      FUNCTION = 1
  END SELECT
END FUNCTION

```

CONTROL NORMALIZE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CONTROL NORMALIZE statement **New!**

Purpose Make a visible.

Syntax `CONTROL NORMALIZE hDlg, ID&`

Remarks The Control identified by the hDlg/ID& combination is made visible. *hDlg* is the handle of the [dialog](#) which owns the control. *ID&* is the unique [control identifier](#) assigned to the control with CONTROL ADD.

See also [CONTROL HIDE](#), [CONTROL SET SIZE](#), [DIALOG HIDE](#), [DIALOG NORMALIZE](#)

CONTROL POST statement

CONTROL POST statement

Purpose Place a [message](#) in the message queue to be processed at the leisure of the target control.

Syntax `CONTROL POST hDlg, id&, Msg&, wParam&, lParam&`

Remarks CONTROL POST places the message in the message queue and returns immediately. The message is processed by the control at a later time, when it reads the message from the queue.

This behavior is quite different to the [CONTROL SEND](#) statement, which forces the control to process the message immediately before returning. Since CONTROL POST is an asynchronous operation, it is not possible to retrieve a return code from the message.

hDlg refers to the dialog that owns the control.

id& is the unique control [identifier](#) as assigned to the control with a statement.

Msg& is the message you want to post to the control.

wParam& is the first message parameter. *lParam&* is the second message parameter. The values of *wParam&* and *lParam&* are message-dependent. By Default, PowerBASIC passes these parameters BYVAL. If the target control is expected to alter the values held by variables passed in the *wParam&* and *lParam&* parameters, pass them using [VARPTR\(\)](#) or the changes will likely be discarded.

Note that the address of the data must remain valid until after the control has processed the message and accessed the data. In this case, using [STATIC](#) or [GLOBAL](#) variables can be very important or a General Protection Fault (GPF) may occur (that is, if the variables have gone out of [scope](#) by the time the message is processed).

An example of posting the addresses of variables to a control:

```
' Retrieve an Edit controls Current Selection
' Sel1& and Sel2& must be STATIC or GLOBAL
CONTROL POST CB.HNDL, %ID_EDIT6, %EM_GETSEL, VARPTR(Sel1&),
VARPTR(Sel2&)
```

CONTROL POST returns immediately after the placing the message in the queue.

Restrictions To post a custom message to a control, use a message value in the range of (%WM_USER + 500) to (%WM_USER + &H07FFF), or use the RegisterWindowMessage API to obtain a unique message value from the operating system. Using messages with a numeric value of less than %WM_USER + 500 may conflict with Windows Common Control messages.

See also [Dynamic Dialog Tools](#), [CONTROL HANDLE](#), [CONTROL SEND](#), [DIALOG POST](#), [DIALOG SEND](#)

Example

```
' Programmatically post a click message to a button:
CONTROL POST hDlg, %ID_BTN1, %BM_CLICK, 0, 0
```

CONTROL REDRAW statement

CONTROL REDRAW statement

Purpose Schedule a designated control to be redrawn.

Syntax `CONTROL REDRAW hDlg, id&`

Remarks CONTROL REDRAW invalidates the target control and schedules a redraw event to occur.

hDlg refers to the dialog that owns the control.

id& is the unique control [identifier](#) as assigned to the control with a `statement`.

Restrictions Redrawing of individual controls is considered a low priority event, and a control redraw may not happen instantly if there are pending [messages](#) in the message queue. That is, pending messages in the message queue may need to be processed before the scheduled redraw event occurs.

It is not advisable to use CONTROL REDRAW or [DIALOG REDRAW](#) within the %WM_PAINT and associated message handling code, or an infinite redraw loop could occur.

See also [Dynamic Dialog Tools](#), [CONTROL SET COLOR](#), [DIALOG SET COLOR](#), [DIALOG REDRAW](#)

Example `CONTROL REDRAW hDlg, %ID_LABEL1`

CONTROL SEND statement

CONTROL SEND statement

| | |
|---------------------|---|
| Purpose | Send a message to a control. |
| Syntax | <code>CONTROL SEND <i>hDlg</i>, <i>id&</i>, <i>Msg&</i>, <i>wParam&</i>, <i>lParam&</i> [TO <i>lResult&</i>]</code> |
| Remarks | <p><i>hDlg</i> refers to the dialog that owns the control.</p> <p><i>id&</i> is the unique control identifier as assigned to the control with a statement.</p> <p><i>Msg&</i> is the message you want to send the control.</p> <p><i>wParam&</i> is the first message parameter. <i>lParam&</i> is the second message parameter. The values of <i>wParam&</i> and <i>lParam&</i> are message-dependent. By default, PowerBASIC passes these parameters BYVAL. If the target control is expected to return or alter the values passed in the <i>wParam&</i> and <i>lParam&</i> parameters, pass them using VARPTR or the return values will be discarded. For example:</p> <pre>' Retrieve an Edit control's Current Selection CONTROL SEND CB.HNDL, %ID_EDIT1, %EM_GETSEL, VARPTR(sel1&), VARPTR(sel2&)</pre> <p>CONTROL SEND does not return from execution until the control's callback has processed the message. This synchronous behavior is quite different to the behavior of CONTROL POST, which simply places the message in the control's message queue (for processing at a later time) and immediately returns. On this basis, CONTROL SEND can receive a return value from the message, but CONTROL POST cannot.</p> |
| TO | <p>The return value from the message can optionally be assigned to <i>lResult&</i>.</p> <p>If CONTROL SEND sends a message that arrives back in the same callback as the message originated, care should be exercised to ensure that critical STATIC and GLOBAL variables are not unexpectedly altered by the second message processing code in the callback. This is known as re-entrant code design.</p> |
| Restrictions | To send a custom message to a dialog, use a message value in the range of (%WM_USER + 500) to (%WM_USER + &H07FFF), or use the RegisterWindowMessage API to obtain a unique message value from the operating system. Using messages with a numeric value of less than %WM_USER + 500 may conflict with Windows Common Control messages. |
| See also | Dynamic Dialog Tools , CONTROL HANDLE , CONTROL POST , DIALOG POST , DIALOG SEND |
| Example | <pre>' Programmatically click a button: CONTROL SEND hDlg, %ID_BTN1, %BM_CLICK, 0, 0</pre> |

CONTROL SET CHECK statement

CONTROL SET CHECK statement

| | |
|----------------|--|
| Purpose | Set the Check State for a CHECK3STATE or CHECKBOX control. |
| Syntax | <code>CONTROL SET CHECK <i>hDlg</i>, <i>id&</i>, <i>checkstate&</i></code> |
| Remarks | <p>With a checkbox control, the Check State is set (checked) when an 'X' symbol is shown in the check box. The Check State is deemed unset (unchecked or cleared) when the check box is empty.</p> <p>A CHECK3STATE control supports a third state, known as indeterminate. In this state, the check box is grayed.</p> <p><i>hDlg</i> refers to the dialog that owns the control.</p> |

id& is the unique control [identifier](#) as assigned to the button control with a statement.

For CHECKBOX controls, set *checkstate&* to zero (0) to uncheck (unset or clear) the Check State of the control, or one (1) to check (set) the Check State of the control.

For CHECK3STATE controls, set *checkstate&* to zero (0) to uncheck (unset or clear) the Check State of the control, one (1) to check (set) the Check State (display an 'X' symbol in the box), or two (2) to set the indeterminate state (display a grayed check box).

To set the Check State of OPTION controls, use the [CONTROL SET OPTION](#) statement.

See also

[Dynamic Dialog Tools](#), [CONTROL ADD CHECK3STATE](#), [CONTROL ADD CHECKBOX](#), [CONTROL ADD OPTION](#), [CONTROL GET CHECK](#), [CONTROL SET OPTION](#), [TREEVIEW GET CHECK](#), [TREEVIEW SET CHECK](#)

CONTROL SET CLIENT statement

CONTROL SET CLIENT statement

IMPROVED

Purpose Change the size of a control to a specific [client area](#) size.

Syntax `CONTROL SET CLIENT hDlg, id&, nWide&, nHigh&`

Remarks Client size may be smaller than total size, depending on the type of borders used. The client area is the part inside the borders of a control, which varies depending upon the [style](#) and [exstyle](#) at creation. In a control without borders, the client size and total size is the same. As an alternate example, a control with the %WS_BORDER style will typically have a client area a few pixels smaller than the total size.

hDlg Handle of the dialog that owns the control.

id& The unique control [identifier](#), assigned to the control with the statement.

nWide&, *nHigh&* Integral expressions, [variables](#), or [numeric literal](#) values, specifying the desired size of the client area. Width and height are specified in pixels or [dialog units](#), depending upon the system used when the parent dialog was created.

Graphic Controls Beginning with this version of PowerBASIC, [GRAPHIC CONTROLS](#) may be resized with CONTROL SET CLIENT, GRAPHIC SET CLIENT, [CONTROL SET SIZE](#), and GRAPHIC SET SIZE.

When you change the size of a graphic control, the original bitmap is copied, pixel for pixel, to the newly resized control. Any expanded area is filled with the current background color. Your program draws to it in the normal fashion for a bitmap of the new size.

If a clip area had been established to create margins, it is reset. If scaled coordinates had been established, they are also reset, as neither would be appropriate for the altered size. You can enable these attributes again with GRAPHIC SCALE or GRAPHIC SET CLIP, based upon the new size of the drawing area.

See also

[Dynamic Dialog Tools](#), [CONTROL GET CLIENT](#), [CONTROL GET LOC](#), [CONTROL GET SIZE](#), [CONTROL SET LOC](#), [CONTROL SET SIZE](#), [GRAPHIC SET CLIENT](#), [GRAPHIC SET SIZE](#)

CONTROL SET COLOR statement

CONTROL SET COLOR statement

| | |
|----------------|--|
| Purpose | Set the color of a control to a specific RGB foreground and background color. |
| Syntax | <code>CONTROL SET COLOR <i>hDlg</i>, <i>id&</i>, <i>foreclr&</i>, <i>backclr&</i></code> |
| Remarks | <p><i>hDlg</i> identifies the control's parent dialog, and <i>id&</i> is the unique control identifier as assigned to the control with a statement.</p> <p>Color values of <i>foreclr&</i> and <i>backclr&</i> must be in the range of &H0 to &H0FFFFFFF. RGB can be a useful function to derive a 32-bit color value from discrete Red, Green and Blue values:</p> <p><i>foreclr&</i> The foreground color parameter <i>foreclr&</i> is used to set the color of the text displayed in the control. If <i>foreclr&</i> = -1&, the default foreground text color is used.</p> <p><i>backclr&</i> The <i>backclr&</i> parameter specifies the color of the background behind the text in the control. If <i>backclr&</i> = -1&, the default background text color is used. If <i>backclr&</i> = -2&, the text background is not painted, allowing the background to show "through" the text. The non-visible background style may produce undesirable side effects with some controls. For example, on a FRAME control, the caption text will appear superimposed over an unbroken frame.</p> |

In 16-bit or greater color-depth mode, the specified RGB color is used when the background of the control is drawn. However, in 8-bit (256-color) mode, the color system works quite differently. Behind the scenes in Windows, the base system palette usually contains 20 solid colors that are not dithered when drawn on the controls background. These solid-colors are ideal for control background colors with [DDI](#) dialogs in 256-color mode.

Conversely, when using a non-solid RGB color value, Windows will dither (approximate) the color to draw the control, using combinations of two or more colors. This usually produces an undesirable pattern effect.

To avoid these problems when in 256-color mode, controls should be colored with one of the 20 standard (solid) system colors, or the default color should be used instead. PowerBASIC includes the following 10 built-in equates for help with the selection of a standard solid color:

```
%RGB_BLACK %RGB_BLUE %RGB_GREEN %RGB_CYAN %RGB_RED
%RGB_MAGENTA %RGB_YELLOW %RGB_WHITE %RGB_GRAY %RGB_LIGHTGRAY
```

Many non standard colors are also built into the compiler, see the [Built In RGB Color Equates](#) topic for a complete list.

If you prefer to disable color in 256-color mode, the number of colors can be easily tested with the following code:

```
' Determine number of colors
LOCAL hDC AS DWORD, iColors AS LONG

hDC = GetWindowDC(GetDesktopWindow())
iColors = 2& ^ (GetDeviceCaps(hDC, %BITSPIXEL) * GetDeviceCaps(hDC, %
PLANES))
ReleaseDC GetDesktopWindow(), hDC
IF iColors > 256 THEN _
    CONTROL SET COLOR hDlg, idctl&, -1, RGB(0,255,100)
```

In 256-color mode on most computers, the values of the standard 20 system colors can be found by requesting the first and last 10 (0 to 9, and 246 to 255 inclusive) entries from the `GetSystemPaletteEntries` API function, as follows:

```
' Fill array with solid colors
DIM hDC AS DWORD, Cols AS LONG, x AS LONG

hDC = GetWindowDC(GetDesktopWindow())
Cols = GetDeviceCaps(hDC, %NUMRESERVED)
REDIM lp(1 TO Cols) AS LONG
x& = GetSystemPaletteEntries(hDC, 0, Cols \ 2, BYVAL VARPTR(lp(1)))
```

```
x& = GetSystemPaletteEntries(hDC, 256 - x&, Cols - x&, BYVAL
VARPTR(lp(x& + 1)))
ReleaseDC GetDesktopWindow, hDC
' Array lp() now contains the solid color table
```

For more information on working with palettes in 256-color mode, please consult WIN32.HLP or visit <http://msdn.microsoft.com>.

Restrictions

Windows does not permit the color of standard push button controls, line controls, image controls, image buttons, and most common controls to be altered by the standard CONTROL SET COLOR techniques.

To create a colored push button or colored region on a dialog, the preferred solution is to use an [IMGBUTTON/IMAGEBUTTONX](#) or [IMAGE/IMAGEX](#) control, with a suitably colored bitmap. Some common controls offer specific ways to set their color. For example, the background color of a List View control can be set with the %LVM_SETBKCOLOR message.

When dynamically changing colors of a control from within a [callback](#) (i.e., after the DIALOG SHOW statement), a CONTROL SET COLOR statement should be immediately followed by an explicit [CONTROL REDRAW](#) statement.

Without this forced control redraw, the control background color change may not become evident to the user until the control is eventually repainted in the normal course of user interaction. For example, a normal repaint may only occur if the control becomes obscured and then uncovered by another window. Ensuring a timely repaint of the control will guarantee the control maintains an up-to-date appearance at all times.

When updating the colors of multiple controls at the same time, a [DIALOG REDRAW](#) is usually more efficient than multiple CONTROL REDRAW statements.

See also

[Built In RGB Color Equates](#), [Dynamic Dialog Tools](#), [CONTROL GET CLIENT](#), [CONTROL GET SIZE](#), [CONTROL REDRAW](#), [CONTROL SET FONT](#), [DIALOG REDRAW](#), [DIALOG SET COLOR](#)

Example

```
' Set the color with discrete RGB values
CONTROL SET COLOR hDlg, idBtn&, RGB(255,255,255), RGB(0,0,255)

' Or we could use the built-in equates:
CONTROL SET COLOR hDlg, idBtn&, %RGB_WHITE, %RGB_BLUE
```

CONTROL SET FOCUS statement**CONTROL SET FOCUS statement****Purpose**

Set the keyboard focus to the specified control.

Syntax

```
CONTROL SET FOCUS hDlg, id&
```

Remarks

hDlg refers to the dialog that owns the control.

id& is the unique control [identifier](#) as assigned to the control with a statement.

The control that owns the focus will receive all keyboard messages. Many controls change their appearance when they receive (and lose) keyboard focus, usually by the display of a "focus rectangle" around or on the control that has keyboard focus. Only one control can have keyboard focus at any moment, and situations can arise where no controls have focus.

Controls that include a "notify" [style](#) (i.e., %BS_NOTIFY) will receive a notification [message](#) when focus is gained or lost. That is, when one such control loses focus, it receives a message to that effect and the control gaining focus may also receive an appropriate focus notification message.

When a control gains focus the parent dialog will also be set as the foreground window.

Windows does not guarantee the order in which focus notification messages are dispatched to the control losing focus and the control gaining focus. Applications should not rely on the order in which these types of messages are received.

Restrictions CONTROL SET FOCUS cannot be used to set the focus of a control in a separate thread.

See also [Dynamic Dialog Tools](#)

CONTROL SET FONT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CONTROL SET FONT statement IMPROVED

Purpose Select a font to be used for a particular Windows Control.

Syntax CONTROL SET FONT *hDlg, id&, FontHndl&*

hDlg [Handle](#) of the [dialog](#) in which owns the control.

id& Unique [identifier](#) for the control which was assigned with a statement.

FontHndl& The numeric handle returned by the [FONT NEW](#) statement when the font was created.

Remarks The font specified by *FontHndl&* is selected to be used by this particular control, until or unless it is changed with another CONTROL SET FONT statement. If you specify a *FontHndl&* of zero, the font is changed back to the original [default font](#) chosen by PowerBASIC.

You can predefine virtually any number of fonts and attributes by executing FONT NEW statements for each of them. That makes them ready for immediate use when selected by CONTROL SET FONT, [GRAPHIC SET FONT](#), and [XPRINT SET FONT](#).

See also [DIALOG DEFAULT FONT](#), [FONT END](#), [FONT NEW](#), [GRAPHIC SET FONT](#), [XPRINT SET FONT](#)

CONTROL SET IMAGE statement

CONTROL SET IMAGE statement

Purpose Change the icon or bitmap displayed in an [IMAGE](#) control. The new image is not re-sized to fit the size of the control.

Syntax CONTROL SET IMAGE *hDlg, id&, newimage\$*

Remarks *hDlg* refers to the dialog that owns the control.

id& is the unique control [identifier](#) as assigned to the control with the [CONTROL ADD IMAGE](#) statement.

newimage\$ specifies the name of the bitmap or icon in the [resource file](#). If the image resource uses an

identifier, *newimage\$* should begin with a Number symbol (#), followed by the integer identifier in ASCII format. For example, "#998". Otherwise, the text identifier name should be used.

Restrictions Images can only be exchanged with images of the same type. That is, if the control is displaying a bitmap then the replacement image must also be a bitmap. If the control is displaying an icon, the replacement image must also be an icon. For best results, icons should be 32x32 pixels.

When an image is changed, CONTROL SET IMAGE automatically releases the old image from memory. Previous versions of PowerBASIC placed the onus on the programmer to release the old image handle.

See also [Dynamic Dialog Tools](#), [CONTROL ADD GRAPHIC](#), [CONTROL ADD IMAGE](#), [CONTROL ADD IMAGEX](#), [CONTROL ADD IMGBUTTON](#), [CONTROL ADD IMGBUTTONX](#), [CONTROL GET CLIENT](#), [CONTROL GET SIZE](#), [CONTROL SET IMAGEX](#), [CONTROL SET IMGBUTTON](#), [CONTROL SET IMGBUTTONX](#)

CONTROL SET IMAGEX statement

CONTROL SET IMAGEX statement

Purpose Change the icon or bitmap displayed in an [IMAGEX](#) control. The new image is re-sized to fit the size of the control.

Syntax `CONTROL SET IMAGEX hDlg, id&, newimage$`

Remarks *hDlg* refers to the dialog that owns the control.

id& is the unique control [identifier](#) as assigned to the control with the [CONTROL ADD IMAGEX](#) statement.

newimage\$ specifies the name of the bitmap or icon in the [resource file](#). If the image resource uses an

identifier, *newimage\$* should begin with a Number symbol (#), followed by the integer identifier in ASCII format. For example, "#998". Otherwise, the text identifier name should be used.

Restrictions Images can only be exchanged with images of the same type. That is, if the control is displaying a bitmap then the replacement image must also be a bitmap. If the control is displaying an icon, the replacement image must also be an icon. For best results, icons should be 32x32 pixels.

When an image is changed, CONTROL SET IMAGEX automatically releases the old image from memory. Previous versions of PowerBASIC placed the onus on the programmer to release the old image handle.

See also [Dynamic Dialog Tools](#), [CONTROL ADD GRAPHIC](#), [CONTROL ADD IMAGE](#), [CONTROL ADD IMAGEX](#), [CONTROL ADD IMGBUTTON](#), [CONTROL ADD IMGBUTTONX](#), [CONTROL SET IMAGE](#), [CONTROL SET IMGBUTTON](#), [CONTROL SET IMGBUTTONX](#)

CONTROL SET IMGBUTTON statement

CONTROL SET IMGBUTTON statement

Purpose Change the icon or bitmap displayed in an [IMAGE](#) control. The new image is not re-sized to fit the size of the control.

Syntax `CONTROL SET IMGBUTTON hDlg, id&, newimage$`

Remarks *hDlg* refers to the dialog that owns the control.

id& is the unique control [identifier](#) as assigned to the control with the [CONTROL_ADD_IMGBUTTON](#) statement.

newimage\$ specifies the name of the bitmap or icon in the [resource file](#). If the image resource uses an

identifier, *newimage\$* should begin with a Number symbol (#), followed by the integer identifier in ASCII format. For example, "#998". Otherwise, the text identifier name should be used.

Restrictions Images can only be exchanged with images of the same type. That is, if the control is displaying a bitmap then the replacement image must also be a bitmap. If the control is displaying an icon, the replacement image must also be an icon. For best results, icons should be 32x32 pixels.

When an image is changed, CONTROL SET IMGBUTTON automatically releases the old image from memory. Previous versions of PowerBASIC placed the onus on the programmer to release the old image handle.

See also [Dynamic Dialog Tools](#), [CONTROL_ADD_GRAPHIC](#), [CONTROL_ADD_IMAGE](#), [CONTROL_ADD_IMAGEX](#), [CONTROL_ADD_IMGBUTTON](#), [CONTROL_ADD_IMGBUTTONX](#), [CONTROL_SET_IMAGE](#), [CONTROL_SET_IMAGEX](#), [CONTROL_SET_IMGBUTTONX](#)

CONTROL SET IMGBUTTONX statement

CONTROL SET IMGBUTTONX statement

Purpose Change the icon or bitmap displayed in an [IMAGEX](#) control. The new image is re-sized to fit the size of the control.

Syntax `CONTROL SET IMGBUTTONX hDlg, id&, newimage$`

Remarks *hDlg* refers to the dialog that owns the control.

id& is the unique control [identifier](#) as assigned to the control with the [CONTROL_ADD_IMGBUTTONX](#) statements.

newimage\$ specifies the name of the bitmap or icon in the [resource file](#). If the image resource uses an

identifier, *newimage\$* should begin with a Number symbol (#), followed by the integer identifier in ASCII format. For example, "#998". Otherwise, the text identifier name should be used.

Restrictions Images can only be exchanged with images of the same type. That is, if the control is displaying a bitmap then the replacement image must also be a bitmap. If the control is displaying an icon, the replacement image must also be an icon. For best results, icons should be 32x32 pixels.

When an image is changed, CONTROL SET IMGBUTTONX automatically releases the old image from memory. Previous versions of PowerBASIC placed the onus on the programmer to release the old image handle.

See also [Dynamic Dialog Tools](#), [CONTROL_ADD_GRAPHIC](#), [CONTROL_ADD_IMAGE](#), [CONTROL_ADD_IMAGEX](#), [CONTROL_ADD_IMGBUTTON](#), [CONTROL_ADD_IMGBUTTONX](#), [CONTROL_SET_IMAGE](#), [CONTROL_SET_IMAGEX](#), [CONTROL_SET_IMGBUTTON](#)

CONTROL SET LOC statement

CONTROL SET LOC statement

Purpose Move the control to a new location in the dialog.

| | |
|-----------------|--|
| Syntax | <code>CONTROL SET LOC <i>hDlg</i>, <i>id&</i>, <i>x&</i>, <i>y&</i></code> |
| Remarks | <p><i>hDlg</i> refers to the dialog that owns the control.</p> <p><i>id&</i> is the unique control identifier as assigned to the control with a statement.</p> <p><i>x&</i> and <i>y&</i> specify the new location for the upper left corner of the control. These coordinates are relative to the upper left corner of the client area of the parent dialog (0,0), and are specified in the same terms (pixels or dialog units) as the parent dialog.</p> <p>The location coordinates may be negative or larger than the width of the parent dialog's client area, causing the control to be clipped (partially displayed) or completely hidden.</p> <p>This technique is often employed to capture the ENTER key, by creating a default button (%BS_DEFAULT) and positioning the control outside of the client area of the dialog - even though the control is not visible, it is still active and can respond to control accelerator keystrokes, etc.</p> |
| See also | Dynamic Dialog Tools , CONTROL_GET_CLIENT , CONTROL_GET_LOC , CONTROL_GET_SIZE , CONTROL_SET_SIZE |

CONTROL SET OPTION statement

CONTROL SET OPTION statement

| | |
|-----------------|---|
| Purpose | Set the Check State for an OPTION (radio) control, and unset the Check State for other OPTION buttons in a group. |
| Syntax | <code>CONTROL SET OPTION <i>hDlg</i>, <i>id&</i>, <i>minid&</i>, <i>maxid&</i></code> |
| Remarks | <p>The Check State is deemed set (checked) when the check box is selected, and unset (unchecked or clear) if the check box is empty. Only one OPTION control in a group of OPTION controls should ever have its Check State set at any given time. OPTION controls in a group should be assigned unique sequential identifier numbers.</p> <p><i>hDlg</i> refers to the dialog that owns the OPTION controls.</p> <p><i>id&</i> is the unique control identifier as assigned to the button control with a CONTROL_ADD_OPTION statement. CONTROL SET OPTION sets the Check State for this control, and unsets the Check State for all of the remaining OPTION controls whose identifiers are included in the range <i>minid&</i> through <i>maxid&</i>, inclusive.</p> <p>The first OPTION control in a group should have the style %WS_GROUP to mark the beginning of a group of buttons, and the first non-OPTION control after the group should also have this style set. If there are no other controls after the group, add %WS_GROUP to the first control in the dialog. This ensures keyboard navigation with the arrow buttons will operate within the group of OPTION controls.</p> |
| See also | Dynamic Dialog Tools , CONTROL_ADD_OPTION , CONTROL_GET_CHECK |
| Example | <pre>#INCLUDE "DDT.INC" %OPT1 = 101 %OPT2 = 102 %OPT3 = 103 %OPT4 = 104 %OPT5 = 105 FUNCTION PBMAIN DIM hDlg AS DWORD DIALOG NEW 0, "OPTION control test", , ,100, 100, _ %WS_SYSMENU OR %WS_CAPTION TO hDlg CONTROL ADD OPTION, hDlg, %OPT1, "Option 1", 10, 6, 50, 14, _ %WS_GROUP OR %WS_TABSTOP CONTROL ADD OPTION, hDlg, %OPT2, "Option 2", 10, 20, 50, 14</pre> |

```

CONTROL ADD OPTION, hDlg, %OPT3, "Option 3", 10, 34, 50, 14
CONTROL ADD OPTION, hDlg, %OPT4, "Option 4", 10, 48, 50, 14
CONTROL ADD OPTION, hDlg, %OPT5, "Option 5", 10, 62, 50, 14
CONTROL ADD BUTTON, hDlg, %IDOK, "OK", 25, 80, 50, 14, _
    %WS_GROUP OR %WS_TABSTOP

' Set the initial state to OPTION button 3
CONTROL SET OPTION hDlg, %OPT3, %OPT1, %OPT5

DIALOG SHOW MODAL hDlg
END FUNCTION

```

CONTROL SET SIZE statement

CONTROL SET SIZE statement

IMPROVED

Purpose Change the size of a

Syntax `CONTROL SET SIZE hDlg, id&, nWide&, nHigh&`

Remarks Overall size may be larger than client size, depending on the type of borders used. The client area is the part inside the borders of a control, which varies depending upon the style and exstyle at creation. Overall size includes the borders. In a control without borders, the client size and total size is the same. However, a control with the %WS_BORDER style will typically have a client area a few pixels smaller than the total size.

hDlg [Handle](#) of the [dialog](#) that owns the control.

nWide&, *nHigh&* Integral numeric expressions which specify the desired size of the overall area. Width and height are specified in [pixels](#) or [dialog units](#), depending upon the system used when the parent dialog was created.

Graphic Controls Beginning with this version of PowerBASIC, [GRAPHIC CONTROLS](#) may be resized with [CONTROL SET CLIENT](#), [GRAPHIC SET CLIENT](#), `CONTROL SET SIZE`, and [GRAPHIC SET SIZE](#).

When you change the size of a graphic control, the original bitmap is copied, pixel for pixel, to the newly resized control. Any expanded area is filled with the current background color. Your program draws to it in the normal fashion for a bitmap of the new size.

If a clip area had been established to create margins, it is reset. If scaled coordinates had been established, they are also reset, as neither would be appropriate for the altered size. You can enable these attributes again with [GRAPHIC SCALE](#) or [GRAPHIC SET CLIP](#), based upon the new size of the drawing area.

See also [Dynamic Dialog Tools](#), [CONTROL GET CLIENT](#), [CONTROL GET LOC](#), [CONTROL GET SIZE](#), [CONTROL SET LOC](#), [GRAPHIC SET CLIENT](#), [GRAPHIC SET SIZE](#)

CONTROL SET TEXT statement

CONTROL SET TEXT statement

Purpose Change the text in a control.

Syntax `CONTROL SET TEXT hDlg, id&, txt$`

Remarks *hDlg* refers to the dialog that owns the control.

id& is the unique control [identifier](#) as assigned to the control with a statement.

txt\$ is the new text for the control. Any existing text in the control is replaced with the new text.

See also [Dynamic Dialog Tools](#), [CONTROL_GET_TEXT](#)

CONTROL SET USER statement

CONTROL SET USER statement

Purpose Set a value in the user data area of a [DDT](#) control.

Syntax `CONTROL SET USER hDlg, id&, index&, usrval&`

Remarks Each DDT control has a user data area consisting of eight [Long-integer](#) values which may be used at the programmer's discretion to save relevant data. CONTROL SET USER allows one of the values to be set, based upon the index parameter value (1 through 8).

hDlg refers to the dialog that owns the control.

id& is the unique control [identifier](#) as assigned to the control with a statement.

index& is the index number of the user data value to set, in the range 1 to 8 inclusive.

usrval& is the Long-integer data value to store in the user data area.

Restrictions Data in the user data area is lost when the control is destroyed. The data area is completely separate from the %GWL_USERDATA area maintained by Windows.

See also [Dynamic Dialog Tools](#), [COMBOBOX_GET_USER](#), [COMBOBOX_SET_USER](#), [CONTROL_GET_USER](#), [DIALOG_GET_USER](#), [DIALOG_SET_USER](#), [LISTBOX_GET_USER](#), [LISTBOX_SET_USER](#), [LISTVIEW_GET_USER](#), [LISTVIEW_SET_USER](#), [TREEVIEW_GET_USER](#), [TREEVIEW_SET_USER](#)

CONTROL SHOW STATE statement

CONTROL SHOW STATE statement

Purpose Change the visible state of a control.

Syntax `CONTROL SHOW STATE hDlg, id&, showstate& [TO lResult&]`

Remarks CONTROL SHOW STATE is used to alter the state and/or appearance of the specified control, identified by the [parent](#) dialog [handle](#) *hDlg*, and control *id*& unique [identifier](#) combination.

showstate& can be one of the following (with a value in the range from 0 to 10) as defined in the [WIN32API.INC](#) file):

| | |
|---------------------------|--|
| <code>%SW_HIDE</code> | Hide the control. |
| <code>%SW_MAXIMIZE</code> | Maximize the specified control. |
| <code>%SW_MINIMIZE</code> | Minimize the specified control. |
| <code>%SW_RESTORE</code> | Activate and display the control. If the control is minimized or maximized, Windows restores it to its original size and position. An application should specify this flag when restoring a minimized control. |
| <code>%SW_SHOW</code> | Activate the control and display it in its current size and position. |

| | |
|----------------------------|---|
| % SW_SHOWMAXIMIZED | Synonym of %SW_MAXIMIZE. |
| % SW_SHOWMINIMIZED | Activate the control and minimize it. |
| %SW_SHOWNA | Display the control in its current state without activating it. The currently active window/control remains active. |
| % SW_SHOWNOACTIVAT E | Display the control in its most recent size and position without activating it. The currently active window/control remains active. |
| %SW_SHOWNORMAL | Activate and display the control. If the control is minimized or maximized, it is restored it to its original size and position. |

If the optional TO clause is included, the *!Result&* [variable](#) is assigned the value zero if the control was previously not visible, or non-zero if it was previously visible.

See also [Dynamic Dialog Tools](#), [CONTROL DISABLE](#), [CONTROL ENABLE](#), [DIALOG SHOW STATE](#)

COS function

COS function

Purpose Return the cosine of an angle.

Syntax `y = COS(numeric_expression)`

Remarks *numeric_expression* is an angle specified in radians. To convert radians to degrees, multiply by 57.29577951308232##. To convert degrees to radians, multiply by 0.0174532925199433##. For more information on radians, see the [ATN](#) function.

COS returns an Extended-precision value that always ranges between -1 and +1 inclusive.

The Inverse Cosine (ARCCOS) of a value can be calculated as follows:

```
pi## = 3.141592653589793##
ArcCos = pi## / 2 - ATN(Value / SQR(1 - Value * Value))
```

The Hyperbolic Cosine (COSH) of a value can also be calculated:

```
CosH = (EXP(Value) + EXP(-Value)) / 2
```

The Inverse Hyperbolic Cosine (ARCCOSH) of a value can also be calculated:

```
ArcCosH = LOG(Value + SQR(Value * Value - 1))
```

```
' Useful Macro functions
```

```
MACRO Pi = 3.141592653589793##
```

```
MACRO DegreesToRadians(dpDegrees) = (dpDegrees*0.0174532925199433##)
```

```
MACRO RadiansToDegrees(dpRadians) = (dpRadians*57.29577951308232##)
```

See also [ATN](#), [SIN](#), [TAN](#)

Example

```
pi## = 3.141592653589793##
' we could also use pi## = ATN(1) * 4
FOR I& = 0 TO 360 STEP 45
  x$ = "Cosine of " + FORMAT$(I&, "0") + _
    " degrees = " + FORMAT$(COS(pi## / 180 * _
    I&), "0.00")
NEXT I&
```

Result

```
Cosine of 0 degrees = 1.00
Cosine of 45 degrees = 0.71
Cosine of 90 degrees = 0.00
Cosine of 135 degrees = -0.71
Cosine of 180 degrees = -1.00
```

```

Cosine of 225 degrees = -0.71
Cosine of 270 degrees = 0.00
Cosine of 315 degrees = 0.71
Cosine of 360 degrees = 1.00

```

CQUD function

CBYT, CCUR, CCUX, CDBL, CDWD, CEXT, CINT, CLNG, CQUD, CSNG, and CWRD functions

Purpose Convert a value to specific [variable](#) type.

Syntax

```

bytevar?           = CBYT(numeric_expression)
currencyvar@       = CCUR(numeric_expression)
currencyextvar@@   = CCUX(numeric_expression)
doublevar#         = CDBL(numeric_expression)
doublewordvar???  = CDWD(numeric_expression)
extendedvar##      = CEXT(numeric_expression)
integervar%        = CINT(numeric_expression)
longintvar&        = CLNG(numeric_expression)
quadintvar&&       = CQUD(numeric_expression)
singlevar!         = CSNG(numeric_expression)
wordvar??          = CWRD(numeric_expression)

```

Remarks Each of these functions converts a expression to a particular variable type. In each case, *numeric_expression* must be within the legal range for the result type. The *numeric_expression* will be rounded if necessary.

| Function | Result type |
|----------|---|
| CBYT | Byte |
| CCUR | Currency |
| CCUX | Extended-currency |
| CDBL | Double-precision floating-point |
| CDWD | Double-word |
| CEXT | Extended-precision floating-point |
| CINT | Integer |
| CLNG | Long-integer |
| CQUD | Quad-integer |
| CSNG | Single-precision floating-point |
| CWRD | Word |

These conversion functions are rarely needed as PowerBASIC automatically performs any necessary conversions when executing an assignment statement or passing parameters. For example:

```
e% = f#
```

is equivalent to:

```
e% = CINT(f#)
```

In the case of the functions that convert to

values, the fractional part of the number is rounded. If the fractional part is exactly .5 then it rounds to the nearest even integral value. For example, CINT(1.5) returns 2, CINT(.5) returns 0, and CLNG(-0.6) returns -1.

Restrictions CSNG limit string display to 7 significant digits.

See also [CEIL, CVI and associated functions](#), [FIX, INT, MKI\\$ and associated functions](#)

Example

```
' Calculate CINT for a series of values
FOR I! = 2.4! TO 2.65! STEP 0.05!
  x$ = FORMAT$(I!, "0.00") + " is" + STR$(CINT(I!))
NEXT I!
```

Result

```
2.40 is 2
2.45 is 2
2.50 is 2
2.55 is 3
2.60 is 3
2.65 is 3
```

CSET statement

CSET statement

Purpose Center a
within the space of another string or [User-Defined Type](#).

Syntax CSET [ABS] *result_var* = *string_expression* [USING *string_expression*]

Remarks CSET centers a string into the space of another string or variable of a User-Defined Type.

ABS If ABS is specified, or *ustring_expression* is null (empty), CSET leaves the padding positions unchanged from their original content, rather than replacing them with spaces.

USING If *string_expression* is shorter than *result_var*, CSET centers *string_expression* within *result_var*, padding both sides with the first character in *ustring_expression*, or spaces if not specified.

If *string_expression* is longer than *result_var*, CSET truncates *string_expression* from the right until it fits in *result_var*.

CSET can be used to assign the content of a User-Defined Type to a User-Defined Type variable of a different class, or assign a dynamic string to a User-Defined Type. For example:

```
    CSET MyType = MyType2
    CSET MyType = a$
```

[LSET](#) and [RSET](#) work similarly, but performs left and right-justification respectively.

See also [CSET\\$, GET, LET, LET \(With Types\), LSET, LSET\\$, PUT, RESET, RSET, RSET\\$, STRINSERT\\$, TYPE SET](#)

Example

```
a$ = RTRIM$(REPEAT$(5, "COOL "))
CSET ABS a$ = "..PowerBASIC.."
' result: "COOL ..PowerBASIC.. COOL"
CSET a$ = "PowerBASIC" USING "*"
' result: "*****PowerBASIC*****"
```

CSET\$ function

CSET\$ function

Purpose Return a
containing a centered (padded) string.

Syntax *result_var* = CSET\$(*string_expression*, *strlen&* [USING *ustring_expression*])

Remarks CSET\$ centers the string [string_expression](#) into a string of *strlen&* characters.

USING If *ustring_expression* is null (empty) or is not specified, CSET\$ pads *string_expression* with space characters. Otherwise, CSET\$ pads the string with the first character of *ustring_expression*.

If *string_expression* is shorter than *strlen&*, CSET\$ centers *string_expression* within *result_var*, padding both sides as described above; otherwise, CSET\$ returns the left-most *strlen&* bytes of *string_expression*.

See also [CSET](#), [GET](#), [LET](#), [LSET](#), [LSET\\$](#), [PUT](#), [RESET](#), [RSET](#), [RSET\\$](#), [STRINSERT\\$](#), [TYPE SET](#)

Example

```
a$ = CSET$("PowerBASIC", 20)
' result: "      PowerBASIC      "
```

```
a$ = CSET$("PowerBASIC",20 USING "***")
' result: "*****PowerBASIC*****"
```

CSNG function

CBYT, CCUR, CCUX, CDBL, CDWD, CEXT, CINT, CLNG, CQUD, CSNG, and CWRD functions

Purpose Convert a value to specific [variable](#) type.

Syntax

```
bytevar?           = CBYT(numeric_expression)
currencyvar@      = CCUR(numeric_expression)
currencyextvar@@  = CCUX(numeric_expression)
doublevar#        = CDBL(numeric_expression)
doublewordvar??? = CDWD(numeric_expression)
extendedvar##     = CEXT(numeric_expression)
integervar%      = CINT(numeric_expression)
longintvar&       = CLNG(numeric_expression)
quadintvar&&      = CQUD(numeric_expression)
singlevar!        = CSNG(numeric_expression)
wordvar??         = CWRD(numeric_expression)
```

Remarks Each of these functions converts a *numeric_expression* to a particular variable type. In each case, *numeric_expression* must be within the legal range for the result type. The *numeric_expression* will be rounded if necessary.

| Function | Result type |
|----------|---|
| CBYT | Byte |
| CCUR | Currency |
| CCUX | Extended-currency |
| CDBL | Double-precision floating-point |
| CDWD | Double-word |
| CEXT | Extended-precision floating-point |
| CINT | Integer |
| CLNG | Long-integer |
| CQUD | Quad-integer |
| CSNG | Single-precision floating-point |
| CWRD | Word |

These conversion functions are rarely needed as PowerBASIC automatically performs any necessary conversions when executing an assignment statement or passing parameters. For example:

```
e% = f#
```

is equivalent to:

```
e% = CINT(f#)
```

In the case of the functions that convert to

values, the fractional part of the number is rounded. If the fractional part is exactly .5 then it rounds to the nearest even integral value. For example, CINT(1.5) returns 2, CINT(.5) returns 0, and CLNG(-0.6) returns -1.

Restrictions CSNG limit string display to 7 significant digits.

See also [CEIL](#), [CVI](#) and associated functions, [FIX](#), [INT](#), [MKI\\$](#) and associated functions

Example

```
' Calculate CINT for a series of values
FOR I! = 2.4! TO 2.65! STEP 0.05!
  x$ = FORMAT$(I!, "0.00") + " is" + STR$(CINT(I!))
NEXT I!
```

Result

```
2.40 is 2
2.45 is 2
2.50 is 2
2.55 is 3
2.60 is 3
2.65 is 3
```

CURDIR\$ function

CURDIR\$ function

Purpose Return the current directory path for the specified drive.

Syntax `s$ = CURDIR$[(drive$)]`

Remarks *drive\$* is an optional [string expression](#), containing the drive letter of the target disk drive. If *drive\$* is not specified or is an empty

, the current directory path is returned for the *default* drive.

See also [CHDRIVE](#), [CHDIR](#)

Example

```
FUNCTION PBMAIN
  LOCAL FullCurrentPath$
  LOCAL CurrentDrive$
  FullCurrentPath$ = CURDIR$
  IF MID$(CURDIR$,2,1) = ":" THEN
    CurrentDrive$ = LEFT$(CURDIR$,2)
  END IF
END FUNCTION
```

CVBYT function

CVBYT, CVCUR, CVCUX, CVD, CVDWD, CVE, CVI, CVL, CVQ, CVS and CVWRD functions

Purpose Extracts data from an [ANSI](#) .

Syntax

```
bytevar?           = CVBYT(stringexpr [, offset])
curvar@            = CVCUR(stringexpr [, offset])
cuxvar@@           = CVCUX(stringexpr [, offset])
doublevar#         = CVD (stringexpr [, offset])
doublewordvar???  = CVDWD(stringexpr [, offset])
```

```

extendedvar## = CVE (stringexpr [, offset])
integervar%  = CVI (stringexpr [, offset])
longintvar&  = CVL (stringexpr [, offset])
quadintvar&& = CVQ (stringexpr [, offset])
singlevar!   = CVS (stringexpr [, offset])
wordvar??    = CVWRD(stringexpr [, offset])

```

Remarks

The CVx functions return a number corresponding to a binary pattern stored in a ANSI string value. The binary pattern is the internal format used by PowerBASIC to store these values in memory. This format follows the IEEE standard wherever it applies. The [MKx\\$](#) functions are complementary to the CVx functions. Do not confuse these functions with the [VAL](#) function, which converts a number stored as a printable text string (such as "123.45") into a numeric expression.

In all but the most extreme cases, *StringExpr* must be an ANSI string or [UDT](#) which consists of single [bytes](#). [WIDE](#) (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The CVx functions allow you to retrieve values beyond the first byte of the *StringExpr*. In this case, the optional *offset* parameter tells the byte position where the conversion should begin. This is the byte position, not the character position, even with a [WIDE StringExpr](#). If *Offset* is not given, it is presumed to be one (1).

For example: "Value& = CVL(x\$, 3)" would extract the 3rd through 6th bytes of x\$ and convert these 4 bytes to the corresponding Long-integer value. In this example, x\$ must be at least 6 bytes long.

| Function | Variable | Converts to |
|----------|----------------|--|
| CVBYT | 1-byte string | Byte |
| CVCUR | 8-byte string | Currency |
| CVCUX | 8-byte string | Extended-currency |
| CVD | 8-byte string | Double-precision float |
| CVDWD | 4-byte string | Double-word |
| CVE | 10-byte string | Extended-precision float |
| CVI | 2-byte string | Integer |
| CVL | 4-byte string | Long-integer |
| CVQ | 8-byte string | Quad-integer |
| CVS | 4-byte string | Single-precision float |
| CVWRD | 2-byte string | Word |

Restrictions

Expressions involving [Numeric Equates](#) and conditional compilation ([#IF](#)) may also include the CVQ function. This allows you to easily assign numeric values to an equate, based upon a meaningful mnemonic. In this context, the CVQ expression is limited to a length of eight bytes. For example:

```

%Mode = CVQ("DEBUG")
%Style = CVQ("Cool")

```

CVS limits string display to seven significant digits.

See also

[MKBYTES and associated functions](#)

CVCUR function**CVBYT, CVCUR, CVCUX, CVD, CVDWD, CVE, CVI, CVL, CVQ, CVS and CVWRD functions**

Purpose

Extracts
data from an [ANSI](#) .

Syntax

```

bytevar?           = CVBYT(stringexpr [, offset])
curvar@           = CVCUR(stringexpr [, offset])
cuxvar@@         = CVCUX(stringexpr [, offset])
doublevar#       = CVD (stringexpr [, offset])
doublewordvar??? = CVDWD(stringexpr [, offset])
extendedvar##    = CVE (stringexpr [, offset])
integervar%     = CVI (stringexpr [, offset])
longintvar&     = CVL (stringexpr [, offset])
quadintvar&&    = CVQ (stringexpr [, offset])
singlevar!      = CVS (stringexpr [, offset])
wordvar??       = CVWRD(stringexpr [, offset])

```

Remarks

The CVx functions return a number corresponding to a binary pattern stored in a ANSI string value. The binary pattern is the internal format used by PowerBASIC to store these values in memory. This format follows the IEEE standard wherever it applies. The [MKx\\$](#) functions are complementary to the CVx functions. Do not confuse these functions with the [VAL](#) function, which converts a number stored as a printable text string (such as "123.45") into a numeric expression.

In all but the most extreme cases, *StringExpr* must be an ANSI string or [UDT](#) which consists of single [bytes](#). [WIDE](#) (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The CVx functions allow you to retrieve values beyond the first byte of the *StringExpr*. In this case, the optional *offset* parameter tells the byte position where the conversion should begin. This is the byte position, not the character position, even with a [WIDE StringExpr](#). If *Offset* is not given, it is presumed to be one (1).

For example: "Value& = CVL(x\$, 3)" would extract the 3rd through 6th bytes of x\$ and convert these 4 bytes to the corresponding Long-integer value. In this example, x\$ must be at least 6 bytes long.

| Function | Variable | Converts to |
|----------|----------------|--|
| CVBYT | 1-byte string | Byte |
| CVCUR | 8-byte string | Currency |
| CVCUX | 8-byte string | Extended-currency |
| CVD | 8-byte string | Double-precision float |
| CVDWD | 4-byte string | Double-word |
| CVE | 10-byte string | Extended-precision float |
| CVI | 2-byte string | Integer |
| CVL | 4-byte string | Long-integer |
| CVQ | 8-byte string | Quad-integer |
| CVS | 4-byte string | Single-precision float |
| CVWRD | 2-byte string | Word |

Restrictions

Expressions involving [Numeric Equates](#) and conditional compilation ([#IF](#)) may also include the CVQ function. This allows you to easily assign numeric values to an equate, based upon a meaningful mnemonic. In this context, the CVQ expression is limited to a length of eight bytes. For example:

```

%Mode = CVQ("DEBUG")
%Style = CVQ("Cool")

```

CVS limits string display to seven significant digits.

See also

[MKBYT\\$ and associated functions](#)

CVCUX function

CVBYT, CVCUR, CVCUX, CVD, CVDWD, CVE, CVI, CVL, CVQ, CVS and CVWRD functions

| | |
|----------------|---|
| Purpose | Extracts data from an ANSI . |
| Syntax | <pre> bytevar? = CVBYT(stringexpr [, offset]) curvar@ = CVCUR(stringexpr [, offset]) cuxvar@@ = CVCUX(stringexpr [, offset]) doublevar# = CVD (stringexpr [, offset]) doublewordvar??? = CVDWD(stringexpr [, offset]) extendedvar## = CVE (stringexpr [, offset]) integervar% = CVI (stringexpr [, offset]) longintvar& = CVL (stringexpr [, offset]) quadintvar&& = CVQ (stringexpr [, offset]) singlevar! = CVS (stringexpr [, offset]) wordvar?? = CVWRD(stringexpr [, offset]) </pre> |

Remarks The CVx functions return a number corresponding to a binary pattern stored in a ANSI string value. The binary pattern is the internal format used by PowerBASIC to store these values in memory. This format follows the IEEE standard wherever it applies. The [MKx\\$](#) functions are complementary to the CVx functions. Do not confuse these functions with the [VAL](#) function, which converts a number stored as a printable text string (such as "123.45") into a numeric expression.

In all but the most extreme cases, *StringExpr* must be an ANSI string or [UDT](#) which consists of single [bytes](#). [WIDE](#) (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The CVx functions allow you to retrieve values beyond the first byte of the *StringExpr*. In this case, the optional *offset* parameter tells the byte position where the conversion should begin. This is the byte position, not the character position, even with a [WIDE StringExpr](#). If *Offset* is not given, it is presumed to be one (1).

For example: "Value& = CVL(x\$, 3)" would extract the 3rd through 6th bytes of x\$ and convert these 4 bytes to the corresponding Long-integer value. In this example, x\$ must be at least 6 bytes long.

| Function | Variable | Converts to |
|----------|----------------|--|
| CVBYT | 1-byte string | Byte |
| CVCUR | 8-byte string | Currency |
| CVCUX | 8-byte string | Extended-currency |
| CVD | 8-byte string | Double-precision float |
| CVDWD | 4-byte string | Double-word |
| CVE | 10-byte string | Extended-precision float |
| CVI | 2-byte string | Integer |
| CVL | 4-byte string | Long-integer |
| CVQ | 8-byte string | Quad-integer |
| CVS | 4-byte string | Single-precision float |
| CVWRD | 2-byte string | Word |

Restrictions Expressions involving [Numeric Equates](#) and conditional compilation ([#IF](#)) may also include the CVQ function. This allows you to easily assign numeric values to an equate,

based upon a meaningful mnemonic. In this context, the CVQ expression is limited to a length of eight bytes. For example:

```
%Mode = CVQ("DEBUG")
%Style = CVQ("Cool")
```

CVS limits string display to seven significant digits.

See also [MKBYTES and associated functions](#)

CVD function

CVBYT, CVCUR, CVCUX, CVD, CVDWD, CVE, CVI, CVL, CVQ, CVS and CVWRD functions

Purpose

Extracts data from an [ANSI](#) .

Syntax

```
bytevar? = CVBYT(stringexpr [, offset])
curvar@ = CVCUR(stringexpr [, offset])
cuxvar@@ = CVCUX(stringexpr [, offset])
doublevar# = CVD (stringexpr [, offset])
doublewordvar??? = CVDWD(stringexpr [, offset])
extendedvar## = CVE (stringexpr [, offset])
integervar% = CVI (stringexpr [, offset])
longintvar& = CVL (stringexpr [, offset])
quadintvar&& = CVQ (stringexpr [, offset])
singlevar! = CVS (stringexpr [, offset])
wordvar?? = CVWRD(stringexpr [, offset])
```

Remarks

The CVx functions return a number corresponding to a binary pattern stored in a ANSI string value. The binary pattern is the internal format used by PowerBASIC to store these values in memory. This format follows the IEEE standard wherever it applies. The [MKx\\$](#) functions are complementary to the CVx functions. Do not confuse these functions with the [VAL](#) function, which converts a number stored as a printable text string (such as "123.45") into a numeric expression.

In all but the most extreme cases, *StringExpr* must be an ANSI string or [UDT](#) which consists of single [bytes](#). [WIDE](#) (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The CVx functions allow you to retrieve values beyond the first byte of the *StringExpr*. In this case, the optional *offset* parameter tells the byte position where the conversion should begin. This is the byte position, not the character position, even with a [WIDE StringExpr](#). If *Offset* is not given, it is presumed to be one (1).

For example: "Value& = CVL(x\$, 3)" would extract the 3rd through 6th bytes of x\$ and convert these 4 bytes to the corresponding Long-integer value. In this example, x\$ must be at least 6 bytes long.

| Function | Variable | Converts to |
|----------|----------------|--|
| CVBYT | 1-byte string | Byte |
| CVCUR | 8-byte string | Currency |
| CVCUX | 8-byte string | Extended-currency |
| CVD | 8-byte string | Double-precision float |
| CVDWD | 4-byte string | Double-word |
| CVE | 10-byte string | Extended-precision float |
| CVI | 2-byte string | Integer |

| | | |
|-------|---------------|--|
| CVL | 4-byte string | Long-integer |
| CVQ | 8-byte string | Quad-integer |
| CVS | 4-byte string | Single-precision float |
| CVWRD | 2-byte string | Word |

Restrictions Expressions involving [Numeric Equates](#) and conditional compilation ([#IF](#)) may also include the CVQ function. This allows you to easily assign numeric values to an equate, based upon a meaningful mnemonic. In this context, the CVQ expression is limited to a length of eight bytes. For example:

```
%Mode = CVQ("DEBUG")
%Style = CVQ("Cool")
```

CVS limits string display to seven significant digits.

See also [MKBYT\\$ and associated functions](#)

CVDWD function

CVBYT, CVCUR, CVCUX, CVD, CVDWD, CVE, CVI, CVL, CVQ, CVS and CVWRD functions

Purpose Extracts

data from an [ANSI](#) .

Syntax

```
bytevar?           = CVBYT(stringexpr [, offset])
curvar@            = CVCUR(stringexpr [, offset])
cuxvar@            = CVCUX(stringexpr [, offset])
doublevar#        = CVD (stringexpr [, offset])
doublewordvar???  = CVDWD(stringexpr [, offset])
extendedvar##     = CVE (stringexpr [, offset])
integervar%       = CVI (stringexpr [, offset])
longintvar&       = CVL (stringexpr [, offset])
quadintvar&&      = CVQ (stringexpr [, offset])
singlevar!        = CVS (stringexpr [, offset])
wordvar??         = CVWRD(stringexpr [, offset])
```

Remarks

The CVx functions return a number corresponding to a binary pattern stored in a ANSI string value. The binary pattern is the internal format used by PowerBASIC to store these values in memory. This format follows the IEEE standard wherever it applies. The [MKx\\$](#) functions are complementary to the CVx functions. Do not confuse these functions with the [VAL](#) function, which converts a number stored as a printable text string (such as "123.45") into a numeric expression.

In all but the most extreme cases, *StringExpr* must be an ANSI string or [UDT](#) which consists of single [bytes](#). [WIDE](#) (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The CVx functions allow you to retrieve values beyond the first byte of the *StringExpr*. In this case, the optional *offset* parameter tells the byte position where the conversion should begin. This is the byte position, not the character position, even with a [WIDE StringExpr](#). If *Offset* is not given, it is presumed to be one (1).

For example: "Value& = CVL(x\$, 3)" would extract the 3rd through 6th bytes of x\$ and convert these 4 bytes to the corresponding Long-integer value. In this example, x\$ must be at least 6 bytes long.

| Function | Variable | Converts to |
|----------|---------------|--------------------------|
| CVBYT | 1-byte string | Byte |
| CVCUR | 8-byte string | Currency |

| | | |
|-------|----------------|--|
| CVCUX | 8-byte string | Extended-currency |
| CVD | 8-byte string | Double-precision float |
| CVDWD | 4-byte string | Double-word |
| CVE | 10-byte string | Extended-precision float |
| CVI | 2-byte string | Integer |
| CVL | 4-byte string | Long-integer |
| CVQ | 8-byte string | Quad-integer |
| CVS | 4-byte string | Single-precision float |
| CVWRD | 2-byte string | Word |

Restrictions Expressions involving [Numeric Equates](#) and conditional compilation ([#IF](#)) may also include the CVQ function. This allows you to easily assign numeric values to an equate, based upon a meaningful mnemonic. In this context, the CVQ expression is limited to a length of eight bytes. For example:

```
%Mode = CVQ("DEBUG")
%Style = CVQ("Cool")
```

CVS limits string display to seven significant digits.

See also [MKBYT\\$ and associated functions](#)

CVE function

CVBYT, CVCUR, CVCUX, CVD, CVDWD, CVE, CVI, CVL, CVQ, CVS and CVWRD functions

Purpose Extracts

data from an [ANSI](#) .

Syntax

```
bytevar?           = CVBYT(stringexpr [, offset])
curvar@            = CVCUR(stringexpr [, offset])
cuxvar@@           = CVCUX(stringexpr [, offset])
doublevar#        = CVD (stringexpr [, offset])
doublewordvar??? = CVDWD(stringexpr [, offset])
extendedvar##     = CVE (stringexpr [, offset])
integervar%       = CVI (stringexpr [, offset])
longintvar&       = CVL (stringexpr [, offset])
quadintvar&&      = CVQ (stringexpr [, offset])
singlevar!        = CVS (stringexpr [, offset])
wordvar??         = CVWRD(stringexpr [, offset])
```

Remarks The CVx functions return a number corresponding to a binary pattern stored in a ANSI string value. The binary pattern is the internal format used by PowerBASIC to store these values in memory. This format follows the IEEE standard wherever it applies. The [MKx\\$](#) functions are complementary to the CVx functions. Do not confuse these functions with the [VAL](#) function, which converts a number stored as a printable text string (such as "123.45") into a numeric expression.

In all but the most extreme cases, *StringExpr* must be an ANSI string or [UDT](#) which consists of single [bytes](#). [WIDE](#) (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The CVx functions allow you to retrieve values beyond the first byte of the *StringExpr*. In this case, the optional *offset* parameter tells the byte position where the conversion should begin. This is the byte position, not the character position, even with a [WIDE StringExpr](#). If *Offset* is not given, it is presumed to be one (1).

For example: "Value& = CVL(x\$, 3)" would extract the 3rd through 6th bytes of x\$ and convert these 4 bytes to the corresponding Long-integer value. In this example, x\$ must be at least 6 bytes long.

| Function | Variable | Converts to |
|----------|----------------|--|
| CVBYT | 1-byte string | Byte |
| CVCUR | 8-byte string | Currency |
| CVCUX | 8-byte string | Extended-currency |
| CVD | 8-byte string | Double-precision float |
| CVDWD | 4-byte string | Double-word |
| CVE | 10-byte string | Extended-precision float |
| CVI | 2-byte string | Integer |
| CVL | 4-byte string | Long-integer |
| CVQ | 8-byte string | Quad-integer |
| CVS | 4-byte string | Single-precision float |
| CVWRD | 2-byte string | Word |

Restrictions Expressions involving [Numeric Equates](#) and conditional compilation ([#E](#)) may also include the CVQ function. This allows you to easily assign numeric values to an equate, based upon a meaningful mnemonic. In this context, the CVQ expression is limited to a length of eight bytes. For example:

```
%Mode = CVQ("DEBUG")
%Style = CVQ("Cool")
```

CVS limits string display to seven significant digits.

See also [MKBYT\\$ and associated functions](#)

CVI function

CVBYT, CVCUR, CVCUX, CVD, CVDWD, CVE, CVI, CVL, CVQ, CVS and CVWRD functions

Purpose Extracts

data from an [ANSI](#) .

Syntax

```
bytevar? = CVBYT(stringexpr [, offset])
curvar@ = CVCUR(stringexpr [, offset])
cuxvar@@ = CVCUX(stringexpr [, offset])
doublevar# = CVD (stringexpr [, offset])
doublewordvar??? = CVDWD(stringexpr [, offset])
extendedvar## = CVE (stringexpr [, offset])
integervar% = CVI (stringexpr [, offset])
longintvar& = CVL (stringexpr [, offset])
quadintvar&& = CVQ (stringexpr [, offset])
singlevar! = CVS (stringexpr [, offset])
wordvar?? = CVWRD(stringexpr [, offset])
```

Remarks The CVx functions return a number corresponding to a binary pattern stored in a ANSI string value. The binary pattern is the internal format used by PowerBASIC to store these values in memory. This format follows the IEEE standard wherever it applies. The [MKx\\$](#) functions are complementary to the CVx functions. Do not confuse these functions with the [VAL](#) function, which converts a number stored as a printable text string (such as "123.45") into a numeric expression.

In all but the most extreme cases, *StringExpr* must be an ANSI string or [UDT](#) which consists of single [bytes](#). [WIDE](#) (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The CVx functions allow you to retrieve values beyond the first byte of the *StringExpr*. In this case, the optional *offset* parameter tells the byte position where the conversion should begin. This is the byte position, not the character position, even with a [WIDE StringExpr](#). If *Offset* is not given, it is presumed to be one (1).

For example: "Value& = CVL(x\$, 3)" would extract the 3rd through 6th bytes of x\$ and convert these 4 bytes to the corresponding Long-integer value. In this example, x\$ must be at least 6 bytes long.

| Function | Variable | Converts to |
|----------|----------------|--|
| CVBYT | 1-byte string | Byte |
| CVCUR | 8-byte string | Currency |
| CVCUX | 8-byte string | Extended-currency |
| CVD | 8-byte string | Double-precision float |
| CVDWD | 4-byte string | Double-word |
| CVE | 10-byte string | Extended-precision float |
| CVI | 2-byte string | Integer |
| CVL | 4-byte string | Long-integer |
| CVQ | 8-byte string | Quad-integer |
| CVS | 4-byte string | Single-precision float |
| CVWRD | 2-byte string | Word |

Restrictions Expressions involving [Numeric Equates](#) and conditional compilation ([#E](#)) may also include the CVQ function. This allows you to easily assign numeric values to an equate, based upon a meaningful mnemonic. In this context, the CVQ expression is limited to a length of eight bytes. For example:

```
%Mode = CVQ("DEBUG")
%Style = CVQ("Cool")
```

CVS limits string display to seven significant digits.

See also [MKBYT\\$ and associated functions](#)

CVL function

CVBYT, CVCUR, CVCUX, CVD, CVDWD, CVE, CVI, CVL, CVQ, CVS and CVWRD functions

Purpose Extracts data from an [ANSI](#) .

Syntax

```
bytevar? = CVBYT(stringexpr [, offset])
curvar@ = CVCUR(stringexpr [, offset])
cuxvar@ = CVCUX(stringexpr [, offset])
doublevar# = CVD (stringexpr [, offset])
doublewordvar??? = CVDWD(stringexpr [, offset])
extendedvar## = CVE (stringexpr [, offset])
integervar% = CVI (stringexpr [, offset])
longintvar& = CVL (stringexpr [, offset])
quadintvar&& = CVQ (stringexpr [, offset])
singlevar! = CVS (stringexpr [, offset])
```

```
wordvar?? = CVWRD(stringexpr [, offset])
```

Remarks

The CVx functions return a number corresponding to a binary pattern stored in a ANSI string value. The binary pattern is the internal format used by PowerBASIC to store these values in memory. This format follows the IEEE standard wherever it applies. The [MKx\\$](#) functions are complementary to the CVx functions. Do not confuse these functions with the [VAL](#) function, which converts a number stored as a printable text string (such as "123.45") into a numeric expression.

In all but the most extreme cases, *StringExpr* must be an ANSI string or [UDT](#) which consists of single [bytes](#). [WIDE](#) (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The CVx functions allow you to retrieve values beyond the first byte of the *StringExpr*. In this case, the optional *offset* parameter tells the byte position where the conversion should begin. This is the byte position, not the character position, even with a [WIDE StringExpr](#). If *Offset* is not given, it is presumed to be one (1).

For example: "Value& = CVL(x\$, 3)" would extract the 3rd through 6th bytes of x\$ and convert these 4 bytes to the corresponding Long-integer value. In this example, x\$ must be at least 6 bytes long.

| Function | Variable | Converts to |
|----------|----------------|--|
| CVBYT | 1-byte string | Byte |
| CVCUR | 8-byte string | Currency |
| CVCUX | 8-byte string | Extended-currency |
| CVD | 8-byte string | Double-precision float |
| CVDWD | 4-byte string | Double-word |
| CVE | 10-byte string | Extended-precision float |
| CVI | 2-byte string | Integer |
| CVL | 4-byte string | Long-integer |
| CVQ | 8-byte string | Quad-integer |
| CVS | 4-byte string | Single-precision float |
| CVWRD | 2-byte string | Word |

Restrictions

Expressions involving [Numeric Equates](#) and conditional compilation ([#IF](#)) may also include the CVQ function. This allows you to easily assign numeric values to an equate, based upon a meaningful mnemonic. In this context, the CVQ expression is limited to a length of eight bytes. For example:

```
%Mode = CVQ("DEBUG")
%Style = CVQ("Cool")
```

CVS limits string display to seven significant digits.

See also

[MKBYT\\$ and associated functions](#)

CVQ function**CVBYT, CVCUR, CVCUX, CVD, CVDWD, CVE, CVI, CVL, CVQ, CVS and CVWRD functions****Purpose**

Extracts data from an [ANSI](#) .

Syntax

```
bytevar? = CVBYT(stringexpr [, offset])
curvar@ = CVCUR(stringexpr [, offset])
cuxvar@@ = CVCUX(stringexpr [, offset])
```

```

doublevar#           = CVD (stringexpr [, offset])
doublewordvar????   = CVDWD(stringexpr [, offset])
extendedvar##       = CVE (stringexpr [, offset])
integervar%         = CVI (stringexpr [, offset])
longintvar&         = CVL (stringexpr [, offset])
quadintvar&&        = CVQ (stringexpr [, offset])
singlevar!          = CVS (stringexpr [, offset])
wordvar??           = CVWRD(stringexpr [, offset])

```

Remarks

The CVx functions return a number corresponding to a binary pattern stored in an ANSI string value. The binary pattern is the internal format used by PowerBASIC to store these values in memory. This format follows the IEEE standard wherever it applies. The [MKx\\$](#) functions are complementary to the CVx functions. Do not confuse these functions with the [VAL](#) function, which converts a number stored as a printable text string (such as "123.45") into a numeric expression.

In all but the most extreme cases, *StringExpr* must be an ANSI string or [UDT](#) which consists of single [bytes](#). [WIDE](#) (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The CVx functions allow you to retrieve values beyond the first byte of the *StringExpr*. In this case, the optional *offset* parameter tells the byte position where the conversion should begin. This is the byte position, not the character position, even with a [WIDE StringExpr](#). If *Offset* is not given, it is presumed to be one (1).

For example: "Value& = CVL(x\$, 3)" would extract the 3rd through 6th bytes of x\$ and convert these 4 bytes to the corresponding Long-integer value. In this example, x\$ must be at least 6 bytes long.

| Function | Variable | Converts to |
|----------|----------------|--|
| CVBYT | 1-byte string | Byte |
| CVCUR | 8-byte string | Currency |
| CVCUX | 8-byte string | Extended-currency |
| CVD | 8-byte string | Double-precision float |
| CVDWD | 4-byte string | Double-word |
| CVE | 10-byte string | Extended-precision float |
| CVI | 2-byte string | Integer |
| CVL | 4-byte string | Long-integer |
| CVQ | 8-byte string | Quad-integer |
| CVS | 4-byte string | Single-precision float |
| CVWRD | 2-byte string | Word |

Restrictions

Expressions involving [Numeric Equates](#) and conditional compilation ([#IF](#)) may also include the CVQ function. This allows you to easily assign numeric values to an equate, based upon a meaningful mnemonic. In this context, the CVQ expression is limited to a length of eight bytes. For example:

```

%Mode = CVQ("DEBUG")
%Style = CVQ("Cool")

```

CVS limits string display to seven significant digits.

See also

[MKBYTES and associated functions](#)

CVS function**CVBYT, CVCUR, CVCUX, CVD, CVDWD, CVE,**

CVI, CVL, CVQ, CVS and CVWRD functions

| | |
|----------------|--|
| Purpose | Extracts data from an ANSI . |
| Syntax | <pre> bytevar? = CVBYT(stringexpr [, offset]) curvar@ = CVCUR(stringexpr [, offset]) cuxvar@@ = CVCUX(stringexpr [, offset]) doublevar# = CVD (stringexpr [, offset]) doublewordvar??? = CVDWD(stringexpr [, offset]) extendedvar## = CVE (stringexpr [, offset]) integervar% = CVI (stringexpr [, offset]) longintvar& = CVL (stringexpr [, offset]) quadintvar&& = CVQ (stringexpr [, offset]) singlevar! = CVS (stringexpr [, offset]) wordvar?? = CVWRD(stringexpr [, offset]) </pre> |
| Remarks | <p>The CVx functions return a number corresponding to a binary pattern stored in a ANSI string value. The binary pattern is the internal format used by PowerBASIC to store these values in memory. This format follows the IEEE standard wherever it applies. The MKx\$ functions are complementary to the CVx functions. Do not confuse these functions with the VAL function, which converts a number stored as a printable text string (such as "123.45") into a numeric expression.</p> |

In all but the most extreme cases, *StringExpr* must be an ANSI string or [UDT](#) which consists of single [bytes](#). [WIDE](#) (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The CVx functions allow you to retrieve values beyond the first byte of the *StringExpr*. In this case, the optional *offset* parameter tells the byte position where the conversion should begin. This is the byte position, not the character position, even with a [WIDE StringExpr](#). If *Offset* is not given, it is presumed to be one (1).

For example: "Value& = CVL(x\$, 3)" would extract the 3rd through 6th bytes of x\$ and convert these 4 bytes to the corresponding Long-integer value. In this example, x\$ must be at least 6 bytes long.

| Function | Variable | Converts to |
|----------|----------------|--|
| CVBYT | 1-byte string | Byte |
| CVCUR | 8-byte string | Currency |
| CVCUX | 8-byte string | Extended-currency |
| CVD | 8-byte string | Double-precision float |
| CVDWD | 4-byte string | Double-word |
| CVE | 10-byte string | Extended-precision float |
| CVI | 2-byte string | Integer |
| CVL | 4-byte string | Long-integer |
| CVQ | 8-byte string | Quad-integer |
| CVS | 4-byte string | Single-precision float |
| CVWRD | 2-byte string | Word |

Restrictions Expressions involving [Numeric Equates](#) and conditional compilation ([#IF](#)) may also include the CVQ function. This allows you to easily assign numeric values to an equate, based upon a meaningful mnemonic. In this context, the CVQ expression is limited to a length of eight bytes. For example:

```

%Mode = CVQ("DEBUG")
%Style = CVQ("Cool")

```

CVS limits string display to seven significant digits.

See also [MKBYT\\$ and associated functions](#)

CVWRD function

CVBYT, CVCUR, CVCUX, CVD, CVDWD, CVE, CVI, CVL, CVQ, CVS and CVWRD functions

Purpose Extracts

data from an [ANSI](#) .

Syntax

```

bytevar?           = CVBYT(stringexpr [, offset])
curvar@            = CVCUR(stringexpr [, offset])
cuxvar@            = CVCUX(stringexpr [, offset])
doublevar#        = CVD (stringexpr [, offset])
doublewordvar???  = CVDWD(stringexpr [, offset])
extendedvar##     = CVE (stringexpr [, offset])
integervar%       = CVI (stringexpr [, offset])
longintvar&       = CVL (stringexpr [, offset])
quadintvar&&      = CVQ (stringexpr [, offset])
singlevar!        = CVS (stringexpr [, offset])
wordvar??         = CVWRD(stringexpr [, offset])

```

Remarks The CVx functions return a number corresponding to a binary pattern stored in a ANSI string value. The binary pattern is the internal format used by PowerBASIC to store these values in memory. This format follows the IEEE standard wherever it applies. The [MKx\\$](#) functions are complementary to the CVx functions. Do not confuse these functions with the [VAL](#) function, which converts a number stored as a printable text string (such as "123.45") into a numeric expression.

In all but the most extreme cases, *StringExpr* must be an ANSI string or [UDT](#) which consists of single [bytes](#). [WIDE](#) (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The CVx functions allow you to retrieve values beyond the first byte of the *StringExpr*. In this case, the optional *offset* parameter tells the byte position where the conversion should begin. This is the byte position, not the character position, even with a [WIDE StringExpr](#). If *Offset* is not given, it is presumed to be one (1).

For example: "Value& = CVL(x\$, 3)" would extract the 3rd through 6th bytes of x\$ and convert these 4 bytes to the corresponding Long-integer value. In this example, x\$ must be at least 6 bytes long.

| Function | Variable | Converts to |
|----------|----------------|--|
| CVBYT | 1-byte string | Byte |
| CVCUR | 8-byte string | Currency |
| CVCUX | 8-byte string | Extended-currency |
| CVD | 8-byte string | Double-precision float |
| CVDWD | 4-byte string | Double-word |
| CVE | 10-byte string | Extended-precision float |
| CVI | 2-byte string | Integer |
| CVL | 4-byte string | Long-integer |
| CVQ | 8-byte string | Quad-integer |
| CVS | 4-byte string | Single-precision float |
| CVWRD | 2-byte string | Word |

Restrictions Expressions involving [Numeric Equates](#) and conditional compilation (`#IF`) may also include the CVQ function. This allows you to easily assign numeric values to an equate, based upon a meaningful mnemonic. In this context, the CVQ expression is limited to a length of eight bytes. For example:

```
%Mode = CVQ("DEBUG")
%Style = CVQ("Cool")
```

CVS limits string display to seven significant digits.

See also [MKBYTES and associated functions](#)

CWRD function

CBYT, CCUR, CCUX, CDBL, CDWD, CEXT, CINT, CLNG, CQUD, CSNG, and CWRD functions

Purpose Convert a value to specific [variable](#) type.

Syntax

```
bytevar?           = CBYT(numeric_expression)
currencyvar@       = CCUR(numeric_expression)
currencyextvar@@   = CCUX(numeric_expression)
doublevar#         = CDBL(numeric_expression)
doublewordvar???   = CDWD(numeric_expression)
extendedvar##      = CEXT(numeric_expression)
integervar%        = CINT(numeric_expression)
longintvar&        = CLNG(numeric_expression)
quadintvar&&       = CQUD(numeric_expression)
singlevar!         = CSNG(numeric_expression)
wordvar??          = CWRD(numeric_expression)
```

Remarks Each of these functions converts a expression to a particular variable type. In each case, *numeric_expression* must be within the legal range for the result type. The *numeric_expression* will be rounded if necessary.

| Function | Result type |
|----------|---|
| CBYT | Byte |
| CCUR | Currency |
| CCUX | Extended-currency |
| CDBL | Double-precision floating-point |
| CDWD | Double-word |
| CEXT | Extended-precision floating-point |
| CINT | Integer |
| CLNG | Long-integer |
| CQUD | Quad-integer |
| CSNG | Single-precision floating-point |
| CWRD | Word |

These conversion functions are rarely needed as PowerBASIC automatically performs any necessary conversions when executing an assignment statement or passing parameters. For example:

```
e% = f#
```

is equivalent to:

```
e% = CINT(f#)
```

In the case of the functions that convert to

values, the fractional part of the number is rounded. If the fractional part is exactly .5 then it rounds to the nearest even integral value. For example, CINT(1.5) returns 2, CINT(.5) returns 0, and CLNG(-0.6) returns -1.

Restrictions CSNG limit string display to 7 significant digits.

See also [CEIL](#), [CVI](#) and associated functions, [FIX](#), [INT](#), [MKI\\$](#) and associated functions

Example

```
' Calculate CINT for a series of values
FOR I! = 2.4! TO 2.65! STEP 0.05!
  x$ = FORMAT$(I!, "0.00") + " is" + STR$(CINT(I!))
NEXT I!
```

Result

```
2.40 is 2
2.45 is 2
2.50 is 2
2.55 is 3
2.60 is 3
2.65 is 3
```

DATA statement

DATA statement

Purpose Declare [string constants](#) within the source code to be read by [READ\\$](#) function.

Syntax DATA ["]item["] [, ["]item["] ...]

Remarks DATA statements may only appear inside of [Subs](#), [Functions](#), [Method](#), or [Properties](#), and are visible only to the code in the procedure in which they appear. Each procedure may therefore have its own private data.

Data may consist of virtually any text characters. Data items may be enclosed in quotes to preserve leading/trailing spaces, which are otherwise stripped during compilation.

Restrictions There is a limit of 64 Kilobytes and 16384 separate data items per procedure. Previous versions of PowerBASIC ignored plain text located immediately after a quoted literal up to the next comma or end-of-line; however, this is no longer acceptable and generates an [Error 477](#) ("Syntax error").

DATA statements cannot extend across more than one physical source code line using line continuation characters. Special care should be used when formatting DATA statements, especially if the data is to contain underscore and/or colon characters. The following examples highlight data items in blue:

If an underscore appears after a comma, it is treated as the start of a quoted data string, rather than a line continuation character:

```
' Three data items exist in this line:
DATA "Tom", "Dick", _Harry
```

The colon (statement separator) character, when used within unquoted string data, performs as a regular statement separator:

```
' Two data items and a separate statement
DATA "Tom","Dick" : Harry& = 1
```

However, if a colon character appears within a quoted data string, it is treated as part of the data string:

```
' 3 data items
DATA "Tom",Dick,":Harry& = 1"
```

See also [DATACOUNT](#), [READ\\$](#), [VAL](#)

Example

```
DATA "Abc", Bob, "Sally", 123
DATA 456.78, " leading space"
DATA embedded "quotes within data"
```

DATACOUNT function

DATACOUNT function

| | |
|-----------------|--|
| Purpose | Return the total count of the number of local DATA items that can be read with the READ\$ function. |
| Syntax | <code>Count% = DATACOUNT</code> |
| Remarks | DATACOUNT only returns the number of DATA items in the Sub , Function , Method , or Property in which it appears (i.e., local DATA statements). While it is not possible to directly read data from outside of the scope of current procedure, global data can be emulated easily by placing it inside a procedure returns data to the calling code. There is a limit of 64 Kilobytes and 16384 separate data items per procedure. |
| See also | DATA , READ\$ |
| Example | <pre> FUNCTION GetCategories(Category() AS STRING) AS LONG LOCAL x AS INTEGER REDIM Category(1 TO DATACOUNT) AS STRING FOR x = 1 TO DATACOUNT Category(x) = READ\$(x) NEXT x FUNCTION = DATACOUNT DATA Animal, Mineral, Vegetable, Alien END FUNCTION </pre> |

DATE\$ system variable

DATE\$ system variable

| | |
|---------------------|---|
| Purpose | Set or retrieve the system date. |
| Syntax | <pre> DATE\$ = s\$ ' sets system date according to s\$ s\$ = DATE\$ ' s\$ now contains system date </pre> |
| Remarks | <p>Assigning a properly formatted value to DATE\$ sets the system date. You can also assign DATE\$ to a string variable, which stores 10 characters in the form "mm-dd-yyyy", where <i>mm</i> represents the month, <i>dd</i> the day, and <i>yyyy</i> the year.</p> <p>To change the date, your date string must be formatted in one of the following ways:</p> <pre> mm-dd-yy mm/dd/yy mm-dd-yyyy mm/dd/yyyy </pre> <p>For example, DATE\$ = "11-09-84" sets the system date to November 9, 1984.</p> |
| Restrictions | The year assigned to the DATE\$ system variable must be within the range 1980 to 2099. DATE\$ never returns locale-specific date formats. When assigning a two digit year, any value less than 81 will be assumed to be in the 2000's and any value greater than 80 will be assumed to be in the 1900's. |
| See also | DAYNAME\$, MONTHNAME\$, POWERTIME , TIME\$ |

DAYNAME\$ function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

DAYNAME\$ function **New!**

Purpose Converts a Day-of-Week number to the associated name.

Syntax `s$ = DAYNAME$(DayNumber&)`

Remarks The DAYNAME\$ function converts a Day-of-Week number into a representing its associated name. The argument must be in the range of 0 through 6, representing the names Sunday, Monday, etc.

See also [DATE\\$](#), [MONTHNAME\\$](#), [POWERTIME](#)

DEC\$ function

DEC\$ function **New!**

Purpose Convert an integral value to a decimal

Syntax `s$ = DEC$(IntVal [, Digits, LeadSpaces, TrailSpaces])`

Remarks *IntVal* is a

expression in the range of a 64-bit [Quad Integer](#) (-9223372036854775808 to +9223372036854775807). Any fractional part of the value is rounded. If the value is negative, the leading minus sign occupies one digit position. The result string is always formatted as an integral number using all the significant digits in *IntVal*. It is never expressed in scientific notation.

If *Digits* is 0 (or not given), no leading characters will be added to the numeric field. If *Digits* is a positive number greater than 0, the result string will be prepended with leading zeros to achieve the desired length. If *Digits* is a negative number, leading spaces are added to reach the absolute length. *Digits* may be in the range of -20 to +20.

LeadSpaces specifies additional leading spaces to be prepended, regardless of the length of the numeric portion of the string.

TrailSpaces specifies additional trailing spaces to be appended to the end of the string.

See also [BIN\\$](#), [FORMAT\\$](#), [HEX\\$](#), [OCT\\$](#), [STR\\$](#), [TRIM\\$](#), [USING\\$](#), [VAL](#)

DECLARE statement

DECLARE statement **IMPROVED**

Purpose Explicitly declare a [Sub](#) or [Function](#).

Syntax

```
DECLARE SUB ProcName [ALIAS "AliasName"] [(arguments)] <Descriptors>
DECLARE FUNCTION ProcName [ALIAS "AliasName"] [(arguments)] <Descriptors>
AS RetType
```

```
DECLARE CALLBACK FUNCTION ProcName [(()) AS LONG]
DECLARE THREAD FUNCTION ProcName (BYVAL var AS (LONG | DWORD)) AS {LONG |
DWORD}
```

Remarks

The DECLARE statement has the following parts:

ProcName

The name of the Sub or Function to be declared. For Functions, a type-specifier may be appended (just like an ordinary [variable](#) name) to specify the of the Function's return value, in place of the [AS *RetType*] clause.

Future versions of PowerBASIC will not support [type-specifier symbols](#) for the Function return type. Specify the return data type with an explicit AS *RetType* clause in all DECLARE and FUNCTION definitions to ensure future compatibility.

ALIAS

An alias clause may be used to specify an alternate name to be used for imported or exported procedures. This allows you to interact with outside modules ([DLL](#) or EXE) using a different procedure name. The alias name must be specified by a string literal which provides the name and capitalization of the procedure in the external DLL.

This option is particularly useful if you want to abbreviate a long name, or if the original name of a function contains characters that are illegal in PowerBASIC. The alias name is the actual name used in the other module, while the *ProcName* is the word you use in your PowerBASIC program. For example:

```
DECLARE SUB ShortName ALIAS "VeryLongProcName"()
DECLARE FUNCTION LegalName ALIAS "Illegal$Name"()
```

Although a *ProcName* must be unique, you may use the same *AliasName* in multiple declarations. This is particularly useful for avoiding AS ANY in cases where a procedure is designed to receive several different types of parameters.

```
DECLARE FUNCTION AddAtom LIB "KERNEL32.DLL" ALIAS
"AddAtomA" (lpString AS STRINGZ) AS WORD
DECLARE FUNCTION AddIntAtom LIB "KERNEL32.DLL" ALIAS "AddAtomA" (BYVAL
lpString AS DWORD) AS WORD
```

The ALIAS clause is very important when importing or exporting Subs and Functions from DLLs. Omitting the ALIAS clause or incorrectly capitalizing the alias name are common causes of DLL load failure problems. Please refer to the [SUB](#) and [FUNCTION](#) sections for more information.

Descriptors

You may optionally add one or more descriptor words (Import, Export, Common, Private, ThreadSafe, BDecl, CDecl, SDecl) to provide specific functionality. They may be added to the DECLARE as a comma delimited list. You should note that some of them are mutually exclusive.

IMPORT

A [string literal](#) or [equate](#) that specifies the name of the module in which an imported procedure is located. This allows you to call Subs or Functions that reside in DLLs. The legacy word LIB may be substituted for IMPORT.

EXPORT

This descriptor identifies a Sub or Function which may be accessed between Dynamic Link Libraries (DLLs), and/or the main executable which links them. If a procedure is not marked EXPORT, it is hidden from these other modules. The EXPORT attribute may be added to a Sub/Function defined elsewhere, by specifying EXPORT in a DECLARE statement. EXPORT can even be added to a Sub/Function in an [SLL](#) with a DECLARE in the host module.

COMMON

A COMMON Sub/Function is one which may be called between linked unit modules (Host or [SLL](#)). If the Common Sub/Function is not present in this module, it is presumed to be found in a separate linked module (Host or SLL). It is not necessary to DECLARE a COMMON Sub or Function in the Host Module. If you choose to do so, it is generally advisable to omit the COMMON descriptor, as its presence will force the SLL to be linked, whether needed or not.

PRIVATE

A PRIVATE Sub/Function is one which may only be accessed from within the current PowerBASIC program or library. Even if not specified, this is the default mode of

operation.

THREADSAFE With the THREADSAFE option, PowerBASIC automatically establishes a semaphore which allows only one thread to execute the Sub/Function at a time. Other callers must wait until the first thread exits the THREADSAFE procedure before they are allowed to begin.

BDECL Specifies that the declared procedure uses the legacy BASIC/Pascal calling convention. Parameters are pushed on the [stack](#) from left to right, and the called procedure is responsible for removing them. BDECL should only be used when necessary to match outside modules.

CDECL Specifies that the declared procedure uses the C calling convention. Parameters are pushed on the stack from right to left, and the calling code is responsible for removing them. CDECL should only be used when necessary to match outside modules.

When a procedure is imported or exported, PowerBASIC automatically creates a lowercase ALIAS, prefixed with an underscore. The following two declarations are equivalent, indicating how the default ALIAS name would be created by PowerBASIC:

```
DECLARE SUB C_Function CDECL ()
DECLARE SUB C_Function CDECL ALIAS "_c_function" ()
```

SDECL This is the default convention, and should be used whenever possible. SDECL (and its synonym STDCALL), specifies the "Standard Calling Convention" for Windows. Parameters are pushed on the stack from right to left, and the called procedure is responsible for removing them.

CALLBACK [Callback Functions](#) are reserved for use with [Dynamic Dialog Tools](#) (DDT) functions. No parameters should be specified, as data is retrieved with the CALLBACK ([CB](#)) functions. Parentheses and the AS LONG return type may be added for clarity.

THREAD [Thread functions](#) are reserved for use with the [THREAD CREATE](#) statement. It must take exactly one [Long](#) Integer parameter by value (BYVAL LONG), and must return a Long Integer value (AS LONG). It is permissible to substitute [DWORD](#) for both of these items.

Passing parameters

Arguments Contains the name(s) or the type of each parameter, in the order they are passed, for up to 32 parameters. If you wish to call a SUB or FUNCTION in a DLL, you must describe the target SUB or FUNCTION with an explicit DECLARE statement. The DECLARE must physically precede any reference to the target procedure.

Previous versions of PowerBASIC required that you create an explicit DECLARE statement if you wished to execute a SUB or function which did not physically precede the reference to it. This extra work is no longer required, as PowerBASIC resolves all forward references to internal procedures automatically.

The complete *arguments* list must be specified for each routine. Each parameter may be defined in one of three ways:

- List only its type name ([INTEGER](#), [DOUBLE](#), etc.)
- List a variable name with a type-specifier appended (count%, txt\$)
- Use the AS clause to specify the type (count AS [INTEGER](#), text AS [STRING*](#) [100](#), etc.).

Legal type names for *arguments* include ANY, [ASCIIZ](#), [BYTE](#), [CUR](#), [CUX](#), [DOUBLE](#), [DWORD](#), [EXT](#), [INTEGER](#), [LONG](#), [PTR](#), [QUAD](#), [SINGLE](#), [STRING](#), [STRINGZ](#), [WORD](#), [WSTRING](#), [WSTRINGZ](#) and [ARRAY](#). The ARRAY keyword is used in conjunction with one of the other types to specify an entire array of that type. For example:

```
DECLARE SUB KerPlunk(INTEGER ARRAY, DOUBLE)
```

declares a procedure called *KerPlunk*, which takes an entire Integer array and a Double-precision variable as parameters. You can also name the parameters using the AS keyword:

```
DECLARE SUB KerPlunk(iArray() AS INTEGER, dVar AS DOUBLE)
```

The following four declare statements are equivalent:

```

DECLARE SUB KerPlunk(x) ' if DEFINT A-Z is in effect
DECLARE SUB KerPlunk(x%)
DECLARE SUB Plunk(x AS INTEGER)
DECLARE SUB KerPlunk(INTEGER)

```

When parameters are passed by reference (BYREF), the address of the variable passed to the routine is placed on the stack. When they are passed by value (BYVAL), the actual data is placed on the stack. You can use the BYVAL or BYREF keywords to specify that a parameter should always be passed in a known format.

Using ANY disables type checking for a particular parameter, and passes the address of the variable on the stack. Since the internal format of variables differ greatly by type, you must use caution to be certain your code knows the data type in each invocation.

Normally, a second parameter is used to specify the actual type of the ANY parameter.

When a Sub/Function definition specifies either a BYREF parameter or a [pointer](#) variable parameter, the calling code may freely pass a BYVAL DWORD or a pointer instead.

While the use of the explicit BYVAL override in the calling code is optional, it is recommended for clarity. It is necessary to explicitly declare all pointer parameters as BYVAL (BYVAL x AS BYTE PTR). Failure to do so will generate compile-time [Error 549](#) ("BYVAL required with pointers").

Additional information on BYVAL/BYREF/BYCOPY parameter passing can be found in the [CALL](#) statement topic.

Using OPTIONAL/OPT

DECLARE statements may specify one or more parameters as optional by preceding the parameter with either the keyword OPTIONAL (or the abbreviation OPT). Optional parameters are only allowed with CDECL or SDECL calling conventions, not BDECL.

When a parameter is declared optional, all subsequent parameters in the declaration are optional as well, whether or not they specify an explicit OPTIONAL or OPT directive. The following two lines are equivalent, with both second and third parameters being optional:

```

DECLARE SUB sABC(a&, OPTIONAL BYVAL b&, OPTIONAL BYVAL c&) AS LONG
DECLARE SUB sABC(a&, OPT BYVAL b&, BYVAL c&) AS LONG

```

[VARIANT](#) variables are particularly well suited for use as an optional parameter. If the calling code omits an optional VARIANT parameter, (BYVAL or BYREF), PowerBASIC (and most other compilers) substitute a variant of type %VT_ERROR which contains an error value of %DISP_E_PARAMNOTFOUND (&H80020004). In this case, you can check for this value directly, or use the [ISMISSING\(\)](#) function to determine whether the parameter was physically passed or not.

When optional parameters (other than VARIANT) are omitted in the calling code, the stack area normally reserved for those parameters is zero-filled.

If the parameter is defined as a BYVAL parameter, it will have the value zero. For [TYPE](#) or [UNION](#) variables passed BYVAL, the compiler will pass a string of binary zeroes of length [SIZEOF](#)(*Type_or_union_var*).

If the parameter is defined as a BYREF *parameter*, [VARPTR](#) (*Vaname*) will equal zero; when this is true, any attempt to use *Vaname* in your code will result in a General Protection Fault or memory corruption. You should use the ISMISSING() function first to determine whether it is safe to access the parameter.

AS type

You may specify the type of data returned by a Function to the calling code. If you do not specify a type, PowerBASIC assumes that the Function returns the data type specified by a [DEFtype](#) statement. However, if no DEFtype or AS type has been specified, a [compile-time error](#) is generated.

Therefore, there are two ways to specify the return type of a Function:

- Include a type-specifier character at the end of *ProcName*
- Include the AS *type* clause as the last part of the DECLARE statement (this is the recommended syntax to ensure compatibility with future versions of PowerBASIC).

For example, the following statements are equivalent:

```
DECLARE FUNCTION aFunction?()
DECLARE FUNCTION aFunction() AS BYTE
```

While most FUNCTION calling conventions are fairly well defined throughout the industry, there are a few exceptions. In the case of functions which return a Quad Integer value, some programming languages (including PowerBASIC) return the quad value in the FPU, while others return it in EDX:EAX.

PowerBASIC automatically detects the method used by imported functions and adjusts accordingly for you, but that's not a feature found in other compilers. Therefore, we recommend that you do not EXPORT QUAD FUNCTIONS unless they will only be accessed by PowerBASIC programs. A simple equivalent functionality would be to return the quad-integer value to the caller in a BYREF QUAD parameter.

- Restrictions** A Sub/Function may be imported and exported within the same module. That is, a function in the module may be stated as EXPORT, while a DECLARE in the same module specifies it as an imported function by the option LIB "filename.dll", as long as FILENAME.DLL is the name of the module. This may be particularly valuable when you wish to build an [#INCLUDE](#) file with all of the DECLARE statements for a project.
- See also** [#EXPORT](#), [#LINK](#), [CALL](#), [CALL DWORD](#), [FASTPROC](#), [FUNCTION/END FUNCTION](#), [IMPORT](#), [ISMISSING](#), [SUB/END SUB](#), [THREAD CREATE](#)
- Example**
- ```
' Main program
DECLARE SUB Calculate LIB "A.DLL" (EXT, CUR, QUAD, INTEGER)
...
CALL Calculate(w##, x@, y&&, z%)
```

## DECR statement

# DECR statement

- Purpose** Decrement a [variable](#) by 1; Decrement a [pointer](#) by the size of its target; or decrement the target of a numeric pointer by 1.
- Syntax** `DECR variable`
- Remarks** *variable* can be a variable or a pointer variable. When DECR is used with a numeric variable, 1 is subtracted from the numeric variable.
- If DECR is used on the target of a numeric pointer variable (i.e., DECR @IntPtr), the target numeric variable is decremented by one. However, when using DECR on a pointer variable, the value of the pointer variable is decremented by the size of its target.
- For example, given a pointer to element 1000 of an Integer array, DECR of the pointer variable itself would result in a decrement of 2, which should point to the previous element in the array (element 999). This is because an Integer is two bytes wide, so the pointer value is reduced by 2 bytes.
- See also** [INCR](#), [LET](#)
- Example**
- ```
DIM x&, LongPtr AS LONG POINTER
DECR x&
DECR LongPtr
DECR @LongPtr
```

DEFBYT statement

DEFBYT, DEFCUR, DEFCUX, DEFDBL,

DEFDWD, DEFEXT, DEFINT, DEFLNG, DEFQUD, DEFSNG, DEFSTR and DEFWRD statements

| | |
|---------------------|--|
| Purpose | Declare the default type for variable identifiers that begin with specified letters. |
| Syntax | <code>DEFtype letter_range [, letter_range] [, ...]</code> |
| Remarks | <i>type</i> represents one of PowerBASIC's variable types: INT (Integer), LNG (Long-integer), QUD (Quad-integer), SNG (Single-precision floating-point), DBL (Double-precision floating-point), EXT (Extended-precision floating-point), CUR (Currency), CUX (Extended-currency), STR (String), BYT (Byte), WRD (Word), and DWD (Double-word). |
| <i>letter_range</i> | is either a single alphabetic character (A through Z, case insignificant), or a range of letters (two letters separated by a hyphen, for example, A-M). |
| DEFtype | Tells the compiler that variables and user-defined functions , whose names begin with the specified letter or range of letters, are of the specified type. Normally, when the compiler finds a variable name without a type specifier , a compile-time error is generated. If however, there was a preceding DEFtype statement such as DEFINT A-Z, the variable would default to that type (in this case, an Integer variable). You may use multiple DEFtype statements. If there is overlap between two DEFtype statements, no error is generated; but the definition of the latter DEFtype statement overrides the former where the two overlap. |

The DEFtype statement may not be supported in future editions of PowerBASIC, so we recommend explicit variable declarations, using [DIM](#), [INSTANCE](#), [LOCAL](#), [STATIC](#), [THREADED](#), or [GLOBAL](#).

| | |
|---------------------|--|
| Restrictions | Deftype only applies to implicitly-defined variables. It has no effect on variables that are defined explicitly. If a #DIM ALL statement exists in the application then Deftype statements will have no effect, #DIM ALL requires all variables to be defined explicitly |
| Example | <pre>DEFINT A-E, G, Q, Y-Z DEFCUX B, F, H-P, R-X FUNCTION PBMAIN A = 1 ' A is Integer B = 2 ' B is Extended-currency. [statements] END FUNCTION</pre> |
| See Also | #DIM ALL , DIM , INSTANCE , LOCAL , STATIC , THREADED , GLOBAL |

DEFCUR statement

DEFBYT, DEFCUR, DEFCUX, DEFDBL, DEFDWD, DEFEXT, DEFINT, DEFLNG, DEFQUD, DEFSNG, DEFSTR and DEFWRD statements

| | |
|----------------|--|
| Purpose | Declare the default type for variable identifiers that begin with specified letters. |
| Syntax | <code>DEFtype letter_range [, letter_range] [, ...]</code> |
| Remarks | <i>type</i> represents one of PowerBASIC's variable types: INT (Integer), LNG (Long-integer), QUD (Quad-integer), SNG (Single-precision floating-point), DBL (Double-precision floating-point), EXT (Extended-precision floating-point), CUR (Currency), CUX (Extended- |

| | |
|---------------------|--|
| | currency), STR (String), BYT (Byte), WRD (Word), and DWD (Double-word). |
| <i>letter_range</i> | is either a single alphabetic character (A through Z, case insignificant), or a range of letters (two letters separated by a hyphen, for example, A-M). |
| DEFtype | Tells the compiler that variables and user-defined functions , whose names begin with the specified letter or range of letters, are of the specified type. Normally, when the compiler finds a variable name without a type specifier , a compile-time error is generated. If however, there was a preceding DEFtype statement such as DEFINT A-Z, the variable would default to that type (in this case, an Integer variable). You may use multiple DEFtype statements. If there is overlap between two DEFtype statements, no error is generated; but the definition of the latter DEFtype statement overrides the former where the two overlap. |
| | The DEFtype statement may not be supported in future editions of PowerBASIC, so we recommend explicit variable declarations, using DIM, INSTANCE, LOCAL, STATIC, THREADED, or GLOBAL. |
| Restrictions | Deftype only applies to implicitly-defined variables. It has no effect on variables that are defined explicitly. If a #DIM ALL statement exists in the application then Deftype statements will have no effect, #DIM ALL requires all variables to be defined explicitly |
| Example | <pre>DEFINT A-E, G, Q, Y-Z DEFCUX B, F, H-P, R-X FUNCTION PBMAIN A = 1 ' A is Integer B = 2 ' B is Extended-currency. [statements] END FUNCTION</pre> |
| See Also | #DIM ALL , DIM , INSTANCE , LOCAL , STATIC , THREADED , GLOBAL |

DEFCUX statement

DEFBYT, DEFCUR, DEFCUX, DEFDBL, DEFDWD, DEFEXT, DEFINT, DEFLNG, DEFQUD, DEFSNG, DEFSTR and DEFWRD statements

| | |
|---------------------|--|
| Purpose | Declare the default type for variable identifiers that begin with specified letters. |
| Syntax | DEFtype <i>letter_range</i> [, <i>letter_range</i>] [, ...] |
| Remarks | <i>type</i> represents one of PowerBASIC's variable types: INT (Integer), LNG (Long-integer), QUD (Quad-integer), SNG (Single-precision floating-point), DBL (Double-precision floating-point), EXT (Extended-precision floating-point), CUR (Currency), CUX (Extended-currency), STR (String), BYT (Byte), WRD (Word), and DWD (Double-word). |
| <i>letter_range</i> | is either a single alphabetic character (A through Z, case insignificant), or a range of letters (two letters separated by a hyphen, for example, A-M). |
| DEFtype | Tells the compiler that variables and user-defined functions , whose names begin with the specified letter or range of letters, are of the specified type. Normally, when the compiler finds a variable name without a type specifier , a compile-time error is generated. If however, there was a preceding DEFtype statement such as DEFINT A-Z, the variable would default to that type (in this case, an Integer variable). You may use multiple DEFtype statements. If there is overlap between two DEFtype statements, no error is generated; but the definition of the latter DEFtype statement |

overrides the former where the two overlap.

The DEFtype statement may not be supported in future editions of PowerBASIC, so we recommend explicit variable declarations, using [DIM](#), [INSTANCE](#), [LOCAL](#), [STATIC](#), [THREADED](#), or [GLOBAL](#).

Restrictions Deftype only applies to implicitly-defined variables. It has no effect on variables that are defined explicitly. If a [#DIM ALL](#) statement exists in the application then Deftype statements will have no effect, #DIM ALL requires all variables to be defined explicitly

Example

```
DEFINT A-E, G, Q, Y-Z
DEFCUX B, F, H-P, R-X
FUNCTION PBMAIN
  A = 1 ' A is Integer
  B = 2 ' B is Extended-currency.
  [statements]
END FUNCTION
```

See Also [#DIM ALL](#), [DIM](#), [INSTANCE](#), [LOCAL](#), [STATIC](#), [THREADED](#), [GLOBAL](#)

DEFDBL statement

DEFBYT, DEFCUR, DEFCUX, DEFDBL, DEFDWD, DEFEXT, DEFINT, DEFLNG, DEFQUD, DEFSNG, DEFSTR and DEFWRD statements

Purpose Declare the default type for [variable](#) identifiers that begin with specified letters.

Syntax DEFtype *letter_range* [, *letter_range*] [, ...]

Remarks *type* represents one of PowerBASIC's variable types: INT ([Integer](#)), LNG ([Long-integer](#)), QUD ([Quad-integer](#)), SNG ([Single-precision floating-point](#)), DBL ([Double-precision floating-point](#)), EXT ([Extended-precision floating-point](#)), CUR ([Currency](#)), CUX ([Extended-currency](#)), STR ([String](#)), BYT ([Byte](#)), WRD ([Word](#)), and DWD ([Double-word](#)).

letter_range is either a single alphabetic character (A through Z, case insignificant), or a range of letters (two letters separated by a hyphen, for example, A-M).

DEFtype Tells the compiler that variables and user-defined [functions](#), whose names begin with the specified letter or range of letters, are of the specified type.

Normally, when the compiler finds a variable name without a [type specifier](#), a [compile-time error](#) is generated. If however, there was a preceding DEFtype statement such as DEFINT A-Z, the variable would default to that type (in this case, an Integer variable).

You may use multiple DEFtype statements. If there is overlap between two DEFtype statements, no error is generated; but the definition of the latter DEFtype statement overrides the former where the two overlap.

The DEFtype statement may not be supported in future editions of PowerBASIC, so we recommend explicit variable declarations, using [DIM](#), [INSTANCE](#), [LOCAL](#), [STATIC](#), [THREADED](#), or [GLOBAL](#).

Restrictions Deftype only applies to implicitly-defined variables. It has no effect on variables that are defined explicitly. If a [#DIM ALL](#) statement exists in the application then Deftype statements will have no effect, #DIM ALL requires all variables to be defined explicitly

Example

```
DEFINT A-E, G, Q, Y-Z
DEFCUX B, F, H-P, R-X
FUNCTION PBMAIN
  A = 1 ' A is Integer
```

```

    B = 2 ' B is Extended-currency.
    [statements]
END FUNCTION

```

See Also [#DIM ALL](#), [DIM](#), [INSTANCE](#), [LOCAL](#), [STATIC](#), [THREADED](#), [GLOBAL](#)

DEFDWD statement

DEFBYT, DEFCUR, DEFCUX, DEFDBL, DEFDWD, DEFEXT, DEFINT, DEFLNG, DEFQUD, DEFSNG, DEFSTR and DEFWRD statements

Purpose Declare the default type for [variable](#) identifiers that begin with specified letters.

Syntax `DEFtype letter_range [, letter_range] [, ...]`

Remarks *type* represents one of PowerBASIC's variable types: INT ([Integer](#)), LNG ([Long-integer](#)), QUD ([Quad-integer](#)), SNG ([Single-precision floating-point](#)), DBL ([Double-precision floating-point](#)), EXT ([Extended-precision floating-point](#)), CUR ([Currency](#)), CUX ([Extended-currency](#)), STR ([String](#)), BYT ([Byte](#)), WRD ([Word](#)), and DWD ([Double-word](#)).

letter_range is either a single alphabetic character (A through Z, case insignificant), or a range of letters (two letters separated by a hyphen, for example, A-M).

DEFtype Tells the compiler that variables and user-defined [functions](#), whose names begin with the specified letter or range of letters, are of the specified type.

Normally, when the compiler finds a variable name without a [type specifier](#), a [compile-time error](#) is generated. If however, there was a preceding DEF*type* statement such as DEFINT A-Z, the variable would default to that type (in this case, an Integer variable).

You may use multiple DEF*type* statements. If there is overlap between two DEF*type* statements, no error is generated; but the definition of the latter DEF*type* statement overrides the former where the two overlap.

The DEF*type* statement may not be supported in future editions of PowerBASIC, so we recommend explicit variable declarations, using [DIM](#), [INSTANCE](#), [LOCAL](#), [STATIC](#), [THREADED](#), or [GLOBAL](#).

Restrictions Def*type* only applies to implicitly-defined variables. It has no effect on variables that are defined explicitly. If a [#DIM ALL](#) statement exists in the application then Def*type* statements will have no effect, #DIM ALL requires all variables to be defined explicitly

Example

```

DEFINT A-E, G, Q, Y-Z
DEFCUX B, F, H-P, R-X
FUNCTION PBMAIN
    A = 1 ' A is Integer
    B = 2 ' B is Extended-currency.
    [statements]
END FUNCTION

```

See Also [#DIM ALL](#), [DIM](#), [INSTANCE](#), [LOCAL](#), [STATIC](#), [THREADED](#), [GLOBAL](#)

DEFEXT statement

DEFBYT, DEFCUR, DEFCUX, DEFDBL, DEFDWD, DEFEXT, DEFINT, DEFLNG,

DEFQUD, DEFSNG, DEFSTR and DEFWRD statements

| | |
|---------------------|--|
| Purpose | Declare the default type for variable identifiers that begin with specified letters. |
| Syntax | <code>DEFtype letter_range [, letter_range] [, ...]</code> |
| Remarks | <i>type</i> represents one of PowerBASIC's variable types: INT (Integer), LNG (Long-integer), QUD (Quad-integer), SNG (Single-precision floating-point), DBL (Double-precision floating-point), EXT (Extended-precision floating-point), CUR (Currency), CUX (Extended-currency), STR (String), BYT (Byte), WRD (Word), and DWD (Double-word). |
| <i>letter_range</i> | is either a single alphabetic character (A through Z, case insignificant), or a range of letters (two letters separated by a hyphen, for example, A-M). |
| DEFtype | Tells the compiler that variables and user-defined functions , whose names begin with the specified letter or range of letters, are of the specified type. Normally, when the compiler finds a variable name without a type specifier , a compile-time error is generated. If however, there was a preceding DEF <i>type</i> statement such as DEFINT A-Z, the variable would default to that type (in this case, an Integer variable). You may use multiple DEF <i>type</i> statements. If there is overlap between two DEF <i>type</i> statements, no error is generated; but the definition of the latter DEF <i>type</i> statement overrides the former where the two overlap. |

The DEF*type* statement may not be supported in future editions of PowerBASIC, so we recommend explicit variable declarations, using [DIM](#), [INSTANCE](#), [LOCAL](#), [STATIC](#), [THREADED](#), or [GLOBAL](#).

| | |
|---------------------|--|
| Restrictions | Def <i>type</i> only applies to implicitly-defined variables. It has no effect on variables that are defined explicitly. If a #DIM ALL statement exists in the application then Def <i>type</i> statements will have no effect, #DIM ALL requires all variables to be defined explicitly |
| Example | <pre>DEFINT A-E, G, Q, Y-Z DEFCUX B, F, H-P, R-X FUNCTION PBMAIN A = 1 ' A is Integer B = 2 ' B is Extended-currency. [statements] END FUNCTION</pre> |
| See Also | #DIM ALL , DIM , INSTANCE , LOCAL , STATIC , THREADED , GLOBAL |

DEFINT statement

DEFBYT, DEFCUR, DEFCUX, DEFDBL, DEFDWD, DEFEXT, DEFINT, DEFLNG, DEFQUD, DEFSNG, DEFSTR and DEFWRD statements

| | |
|---------------------|--|
| Purpose | Declare the default type for variable identifiers that begin with specified letters. |
| Syntax | <code>DEFtype letter_range [, letter_range] [, ...]</code> |
| Remarks | <i>type</i> represents one of PowerBASIC's variable types: INT (Integer), LNG (Long-integer), QUD (Quad-integer), SNG (Single-precision floating-point), DBL (Double-precision floating-point), EXT (Extended-precision floating-point), CUR (Currency), CUX (Extended-currency), STR (String), BYT (Byte), WRD (Word), and DWD (Double-word). |
| <i>letter_range</i> | is either a single alphabetic character (A through Z, case insignificant), or a range of |

letters (two letters separated by a hyphen, for example, A-M).

DEFtype

Tells the compiler that variables and user-defined [functions](#), whose names begin with the specified letter or range of letters, are of the specified type.

Normally, when the compiler finds a variable name without a [type specifier](#), a [compile-time error](#) is generated. If however, there was a preceding DEFtype statement such as DEFINT A-Z, the variable would default to that type (in this case, an Integer variable).

You may use multiple DEFtype statements. If there is overlap between two DEFtype statements, no error is generated; but the definition of the latter DEFtype statement overrides the former where the two overlap.

The DEFtype statement may not be supported in future editions of PowerBASIC, so we recommend explicit variable declarations, using [DIM](#), [INSTANCE](#), [LOCAL](#), [STATIC](#), [THREADED](#), or [GLOBAL](#).

Restrictions

Deftype only applies to implicitly-defined variables. It has no effect on variables that are defined explicitly. If a [#DIM ALL](#) statement exists in the application then Deftype statements will have no effect, #DIM ALL requires all variables to be defined explicitly

Example

```
DEFINT A-E, G, Q, Y-Z
DEFCUX B, F, H-P, R-X
FUNCTION PBMAIN
  A = 1 ' A is Integer
  B = 2 ' B is Extended-currency.
  [statements]
END FUNCTION
```

See Also

[#DIM ALL](#), [DIM](#), [INSTANCE](#), [LOCAL](#), [STATIC](#), [THREADED](#), [GLOBAL](#)

DEFLNG statement

DEFBYT, DEFCUR, DEFCUX, DEFDBL, DEFDWD, DEFEXT, DEFINT, DEFLNG, DEFQUD, DEFSNG, DEFSTR and DEFWRD statements

Purpose

Declare the default type for [variable](#) identifiers that begin with specified letters.

Syntax

```
DEFtype letter_range [, letter_range] [, ...]
```

Remarks

type represents one of PowerBASIC's variable types: INT ([Integer](#)), LNG ([Long-integer](#)), QUD ([Quad-integer](#)), SNG ([Single-precision floating-point](#)), DBL ([Double-precision floating-point](#)), EXT ([Extended-precision floating-point](#)), CUR ([Currency](#)), CUX ([Extended-currency](#)), STR ([String](#)), BYT ([Byte](#)), WRD ([Word](#)), and DWD ([Double-word](#)).

letter_range

is either a single alphabetic character (A through Z, case insignificant), or a range of letters (two letters separated by a hyphen, for example, A-M).

DEFtype

Tells the compiler that variables and user-defined [functions](#), whose names begin with the specified letter or range of letters, are of the specified type.

Normally, when the compiler finds a variable name without a [type specifier](#), a [compile-time error](#) is generated. If however, there was a preceding DEFtype statement such as DEFINT A-Z, the variable would default to that type (in this case, an Integer variable).

You may use multiple DEFtype statements. If there is overlap between two DEFtype statements, no error is generated; but the definition of the latter DEFtype statement overrides the former where the two overlap.

The DEFtype statement may not be supported in future editions of PowerBASIC,

so we recommend explicit variable declarations, using [DIM](#), [INSTANCE](#), [LOCAL](#), [STATIC](#), [THREADED](#), or [GLOBAL](#).

Restrictions Deftype only applies to implicitly-defined variables. It has no effect on variables that are defined explicitly. If a [#DIM ALL](#) statement exists in the application then Deftype statements will have no effect, [#DIM ALL](#) requires all variables to be defined explicitly

Example

```
DEFINT A-E, G, Q, Y-Z
DEFCUX B, F, H-P, R-X
FUNCTION PBMAIN
  A = 1 ' A is Integer
  B = 2 ' B is Extended-currency.
  [statements]
END FUNCTION
```

See Also [#DIM ALL](#), [DIM](#), [INSTANCE](#), [LOCAL](#), [STATIC](#), [THREADED](#), [GLOBAL](#)

DEFQUD statement

DEFBYT, DEFCUR, DEFCUX, DEFDBL, DEFDWD, DEFEXT, DEFINT, DEFLNG, DEFQUD, DEFSNG, DEFSTR and DEFWRD statements

Purpose Declare the default type for [variable](#) identifiers that begin with specified letters.

Syntax `DEFTYPE letter_range [, letter_range] [, ...]`

Remarks *type* represents one of PowerBASIC's variable types: INT ([Integer](#)), LNG ([Long-integer](#)), QUD ([Quad-integer](#)), SNG ([Single-precision floating-point](#)), DBL ([Double-precision floating-point](#)), EXT ([Extended-precision floating-point](#)), CUR ([Currency](#)), CUX ([Extended-currency](#)), STR ([String](#)), BYT ([Byte](#)), WRD ([Word](#)), and DWD ([Double-word](#)).

letter_range is either a single alphabetic character (A through Z, case insignificant), or a range of letters (two letters separated by a hyphen, for example, A-M).

DEFTYPE Tells the compiler that variables and user-defined [functions](#), whose names begin with the specified letter or range of letters, are of the specified type.

Normally, when the compiler finds a variable name without a [type specifier](#), a [compile-time error](#) is generated. If however, there was a preceding DEF *type* statement such as DEFINT A-Z, the variable would default to that type (in this case, an Integer variable).

You may use multiple DEF *type* statements. If there is overlap between two DEF *type* statements, no error is generated; but the definition of the latter DEF *type* statement overrides the former where the two overlap.

The DEF *type* statement may not be supported in future editions of PowerBASIC, so we recommend explicit variable declarations, using [DIM](#), [INSTANCE](#), [LOCAL](#), [STATIC](#), [THREADED](#), or [GLOBAL](#).

Restrictions Deftype only applies to implicitly-defined variables. It has no effect on variables that are defined explicitly. If a [#DIM ALL](#) statement exists in the application then Deftype statements will have no effect, [#DIM ALL](#) requires all variables to be defined explicitly

Example

```
DEFINT A-E, G, Q, Y-Z
DEFCUX B, F, H-P, R-X
FUNCTION PBMAIN
  A = 1 ' A is Integer
  B = 2 ' B is Extended-currency.
  [statements]
END FUNCTION
```

See Also [#DIM ALL](#), [DIM](#), [INSTANCE](#), [LOCAL](#), [STATIC](#), [THREADED](#), [GLOBAL](#)

DEFSNG statement

DEFBYT, DEFCUR, DEFCUX, DEFDBL, DEFDWD, DEFEXT, DEFINT, DEFLNG, DEFQUD, DEFSNG, DEFSTR and DEFWRD statements

Purpose Declare the default type for [variable](#) identifiers that begin with specified letters.

Syntax `DEFtype letter_range [, letter_range] [, ...]`

Remarks *type* represents one of PowerBASIC's variable types: INT ([Integer](#)), LNG ([Long-integer](#)), QUD ([Quad-integer](#)), SNG ([Single-precision floating-point](#)), DBL ([Double-precision floating-point](#)), EXT ([Extended-precision floating-point](#)), CUR ([Currency](#)), CUX ([Extended-currency](#)), STR ([String](#)), BYT ([Byte](#)), WRD ([Word](#)), and DWD ([Double-word](#)).

letter_range is either a single alphabetic character (A through Z, case insignificant), or a range of letters (two letters separated by a hyphen, for example, A-M).

DEFtype Tells the compiler that variables and user-defined [functions](#), whose names begin with the specified letter or range of letters, are of the specified type.

Normally, when the compiler finds a variable name without a [type specifier](#), a [compile-time error](#) is generated. If however, there was a preceding DEF*type* statement such as DEFINT A-Z, the variable would default to that type (in this case, an Integer variable).

You may use multiple DEF*type* statements. If there is overlap between two DEF*type* statements, no error is generated; but the definition of the latter DEF*type* statement overrides the former where the two overlap.

The DEF*type* statement may not be supported in future editions of PowerBASIC, so we recommend explicit variable declarations, using [DIM](#), [INSTANCE](#), [LOCAL](#), [STATIC](#), [THREADED](#), or [GLOBAL](#).

Restrictions Def*type* only applies to implicitly-defined variables. It has no effect on variables that are defined explicitly. If a [#DIM ALL](#) statement exists in the application then Def*type* statements will have no effect, #DIM ALL requires all variables to be defined explicitly

Example

```
DEFINT A-E, G, Q, Y-Z
DEFCUX B, F, H-P, R-X
FUNCTION PBMAIN
  A = 1 ' A is Integer
  B = 2 ' B is Extended-currency.
  [statements]
END FUNCTION
```

See Also [#DIM ALL](#), [DIM](#), [INSTANCE](#), [LOCAL](#), [STATIC](#), [THREADED](#), [GLOBAL](#)

DEFSTR statement

DEFBYT, DEFCUR, DEFCUX, DEFDBL, DEFDWD, DEFEXT, DEFINT, DEFLNG, DEFQUD, DEFSNG, DEFSTR and DEFWRD

statements

| | |
|---------------------|--|
| Purpose | Declare the default type for variable identifiers that begin with specified letters. |
| Syntax | <code>DEFtype letter_range [, letter_range] [, ...]</code> |
| Remarks | <i>type</i> represents one of PowerBASIC's variable types: INT (Integer), LNG (Long-integer), QUD (Quad-integer), SNG (Single-precision floating-point), DBL (Double-precision floating-point), EXT (Extended-precision floating-point), CUR (Currency), CUX (Extended-currency), STR (String), BYT (Byte), WRD (Word), and DWD (Double-word). |
| <i>letter_range</i> | is either a single alphabetic character (A through Z, case insignificant), or a range of letters (two letters separated by a hyphen, for example, A-M). |
| DEFtype | Tells the compiler that variables and user-defined functions , whose names begin with the specified letter or range of letters, are of the specified type. Normally, when the compiler finds a variable name without a type specifier , a compile-time error is generated. If however, there was a preceding DEFtype statement such as DEFINT A-Z, the variable would default to that type (in this case, an Integer variable). You may use multiple DEFtype statements. If there is overlap between two DEFtype statements, no error is generated; but the definition of the latter DEFtype statement overrides the former where the two overlap. |
| | The DEFtype statement may not be supported in future editions of PowerBASIC, so we recommend explicit variable declarations, using DIM, INSTANCE, LOCAL, STATIC, THREADED, or GLOBAL. |
| Restrictions | Deftype only applies to implicitly-defined variables. It has no effect on variables that are defined explicitly. If a #DIM ALL statement exists in the application then Deftype statements will have no effect, #DIM ALL requires all variables to be defined explicitly |
| Example | <pre>DEFINT A-E, G, Q, Y-Z DEFCUX B, F, H-P, R-X FUNCTION PBMAIN A = 1 ' A is Integer B = 2 ' B is Extended-currency. [statements] END FUNCTION</pre> |
| See Also | #DIM ALL , DIM , INSTANCE , LOCAL , STATIC , THREADED , GLOBAL |

DEFWRD statement

DEFBYT, DEFCUR, DEFCUX, DEFDBL, DEFDWD, DEFEXT, DEFINT, DEFLNG, DEFQUD, DEFSNG, DEFSTR and DEFWRD statements

| | |
|---------------------|--|
| Purpose | Declare the default type for variable identifiers that begin with specified letters. |
| Syntax | <code>DEFtype letter_range [, letter_range] [, ...]</code> |
| Remarks | <i>type</i> represents one of PowerBASIC's variable types: INT (Integer), LNG (Long-integer), QUD (Quad-integer), SNG (Single-precision floating-point), DBL (Double-precision floating-point), EXT (Extended-precision floating-point), CUR (Currency), CUX (Extended-currency), STR (String), BYT (Byte), WRD (Word), and DWD (Double-word). |
| <i>letter_range</i> | is either a single alphabetic character (A through Z, case insignificant), or a range of letters (two letters separated by a hyphen, for example, A-M). |

DEFtype Tells the compiler that variables and user-defined [functions](#), whose names begin with the specified letter or range of letters, are of the specified type.

Normally, when the compiler finds a variable name without a [type specifier](#), a [compile-time error](#) is generated. If however, there was a preceding DEFtype statement such as DEFINT A-Z, the variable would default to that type (in this case, an Integer variable).

You may use multiple DEFtype statements. If there is overlap between two DEFtype statements, no error is generated; but the definition of the latter DEFtype statement overrides the former where the two overlap.

The DEFtype statement may not be supported in future editions of PowerBASIC, so we recommend explicit variable declarations, using [DIM](#), [INSTANCE](#), [LOCAL](#), [STATIC](#), [THREADED](#), or [GLOBAL](#).

Restrictions Deftype only applies to implicitly-defined variables. It has no effect on variables that are defined explicitly. If a [#DIM ALL](#) statement exists in the application then Deftype statements will have no effect, #DIM ALL requires all variables to be defined explicitly

Example

```
DEFINT A-E, G, Q, Y-Z
DEFCUX B, F, H-P, R-X
FUNCTION PBMAIN
  A = 1 ' A is Integer
  B = 2 ' B is Extended-currency.
  [statements]
END FUNCTION
```

See Also [#DIM ALL](#), [DIM](#), [INSTANCE](#), [LOCAL](#), [STATIC](#), [THREADED](#), [GLOBAL](#)

DESKTOP GET CLIENT statement

DESKTOP GET CLIENT statement

Purpose Retrieve the size of the client area of the desktop, in [pixels](#).

Syntax `DESKTOP GET CLIENT TO ncWidth&, ncHeight&`

Remarks The desktop client size is the part of the screen that is not obscured by the system tray.

This can be used in combination with [DESKTOP GET LOC](#) or [DESKTOP GET SIZE](#) for exact positioning of windows on the desktop.

See also [Dynamic Dialog Tools](#), [DESKTOP GET LOC](#), [DESKTOP GET SIZE](#)

DESKTOP GET LOC statement

DESKTOP GET LOC statement

Purpose Retrieve the location of the top, left corner of the client area of the desktop, in [pixels](#).

Syntax `DESKTOP GET LOC TO x&, y&`

Remarks The desktop client area is the part of the screen that is not obscured by the system tray. The system tray's position on the screen determines the upper, left position of the client area. If the tray is located at the bottom of the screen (default), left and top coordinates are 0,0. If the tray is located on the right side of the screen, left and top coordinates are 0,0. If the tray is located on the left side of the screen, left and top coordinates are TrayWidth,0. If the tray is located at the top of the screen, left and top coordinates are 0,TrayHeight.

This can be used in combination with [DESKTOP GET CLIENT](#) or [DESKTOP GET SIZE](#) for exact positioning of windows on the desktop.

See also [DESKTOP.GET.CLIENT](#), [DESKTOP.GET.SIZE](#)

DESKTOP.GET.SIZE statement

DESKTOP.GET.SIZE statement

Purpose Retrieve the size of the entire desktop, in [pixels](#).

Syntax `DESKTOP.GET.SIZE TO ncWidth&, ncHeight&`

Remarks The desktop size includes the space taken up by the system tray and is same as the screen size. This can be used in combination with [DESKTOP.GET.CLIENT](#) or [DESKTOP.GET.LOC](#) for exact positioning of windows on the desktop.

See also [DESKTOP.GET.CLIENT](#), [DESKTOP.GET.LOC](#)

DIALOG.DEFAULT.FONT statement

DIALOG.DEFAULT.FONT statement IMPROVED

Purpose Specify the default [DDI](#) font information.

Syntax `DIALOG.DEFAULT.FONT fontname$ [,points&, style&, charset&]`
Legacy syntax:
`DIALOG.FONT [DEFAULT] fontname$ [,points&, style&, charset&]`

fontname\$ Name of the font.

points& Size of the font, in points.

style& Font style attribute.

| | |
|---|--------|
| 0 | Normal |
| 2 | Italic |

charset& CharSet identifier.

| | | | |
|-----|------------------|-----|---------------------|
| 0 | ANSI CharSet | 162 | Turkish CharSet |
| 1 | Default CharSet | 177 | Hebrew CharSet |
| 2 | Symbol CharSet | 178 | Arabic CharSet |
| 77 | Mac CharSet | 186 | Baltic CharSet |
| 128 | Shiftjis CharSet | 204 | Russian CharSet |
| 129 | Hangeul CharSet | 222 | Thai CharSet |
| 130 | Johab CharSet | 238 | East Europe CharSet |
| 136 | Chinese CharSet | 255 | OEM CharSet |
| 161 | Greek CharSet | | |

Remarks The DIALOG.DEFAULT.FONT statement specifies the font which will be used for all subsequent dialogs created with [DIALOG.NEW](#), until another DIALOG.DEFAULT.FONT statement is executed. When a DIALOG.NEW statement is executed, the selected default font is associated with it, and its `fontname$`, for the lifetime of the dialog.

The default font is particularly important when creating new dialogs which use dialog units (rather than pixels) as the unit of measurement. When sizing in dialog units, Windows calculates the physical size of the window based upon the font size, among other factors. Changing the font size later will not update the window size.

You may use the value zero (0) for any of the numeric parameters to designate that the compiler should use the default for that item. If parameter(s) are missing, the compiler substitutes the default value for all remaining parameters. If no DIALOG.DEFAULT.FONT statement is executed, PowerBASIC will select MS Sans Serif, 8 point, with no style

attributes.

When specifying a font, care should be exercised to use a standard font that is available in all versions of Windows, such as "Times New Roman", "Arial", "Courier", "MS Sans Serif", etc. Specifying a font name that is not available forces Windows to substitute a font that may not be visually appealing, and may also alter the relative size of the dialog.

DIALOG DEFAULT FONT is module-specific. That is, it only affects subsequent dialogs created by code in the same EXE or [DLL](#). For example, a DIALOG DEFAULT FONT statement in a DLL, will not affect dialogs created in the calling EXE or other DLLs loaded by the EXE.

See also [CONTROL SET FONT](#), [Dynamic Dialog Tools](#), [DIALOG NEW](#), [DIALOG SET COLOR](#), [FONT END](#), [FONT NEW](#), [GRAPHIC SET FONT](#), [XPRINT SET FONT](#)

DIALOG DISABLE statement

DIALOG DISABLE statement

Purpose Disable a dialog so that it no longer receives any mouse or keyboard [messages](#).

Syntax `DIALOG DISABLE hDlg`

Remarks *hDlg* refers to the dialog you want to disable. A disabled dialog will not receive any messages when it is clicked with the mouse or selected with the keyboard. Disabling a dialog that is already disabled has no effect.

If the dialog has a [Callback](#) Function, a %WM_ENABLE message is sent to the Callback Function before DIALOG DISABLE finishes.

See also [Dynamic Dialog Tools](#), [DIALOG ENABLE](#), [DIALOG HIDE](#), [DIALOG NORMALIZE](#), [DIALOG SHOW MODAL](#), [DIALOG SHOW MODELESS](#), [DIALOG SHOW STATE](#)

DIALOG DOEVENTS statement

DIALOG DOEVENTS statement

Purpose Process pending window or dialog [messages](#) for [MODELESS](#) dialogs. If there are no pending messages, DIALOG DOEVENTS pauses execution of the current thread for a length of time specified by the programmer.

Syntax `DIALOG DOEVENTS [sleep&] [TO count&]`

Remarks DIALOG DOEVENTS is usually used to create a "[message pump](#)" for modeless dialog boxes.

If a window message is pending, it is processed appropriately. If no messages are pending, execution of the current

is paused for the time specified by the *sleep&* parameter. If *sleep&* is zero (0), the remainder of the current time slice is relinquished to other threads or processes. If *sleep&* is greater than zero, the current thread is paused for that number of milliseconds to allow other threads or processes to continue. If *sleep&* is not specified, it defaults to a value of one (1). During the [sleep](#) period, all time-slices for the current thread are given to other threads and processes. If there are no other threads of equal priority, execution continues immediately. The time-slice duration (also known as the Quantum) can vary from version to version of Windows, ranging from 20 mSec to 120 mSec. If the optional TO clause is included, the number of active dialogs is returned in the *count&* variable, once all of the pending messages have been processed.

Restrictions The DIALOG DOEVENTS loop must run for the duration of the modeless dialog(s), or they will not respond or be redrawn correctly.

See also [Dynamic Dialog Tools](#), [DIALOG NEW](#), [DIALOG SHOW MODELESS](#), [SLEEP](#)

Example

```
' Single modeless dialog message pump example.
' (Assume dialog already created with DIALOG NEW)
DIALOG SHOW MODELESS hDlg CALL DlgCallback
DO
    DIALOG DOEVENTS 0 TO Count&
LOOP WHILE Count&
' Application code continues here...
```

```
' Multiple modeless dialog message pump example.
' In some applications, the number of modeless dialogs can vary at any
given moment,
' we want to break the message loop when the 'main' dialog is closed.
' (Assume dialogs already created with DIALOG NEW)
DIALOG SHOW MODELESS hMainDlg& CALL DlgCallback
DIALOG SHOW MODELESS hChildDlg1&
DIALOG SHOW MODELESS hChildDlg2&
[statements]
DO
    DIALOG DOEVENTS
LOOP WHILE ISWIN(hMainDlg&)
' Application code continues here...
```

DIALOG ENABLE statement

DIALOG ENABLE statement

Purpose Enable a dialog so that it can receive [messages](#) when the user interacts with it via the mouse or keyboard.

Syntax `DIALOG ENABLE hDlg`

Remarks *hDlg* refers to the dialog you want to enable. An enabled dialog will receive messages when it is clicked with the mouse or selected with the keyboard. Enabling a dialog has no effect if the dialog is already enabled.

If the dialog has a [Callback](#) Function, a %WM_ENABLE message is sent to the Callback Function before DIALOG ENABLE finishes.

See also [Dynamic Dialog Tools](#), [DIALOG DISABLE](#), [DIALOG HIDE](#), [DIALOG NORMALIZE](#), [DIALOG SHOW MODAL](#), [DIALOG SHOW MODELESS](#), [DIALOG SHOW STATE](#)

DIALOG END statement

DIALOG END statement

Purpose Close and destroy the specified dialog.

Syntax `DIALOG END hDlg [, lResult&]`

Remarks The dialog specified by the *hDlg* [variable](#) is destroyed.

lResult& optionally specifies a value to return to the [DIALOG SHOW MODAL](#) or [DIALOG SHOW MODELESS](#) statement that activated the dialog initially.

Restrictions DIALOG END cannot close or destroy a dialog in a separate thread. In this case, [send](#) or [post](#) a message to the dialog to signal it to close, and respond to the message in the

[callback](#) for the specified dialog. For example:

```
' Trigger a DIALOG END in a separate thread
DIALOG SEND hDlg, %WM_SYSCOMMAND, %SC_CLOSE, 0
```

DIALOG END cannot be used during processing of the %WM_INITDIALOG message. If this effect is necessary, the solution is to post a user-defined message to the dialog and use DIALOG END at that point. For example:

```
CALLBACK FUNCTION MyDialogCallback
  SELECT CASE CB.MSG
    CASE %WM_INITDIALOG
      IF gMustEnd& THEN _ ' We have to stop!
        DIALOG POST CB.HNDL, %WM_USER+999&, 0, 0

    CASE %WM_USER + 999&
      DIALOG END CB.HNDL
      FUNCTION = 1
  END SELECT
END FUNCTION
```

See also [Dynamic Dialog Tools](#), [DIALOG NEW](#), [DIALOG SHOW MODELESS](#), [THREAD CREATE](#)

DIALOG GET CLIENT statement

DIALOG GET CLIENT statement

Purpose Return the [client size](#) of the specified [dialog](#).

Syntax DIALOG GET CLIENT *hDlg* TO *nWide&*, *nHigh&*

Remarks *hDlg* refers to the dialog to examine. The size of the dialog client area is placed in the *nWide&* (width) and *nHigh&* (height) [variables](#). The size is specified in the same terms ([pixels](#) or [dialog units](#)) as the [parent](#) dialog.

See also [Dynamic Dialog Tools](#), [CONTROL GET CLIENT](#), [DIALOG GET LOC](#), [DIALOG GET SIZE](#), [DIALOG PIXELS](#), [DIALOG SET CLIENT](#), [DIALOG SET LOC](#), [DIALOG SET SIZE](#), [DIALOG UNITS](#)

DIALOG GET LOC statement

DIALOG GET LOC statement

Purpose Return the location of the specified [dialog](#).

Syntax DIALOG GET LOC *hDlg* TO *x&*, *y&*

Remarks *hDlg* refers to the dialog to examine. The location of the dialog is placed in the *x&* (horizontal position) and *y&* (vertical position) [variables](#) as a relative location. If the dialog was created with the PIXELS option in the [DIALOG NEW](#) statement, the values are returned in [pixel](#) units. If the UNITS option was used (or no scaling option was specified), the values are returned in [dialog units](#).

If the [parent](#) of the dialog is zero (or %HWND_DESKTOP), the location is relative to the upper-left corner of the display. Otherwise, it is relative to the upper-left corner of [client area](#) of the parent window.

See also [Dynamic Dialog Tools](#), [DIALOG GET CLIENT](#), [DIALOG GET SIZE](#), [DIALOG PIXELS](#), [DIALOG SET LOC](#), [DIALOG SET SIZE](#), [DIALOG UNITS](#)

DIALOG GET SIZE statement

DIALOG GET SIZE statement

| | |
|-----------------|--|
| Purpose | Return the size of the specified dialog . |
| Syntax | <code>DIALOG GET SIZE <i>hDlg</i> TO <i>x&</i>, <i>y&</i></code> |
| Remarks | <i>hDlg</i> refers to the dialog to examine. The total size of the dialog is placed in the <i>x&</i> (width) and <i>y&</i> (height) variables . If the dialog was created with the PIXELS option in the DIALOG NEW statement, the values are returned in pixel units. If the UNITS option was used (or no scaling option was specified), the values are returned in dialog units . |
| See also | Dynamic Dialog Tools , DIALOG GET CLIENT , DIALOG GET LOC , DIALOG PIXELS , DIALOG SET LOC , DIALOG SET SIZE , DIALOG UNITS |

DIALOG GET TEXT statement

DIALOG GET TEXT statement

| | |
|---------------------|--|
| Purpose | Retrieve the text in a dialog or window caption . |
| Syntax | <code>DIALOG GET TEXT <i>hDlg</i> TO <i>titletext\$</i></code> |
| Remarks | The text of the dialog or window caption specified by <i>hDlg</i> . For DDT dialogs, <i>hDlg</i> is the dialog handle returned by the DIALOG NEW statement. In a dialog Callback Function, the CB.HNDL function will return the parent dialog handle and this can also be used with DIALOG GET TEXT. |
| titletext\$ | The text is returned and placed into the variable <i>titletext\$</i> . If the window or dialog is invalid, <i>titletext\$</i> will be set to an empty string. |
| Restrictions | <i>hDlg</i> is a dialog or window handle, so DIALOG GET TEXT works with both DDT dialogs and conventional windows and dialogs. |
| See also | CB Callback functions , CONTROL GET TEXT , CONTROL SET TEXT , DIALOG NEW , DIALOG SET TEXT |
| Example | <code>DIALOG GET TEXT hDlg1& TO a\$</code> |
| Result | Variable <i>a\$</i> contains the caption text of the dialog referenced by <i>hDlg</i> |

DIALOG GET USER statement

DIALOG GET USER statement

| | |
|---------------------|---|
| Purpose | Retrieve a value from the user data area of a DDT dialog. |
| Syntax | <code>DIALOG GET USER <i>hDlg</i>, <i>index&</i> TO <i>retvar&</i></code> |
| Remarks | Each DDT dialog has a user data area consisting of eight Long-integer values which may be used at the programmer's discretion to save relevant data. DIALOG GET USER allows one of the values to be retrieved, based upon the index parameter value (1 through 8). <i>hDlg</i> refers to the dialog that contains the user data. <i>index&</i> is the index number of the user data value to retrieve, in the range 1 to 8 inclusive. <i>retvar&</i> receives the Long-integer data value stored in the nominated user data index. |
| Restrictions | Data in the user data area is lost when the dialog is destroyed. The data area is completely separate from the %GWL_USERDATA area maintained by Windows. |

See also [Dynamic Dialog Tools](#), [COMBOBOX SET USER](#), [CONTROL GET USER](#), [CONTROL SET USER](#), [DIALOG SET USER](#), [LISTBOX GET USER](#), [LISTBOX SET USER](#), [LISTVIEW GET USER](#), [LISTVIEW SET USER](#), [TREEVIEW GET USER](#), [TREEVIEW SET USER](#)

DIALOG HIDE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

DIALOG HIDE statement New!

Purpose Make a [Dialog](#) invisible.

Syntax `DIALOG HIDE hDlg`

Remarks The Dialog identified by the handle [hDlg](#) is made invisible.

See also [CONTROL_HIDE](#), [CONTROL_NORMALIZE](#), [DIALOG_MAXIMIZE](#), [DIALOG_MINIMIZE](#), [DIALOG_NORMALIZE](#)

DIALOG MAXIMIZE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

DIALOG MAXIMIZE statement

Purpose Maximize a [Dialog](#).

Syntax `DIALOG MAXIMIZE hDlg`

Remarks The Dialog identified by the handle [hDlg](#) is maximized. You can restore the Dialog to its normal state with [DIALOG_NORMALIZE](#).

See also [CONTROL_HIDE](#), [CONTROL_NORMALIZE](#), [CONTROL_SET_SIZE](#), [DIALOG_MINIMIZE](#), [DIALOG_NORMALIZE](#), [DIALOG_SET_SIZE](#)

DIALOG MINIMIZE statement

DIALOG MINIMIZE statement

| | |
|-----------------|--|
| Purpose | Minimize a Dialog . |
| Syntax | <code>DIALOG MINIMIZE <i>hDlg</i></code> |
| Remarks | The Dialog identified by the handle <i>hDlg</i> is minimized. You can restore the Dialog to its normal state with DIALOG NORMALIZE . |
| See also | CONTROL_HIDE , CONTROL_NORMALIZE , CONTROL_SET_SIZE , DIALOG_MAXIMIZE , DIALOG_NORMALIZE , DIALOG_SET_SIZE |

DIALOG NEW statement

DIALOG NEW statement

| | |
|---------------------------------|---|
| Purpose | Create a new dialog in memory, ready for display. |
| Syntax | <code>DIALOG NEW [PIXELS, UNITS,] <i>hParent</i>, <i>title\$</i>, [<i>x&</i>], [<i>y&</i>], <i>xx&</i>, <i>yy&</i> [, [<i>style&</i>] [, [<i>exstyle&</i>]] [,] TO <i>hDlg</i></code> |
| Remarks | <p>A new empty dialog is created, but not yet displayed. Once the dialog has been created and all of the desired controls have been added with</p> <p>statements, the dialog can be displayed with the DIALOG_SHOW_MODELESS, or DIALOG_SHOW_MODAL statements.</p> <p>If a modeless dialog is created, the application must create a DIALOG_DOEVENTS message_pump for the duration of the dialog. Failure to provide a message pump can result in disruptions to the display of the dialog, or the inability of the dialog to respond to messages such as button clicks, etc. Modal dialogs do not require a message pump.</p> <p>To change the displayed state of a dialog (i.e., hidden, minimized, etc) after the dialog has been created, use the DIALOG_SHOW_STATE statement.</p> <p>If a dialog does not have either %WS_CHILD or %WS_POPUP styles, Windows may enforce a minimum dialog width of some 60-70 dialog units.</p> |
| PIXELS | If the PIXELS keyword is specified, all size and position parameters are specified in pixels. In this case, related statements such as DIALOG_GET_LOC will also return values in Pixels. |
| UNITS | If UNITS is specified (or no scaling option is specified), all size and position parameters are specified in Dialog Units. (default) |
| <i>hParent</i> | <p>DIALOG NEW takes the following parameters.</p> <p>Handle of the parent window or dialog. If there is no parent, use zero (0) or %HWND_DESKTOP. If the dialog is MODAL, the parent window/dialog will be disabled while this "child" dialog is running.</p> |
| <i>title\$</i> | The text displayed in the title or caption bar of the dialog. |
| <i>x&</i> , <i>y&</i> | Optional location of the top-left corner for the dialog. The location is specified in the same terms (pixels or dialog units) as specified in the DIALOG NEW statement. If neither <i>x&</i> and <i>y&</i> are specified, the dialog is centered on the screen. |
| <i>xx&</i> , <i>yy&</i> | <p>If %CW_USEDEFAULT (&H08000000) is specified, the default Windows position is used (cascading from the upper-left corner).</p> <p>The width and height of the dialog. The size is specified in the same terms (pixels or dialog units) as specified in the DIALOG NEW statement.</p> <p>If the default dialog style (or any other dialog style that includes the %WS_CAPTION style) is used, the width and height parameters specify the client size only, and this does not include any caption and border dimensions.</p> <p>If the style does not include %WS_CAPTION, the width and height specify the overall dialog size, including the caption and border, if any.</p> <p>Note that %WS_CAPTION is a combination of the %WS_BORDER and %</p> |

WS_DLGFRAME styles. The default dialog style includes %WS_BORDER and %WS_DLGFRAME styles, so it implicitly includes the %WS_CAPTION style.

style&

An optional bitmask describing how the dialog should be displayed. default style of &H084C000D4& is made up %DS_3DLOOK, %DS_SETFONT, %DS_MODALFRAME, %DS_NOFAILCREATE, %WS_BORDER, %WS_CLIPSIBLINGS, %WS_DLGFRAME and %WS_POPUP. used if parameter omitted from statement completely. For example:

```
DIALOG NEW 0, "Dialog Title",,, 100, 200,, TO hDlg
```

Custom style values replace the default values. That is, they are not additional to the default style values - your code must specify all necessary style parameters (with the exception of %DS_NOFAILCREATE, %DS_SETFONT and %DS_3DLOOK, which are automatically added into the *style&* parameter by PowerBASIC).

This also applies to the extended styles parameter - if your code specifies a custom primary style, the default extended style will no longer be in effect either. In this case, an explicit extended style may also need to be added to the DIALOG NEW statement if an explicit primary style is specified.

The primary *style&* value can be a combination of any values below, combined together with the [OR](#) operator to form a bitmask:

%DS_3DLOOK Give the dialog box a non-bold font, and draw three-dimensional borders around controls in the dialog box. The %DS_3DLOOK style is not required by applications marked with [#OPTION VERSION4](#) or [#OPTION VERSION5](#); as Windows automatically applies the 3D appearance. DDT dialogs are always created with this style. (default)

%DS_3DLOOK Give the dialog box a non-bold [font](#), and draw three-dimensional borders around controls in the dialog box. The %DS_3DLOOK style is not required by applications marked with [#OPTION VERSION4](#) or [#OPTION VERSION5](#); as Windows automatically applies the 3D appearance. [DDT](#) dialogs are always created with this style. (default)

%DS_ABSALIGN Indicate that the coordinates of the dialog box are screen coordinates; otherwise, Windows assumes they are client coordinates.

%DS_CENTER Center the dialog box in the working area (the area not obscured by the task bar and system tray). This is the default if *x&* and *y&* are not specified.

%DS_CENTERMOUSE Center the mouse cursor in the dialog box when the dialog is initially created.

%DS_CONTEXTHELP Include a question mark in the title bar of the dialog box. When the user clicks the question mark, the cursor changes to a question mark with a pointer. If the user then clicks a control in the dialog box, the dialog callback receives a %WM_HELP message. This style cannot be used with the %WS_MAXIMIZEBOX and %WS_MINIMIZEBOX styles. Also see %WS_EX_CONTEXTHELP.

%DS_CONTROL Create a dialog that works as a child control of another dialog, smoothing the keyboard focus interface across the two dialogs when the TAB key or control accelerators are used. Typically used for dialogs that form the "pages" for tab controls and property-sheets.

%DS_MODALFRAME Create a dialog box with a modal dialog-box frame that can be combined with a title bar and System menu by specifying the %WS_CAPTION and %WS_SYSMENU styles. (default)

| | |
|--------------------------|---|
| %DS_NOFAILCREATE | The dialog is created regardless of any errors that may occur during the creation phase. DDT dialogs are always created with this style. (default) |
| %DS_SETFONT | The font to be used by a DDT dialog and its controls can be predetermined with the DIALOG DEFAULT FONT statement. If the DIALOG DEFAULT FONT statement is not used, the default font (MS Sans Serif, 8 point) is used. The size of the dialog font proportionately affects the conversion of dialog units values into pixels, so an increase in default font size will automatically create a larger dialog, even through the dialog dimensions have remained constant. As child controls are added to a %DS_SETFONT dialog, they will be sent a %WM_SETFONT message to ensure they also make use of the specified dialog font. DDT dialogs are always created with this style. (default) |
| %DS_SETFOREGROUND | Bring the dialog box to the foreground. Internally, Windows calls the SetForegroundWindow API function for the dialog box. |
| %DS_SYSMODAL | Create a system-modal dialog box. This style causes the dialog box to have the %WS_EX_TOPMOST style, but otherwise has no effect on the dialog box or the behavior of other applications and windows when the dialog box is displayed. |
| %WS_BORDER | Create a dialog that has a thin-line border. |
| %WS_CAPTION | Create a dialog that has a title bar. Includes the %WS_BORDER and %WS_DLGFRAME styles. When this style is used, the <i>xx&</i> and <i>yy&</i> parameters specify the size of the client area of the dialog; otherwise, they specify the outer dimensions of the dialog. (default) |
| %WS_CHILD | Create a child dialog. Cannot be used with the %WS_POPUP style. Typically used with %DS_CONTROL for tab control and property sheet "pages". |
| %WS_CLIPCHILDREN | Exclude the area occupied by child controls when drawing occurs on the dialog background. FRAME and LINE controls on a dialog with this style usually use the extended style %WS_EX_TRANSPARENT so the background of those controls is drawn by the dialog before the controls are drawn. %WS_CLIPCHILDREN is commonly used to reduce redraw flicker when a %WS_THICKFRAME style dialog is being resized. |
| %WS_CLIPSIBLINGS | Child controls are clipped (not overdrawn) by one another when the dialog window is repainted. (default) |
| %WS_DISABLED | Create a dialog that is initially disabled. A disabled dialog cannot receive input from the user. |
| %WS_DLGFRAME | Create a window that has a border of the style typically used with dialog boxes. (default) |
| %WS_HSCROLL | Dialog contains a horizontal scroll bar. |
| %WS_ICONIC | Create a dialog that is initially minimized, the same as the %WS_MINIMIZE style. |

| | |
|-----------------------------|---|
| %WS_MAXIMIZE | Create a dialog that is initially maximized. |
| %WS_MAXIMIZEBOX | Create a dialog that has a Maximize button. Use with the %WS_SYSMENU style. |
| %WS_MINIMIZE | Create a dialog that is initially minimized, the same as the %WS_ICONIC style. |
| %WS_MINIMIZEBOX | Create a dialog that has a Minimize button. Use with the %WS_SYSMENU style. |
| %WS_OVERLAPPED | Create an overlapped window. An overlapped window has a title bar (caption) and a border. Synonym of the obsolete style %WS_TILED . |
| %WS_OVERLAPPEDWINDOW | Combination style producing an overlapping dialog. Comprises %WS_CAPTION , %WS_SYSMENU , %WS_THICKFRAME , %WS_MINIMIZEBOX , %WS_MAXIMIZEBOX , and %WS_OVERLAPPED styles. |
| %WS_POPUP | Create a popup dialog. When used by itself, a flat dialog is created with no caption or borders. Combine with %DS_MODALFRAME to create a 3D border. A popup dialog can overlap another window or dialog. (default) |
| %WS_POPUPWINDOW | Create a popup dialog but with a border and system menu. Comprises %WS_BORDER , %WS_POPUP and %WS_SYSMENU . Combine %WS_POPUPWINDOW with %WS_CAPTION to make the Window menu visible. |
| %WS_SYSMENU | Create a dialog that has a System-menu box in its title bar. Must be used with the %WS_CAPTION style. |
| %WS_THICKFRAME | Create a dialog that has a sizing border. That is, the dialog will be resizable. |
| %WS_VSCROLL | Dialog contains a vertical scroll bar. Also see %WS_EX_LEFTSCROLLBAR . |

exstyle&

An optional extended style bitmask describing how the dialog should be displayed. The default extended dialog style comprises **%WS_EX_LEFT** with **%WS_EX_LTRREADING** and **%WS_EX_RIGHTSCROLLBAR**. The default extended style is used only if there are no explicit primary or extended styles parameters in the **DIALOG NEW** statement.

An explicit extended style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

| | |
|-----------------------------|---|
| %WS_EX_ACCEPTFILES | The dialog accepts drag+drop files. The dialog Callback Function receives a %WM_DROPFILES message when files have been dropped onto the dialog. |
| %WS_EX_APPWINDOW | Force a top-level dialog onto the application taskbar when the window is minimized. |
| %WS_EX_CLIENTEDGE | Dialog has a border with a sunken edge. |
| %WS_EX_CONTEXTHELP | Include a question mark in the title bar of the dialog. When the user clicks the question mark, the cursor changes to a question mark with a pointer. If the user then clicks a child window, the child receives a %WM_HELP message. Also see %DS_CONTEXTHELP . |
| %WS_EX_CONTROLPARENT | The user may navigate among the child dialogs of the window by using the TAB key. See %DS_CONTROL . |
| %WS_EX_LEFT | Dialog has generic "left-aligned" properties. (default) |

| | |
|---|--|
| <code>%WS_EX_LEFTSCROLLBAR</code> | If present, the vertical scroll bar is positioned to the left of the client area. Also see <code>%WS_VSCROLL</code> . |
| <code>%WS_EX_LTRREADING</code> | Display the dialog text using Left to Right reading-order properties. (default) |
| <code>%WS_EX_NOPARENTNOTIFY</code> | Suppress <code>%WM_PARENTNOTIFY</code> messages when dialog is created or destroyed. |
| <code>%WS_EX_OVERLAPPEDWINDOW</code> | Comprised of the <code>%WS_EX_CLIENTEDGE</code> and <code>%WS_EX_WINDOWEDGE</code> styles. |
| <code>%WS_EX_PALETTEWINDOW</code> | Comprised of the <code>%WS_EX_WINDOWEDGE</code> , <code>%WS_EX_TOOLWINDOW</code> and <code>%WS_EX_TOPMOST</code> styles. |
| <code>%WS_EX_RIGHT</code> | Dialog has generic "right-aligned" properties that depend on the window class. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment. Otherwise, the style is ignored. |
| <code>%WS_EX_RIGHTSCROLLBAR</code> | If present, the vertical scroll bar is positioned to the right of the client area. See <code>%WS_VSCROLL</code> . (default) |
| <code>%WS_EX_RTLREADING</code> | If the shell language is Hebrew, Arabic, or another language that supports reading order alignment, the dialog text is displayed using Right to Left reading-order properties. For other languages, the style is ignored. |
| <code>%WS_EX_STATICEDGE</code> | Dialog has a 3D border. Primarily used for dialogs that do not require user-input. |
| <code>%WS_EX_TOOLWINDOW</code> | Create a tool window (a window intended to be used as a floating toolbar). A tool window has a shorter than normal caption area and the dialog caption is drawn using a smaller font. A tool window does not appear in the task bar, or in the window that appears when the user presses ALT+TAB. The hybrid versions of Windows (95/98/ME) may require this extended style to be added after creation, using the <code>SetWindowLong</code> API function. |
| <code>%WS_EX_TOPMOST</code> | Place dialog above all non-topmost windows and keep it above them, even while the dialog is deactivated. |
| <code>%WS_EX_TRANSPARENT</code> | Controls/windows beneath the dialog are drawn before the dialog is drawn. The dialog is deemed transparent because elements behind the dialog have already been painted - the dialog itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information. |
| <code>%WS_EX_WINDOWEDGE</code> | Dialog has a border with a raised edge. |

hDlg

[Long-integer](#) Variable where the Windows window handle of the dialog is stored after it has been created and assigned by Windows. This handle should be used with subsequent

and statements, and may be directly used with Windows API calls.

If the dialog could not be created (i.e., due to low Windows resources), zero is returned.

See also

[Dynamic Dialog Tools](#), [CONTROL_ADD](#), [DIALOG DOEVENTS](#), [DIALOG END](#), [DIALOG HIDE](#), [DIALOG MAXIMIZE](#), [DIALOG MINIMIZE](#), [DIALOG NONSTABLE](#), [DIALOG NORMALIZE](#), [DIALOG SET COLOR](#), [DIALOG SHOW MODAL](#), [DIALOG SHOW MODELESS](#), [DIALOG STABILIZE](#), [DIALOG SHOW STATE](#), [TXT_pseudo-](#)

[object](#)

DIALOG NONSTABLE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

DIALOG NONSTABLE statement **New!**

Purpose Make a [Dialog](#) non-stable (closeable).

Syntax `DIALOG NONSTABLE hDlg`

Remarks The Dialog identified by the handle *hDlg* is made non-stable, meaning that it can be closed by the user. If there is a system menu, the close option and the close box are enabled. The ALT-F4 close key is also enabled. This is the default mode of operation.

See also [DIALOG STABILIZE](#)

DIALOG NORMALIZE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

DIALOG NORMALIZE statement **New!**

Purpose Make a [Dialog](#) visible.

Syntax `DIALOG NORMALIZE hDlg`

Remarks The Dialog identified by the handle *hDlg* is made visible at its normal size and position.

See also [DIALOG HIDE](#), [DIALOG MAXIMIZE](#), [DIALOG MINIMIZE](#), [DIALOG SHOW STATE](#)

DIALOG PIXELS statement

DIALOG PIXELS statement

Purpose Convert pixels (device units) into [dialog units](#).

Syntax `DIALOG PIXELS hDlg, x&, y& TO UNITS xx&, yy&`

Remarks The pixel values specified in the *x&* and *y&* [variables](#) are converted into dialog units,

based on the [default font](#) of the dialog specified by *hDlg*. The resulting value in dialog units is stored in the *xx&* and *yy&* variables.

See also [Dynamic Dialog Tools](#), [CONTROL GET CLIENT](#), [DIALOG GET CLIENT](#), [DIALOG GET LOC](#), [DIALOG GET SIZE](#), [DIALOG SET LOC](#), [DIALOG SET SIZE](#), [DIALOG UNITS](#)

DIALOG POST statement

DIALOG POST statement

Purpose Place a [message](#) in the message queue to be processed at the leisure of the target dialog.

Syntax `DIALOG POST hDlg, Msg&, wParam&, lParam&`

Remarks DIALOG POST places the message in the message queue and returns immediately. The message is processed by the dialog at a later time, when it reads the message from the queue.

This behavior is quite different to the [DIALOG SEND](#) statement, which forces the control to process the message immediately before returning. Since DIALOG POST is an asynchronous operation, it is not possible to retrieve a return code from the message.

hDlg refers to the target dialog.

Msg& is the message you want to post to the dialog.

wParam& is the first message parameter. *lParam&* is the second message parameter. The values of *wParam&* and *lParam&* are message-dependent. By Default, PowerBASIC passes these parameters BYVAL. If the target dialog is expected to alter the values held by variables passed in the *wParam&* and *lParam&* parameters, pass them using [VARPTR\(\)](#) or the changes will likely be discarded.

Note that the address of the data must remain valid until after the dialog has processed the message and accessed the data. In this case, using [STATIC](#) or [GLOBAL](#) variables can be very important or a General Protection Fault (GPF) may occur (that is, if the variables have gone out of [scope](#) by the time the message is processed).

An example of posting the addresses of variables to a dialog:

```
' Sel1& and Sel2& must be STATIC or GLOBAL
DIALOG POST CB.HNDL, %WM_USER + 999&, VARPTR(Sel1&), VARPTR(Sel2&)
```

DIALOG POST returns immediately after the placing the message in the queue.

To post a custom message to a dialog, use a message value in the range of (%WM_USER + 500) to (%WM_USER + &H07FFF), or use the RegisterWindowMessage API to obtain a unique message value from the operating system. Using messages with a numeric value of less than %WM_USER + 500 may conflict with Windows Common Control messages.

See also [Dynamic Dialog Tools](#), [CB Callback functions](#), [CONTROL POST](#), [CONTROL SEND](#), [DIALOG SEND](#)

Example `' Programmatically post a message to a dialog:
DIALOG POST hDlg, %WM_CLOSE, 0, 0`

DIALOG REDRAW statement

DIALOG REDRAW statement

Purpose Signal a designated [dialog](#) and all child to be redrawn immediately.

Syntax `DIALOG REDRAW hDlg`

| | |
|---------------------|--|
| Remarks | DIALOG REDRAW invalidates the target dialog area, and signals a redraw/repaint to occur immediately, even if there are pending messages in the message queue. <i>hDlg</i> refers to the dialog that is to be redrawn. |
| Restrictions | It is not advisable to use DIALOG REDRAW or CONTROL REDRAW statements within the %WM_PAINT and associated message handling code, or an infinite redraw loop could occur. |
| See also | Dynamic Dialog Tools , CONTROL REDRAW , CONTROL SET COLOR , DIALOG SET COLOR |
| Example | DIALOG REDRAW hDlg |

DIALOG SEND statement

DIALOG SEND statement

| | |
|---------------------|---|
| Purpose | Send a message to a dialog, then wait until the message has been processed before continuing. |
| Syntax | DIALOG SEND <i>hDlg</i> , <i>msg&</i> , <i>wParam&</i> , <i>lParam&</i> [TO <i>lResult&</i>] |
| Remarks | <i>hDlg</i> identifies the dialog which should receive the message specified by <i>msg&</i> . <i>wParam&</i> is the first message parameter, and <i>lParam&</i> is the second message parameter. By default, PowerBASIC passes these parameters BYVAL. If the target dialog is expected to return or alter the values passed in the <i>wParam&</i> and <i>lParam&</i> parameters, pass them using VARPTR() or the return values will be discarded. For example: <pre>DIALOG SEND CB.HNDL, %WM_USER, VARPTR(Param1&), VARPTR(Param2&)</pre> |
| TO | The return value may be returned and stored in the variable <i>lResult&</i> after the message was processed by the dialog. |
| Restrictions | If the target dialog was not created by the same thread, the DIALOG SEND statement becomes blocked until the thread processes the message. The <code>InSendMessage</code> API function will return TRUE (non-zero) if the callback code is currently processing a message from a separate thread. To send a custom message to a dialog, use a message value in the range of (%WM_USER + 500) to (%WM_USER + &H07FFF), or use the <code>RegisterWindowMessage</code> API to obtain a unique message value from the operating system. A dialog callback can send a message to its own dialog, but care should be taken not to create an infinite loop. Also, if DIALOG SEND sends a message that arrives back in the same callback as the message originated, care should be exercised to ensure that critical STATIC and GLOBAL variables are not unexpectedly altered by the second message processing code in the callback. This is known as re-entrant code design. |
| See also | Dynamic Dialog Tools , CONTROL SEND |

DIALOG SET CLIENT Statement

DIALOG SET CLIENT statement

| | |
|----------------|--|
| Purpose | Change the size of a dialog to a specific client area size. |
| Syntax | DIALOG SET CLIENT <i>hDlg</i> , <i>x&</i> , <i>y&</i> |
| Remarks | <i>hDlg</i> refers to the handle of the dialog to change. <i>x&</i> and <i>y&</i> specify the new width and height of the dialog client area. <i>x&</i> and <i>y&</i> are specified in dialog units or pixels , depending upon the system used when the dialog was created. The dialog client size may be smaller than total size, depending on the type of borders |

used. The client area is the part below the dialog caption, and an eventual menu, where controls can be placed.

See also [Dynamic Dialog Tools](#), [DIALOG NEW](#), [DIALOG PIXELS](#), [DIALOG UNITS](#), [DIALOG GET CLIENT](#), [DIALOG GET LOC](#), [DIALOG GET SIZE](#), [DIALOG SET LOC](#), [DIALOG SET SIZE](#)

Example LOCAL hDlg, hMnu, hSubMenu AS DWORD, h, w AS LONG

```
DIALOG NEW 0, "My Dialog",,,, 400, 300, %WS_CAPTION OR %WS_SYSMENU, 0 TO
hDlg
' Retrieve dialog client area
DIALOG GET CLIENT hDlg TO w, h
MENU NEW BAR TO hMnu
MENU NEW POPUP TO hSubMenu
MENU ADD POPUP, hMnu, "&File", hSubMenu, %MF_ENABLED
MENU ADD STRING, hSubMenu, "E&xit", %IDCANCEL, %MF_ENABLED
MENU ATTACH hMnu, hDlg

' Restore client area to desired size
DIALOG SET CLIENT hDlg, w, h
```

DIALOG SET COLOR statement

DIALOG SET COLOR statement

Purpose Set the background [color](#) of a dialog to a specific [RGB](#) color.

Syntax DIALOG SET COLOR *hDlg, foreclr&, backclr&*

Remarks *hDlg* identifies the dialog to colorize.

Color values *foreclr&* and *backclr&* must be in the range of &H0 to &H0FFFFFF, while the value -1& is used to specify the system default color. RGB can be a useful function to derive a 32-bit color value from discrete Red, Green and Blue values.

foreclr& In the current implementation of PowerBASIC, the dialog foreground color parameter *foreclr&* is not used, but the syntax is retained for future implementation. It is recommended that the foreground color parameter be set to -1&.

backclr& In 16-bit or greater color-depth mode, the RGB color specified is used when the background of the dialog is drawn. If *backclr&* = -1&, the default dialog background color is used. If *backclr&* = -2&, the dialog background is not painted, allowing the content behind the dialog to become visible through the dialog.

In 16-bit or greater color-depth mode, the specified RGB color is used when the background of the dialog is drawn. However, in 8-bit (256-color) mode, the color system works quite differently. Behind the scenes in Windows, the base system palette usually contains 20 solid colors that are not dithered when drawn on a dialog background. These solid-colors are ideal for background colors with [DDT](#) dialogs in 256-color mode.

Conversely, when using a non-solid RGB color value, Windows will dither (approximate) the color to draw the dialog, using combinations of two or more colors. This usually produces an undesirable pattern effect.

To avoid these problems when in 256-color mode, dialogs should either be colored with one of the 20 standard (solid) system colors, or the default color should be used instead. PowerBASIC includes the following 10 built-in equates for help with the selection of a standard solid color:

```
%RGB_BLACK %RGB_BLUE %RGB_GREEN %RGB_CYAN %RGB_RED
%RGB_MAGENTA %RGB_YELLOW %RGB_WHITE %RGB_GRAY %RGB_LIGHTGRAY
```

Many non standard colors are also built into the compiler, see the [Built In RGB Color Equates](#) topic for a complete list.

If you prefer to disable color in 256-color mode, the number of colors can be easily tested with the following code:

```
' Determine number of colors
LOCAL hDC AS DWORD, iColors AS LONG

hDC = GetWindowDC(GetDesktopWindow())
iColors = 2 & ^ (GetDeviceCaps(hDC, %BITSPIXEL) * GetDeviceCaps(hDC, %
PLANES))
ReleaseDC GetDesktopWindow(), hDC
IF iColors > 256 THEN _
DIALOG SET COLOR hDlg, -1, RGB(0,100,192)
```

In 256-color mode on most computers, the values of the standard 20 system colors can be found by requesting the first and last 10 (0 to 9, and 246 to 255 inclusive) entries from the GetSystemPaletteEntries API function, as follows:

```
' Fill array with solid colors
DIM hDC AS DWORD, Cols AS LONG, x AS LONG

hDC = GetWindowDC(GetDesktopWindow)
Cols = GetDeviceCaps(hDC, %NUMRESERVED)
REDIM lp(1 TO Cols) AS LONG
x& = GetSystemPaletteEntries(hDC, 0, Cols \ 2, BYVAL VARPTR(lp(1)))
x& = GetSystemPaletteEntries(hDC, 256 - x&, Cols - x&, BYVAL
VARPTR(lp(x& + 1)))
ReleaseDc GetDesktopWindow, hDC
' Array lp() now contains the solid color table
```

For more information on working with palettes in 256-color mode, please consult WIN32.HLP or visit <http://msdn.microsoft.com>.

When dynamically changing colors of a dialog from within a callback (i.e., after the statement), a DIALOG SET COLOR statement should be immediately followed by an explicit [DIALOG REDRAW](#) statement.

Without a forced dialog redraw, the dialog background color change may not become evident to the user until the dialog is **eventually** repainted in the normal course of user interaction. For example, a normal repaint may only occur if the dialog becomes obscured and then uncovered by another window. Ensuring a timely repaint of the dialog will guarantee the dialog maintains an up-to-date appearance at all times.

See also [Built In RGB Color Equates](#), [Dynamic Dialog Tools](#), [CONTROL REDRAW](#), [DIALOG REDRAW](#), [CONTROL SET COLOR](#), [DIALOG SET ICON](#)

Example `DIALOG NEW 0, "Dialog",,, 160, 120, TO hDlg`

```
' Set the color with an RGB value
DIALOG SET COLOR hDlg, -1, RGB(0,0,255)

' Or we could use the built-in %BLUE equate:
DIALOG SET COLOR hDlg, -1, %BLUE
```

DIALOG SET ICON statement

DIALOG SET ICON statement

Purpose Change both the [dialog](#) icon in the [caption](#), and the icon shown in the ALT+TAB task list.

Syntax `DIALOG SET ICON hDlg, newicon$`

Remarks DIALOG SET ICON changes both the small icon (as used in the dialog caption bar), and the large icon (visible in the icon task list presented during ALT+TAB task switching).

| | |
|---------------------|---|
| <i>hDlg</i> | Handle of the dialog that is to have its icon changed. |
| <i>newicon\$</i> | A string expression which specifies the name of the icon in the resource file . If the icon resource uses an integral identifier, <i>newicon\$</i> should begin with a Number symbol (#), followed by the integral identifier in ASCII format. For example, "#998". Otherwise, the text identifier name should be used. |
| Restrictions | DIALOG SET ICON cannot use bitmap files. 32x32 pixel icons produce the most visually pleasing results. |
| See also | Dynamic Dialog Tools , CONTROL ADD IMAGE , CONTROL ADD IMAGEX , CONTROL ADD IMGBUTTON , CONTROL ADD IMGBUTTONX , CONTROL SET IMAGEX , CONTROL SET IMGBUTTON , CONTROL SET IMGBUTTONX , DIALOG SET TEXT |

DIALOG SET LOC statement

DIALOG SET LOC statement

| | |
|-----------------|---|
| Purpose | Change the position of a dialog . |
| Syntax | <code>DIALOG SET LOC <i>hDlg</i>, <i>x&</i>, <i>y&</i></code> |
| Remarks | <i>hDlg</i> identifies the dialog to reposition. <i>x&</i> and <i>y&</i> specify the new coordinates of the upper-left corner of the target dialog. <i>x&</i> and <i>y&</i> are the horizontal and vertical coordinates respectively. If the dialog was created with the PIXELS option in the DIALOG NEW statement, the values are returned in pixel units . If the UNITS option was used (or no scaling option was specified), the values are returned in dialog units . If the dialog has a parent , the coordinates are relative to the upper-left corner of the parent dialog client area . Otherwise, the coordinates are relative to the upper-left corner of the desktop workspace. |
| See also | Dynamic Dialog Tools , DIALOG GET CLIENT , DIALOG GET LOC , DIALOG GET SIZE , DIALOG PIXELS , DIALOG SET SIZE , DIALOG UNITS |

DIALOG SET SIZE statement

DIALOG SET SIZE statement

| | |
|-----------------|---|
| Purpose | Change the size of a dialog . |
| Syntax | <code>DIALOG SET SIZE <i>hDlg</i>, <i>nWide&</i>, <i>nHigh&</i></code> |
| Remarks | <i>hDlg</i> identifies the dialog to resize. <i>nwide&</i> and <i>nhigh&</i> specify the new width and height, in dialog units , for the dialog. If the dialog was created with the PIXELS option in the DIALOG NEW statement, the values are set in pixel units . If the UNITS option was used (or no scaling option was specified), the values are set in dialog units. |
| See also | Dynamic Dialog Tools , DIALOG GET CLIENT , DIALOG GET LOC , DIALOG GET SIZE , DIALOG PIXELS , DIALOG SET CLIENT , DIALOG SET LOC , DIALOG UNITS |

DIALOG SET TEXT statement

DIALOG SET TEXT statement

| | |
|----------------|--|
| Purpose | Set the text in a dialog or window caption . |
| Syntax | <code>DIALOG SET TEXT <i>hDlg</i>, <i>titletext\$</i></code> |
| Remarks | The caption of the dialog or window specified by <i>hDlg</i> is set with the DIALOG SET TEXT |

statement. For [DDT](#) dialogs, *hDlg* is the dialog [handle](#) returned by the [DIALOG NEW](#) statement. In a dialog [Callback](#) Function, the [CB.HNDL](#) function will return the [parent](#) dialog handle and this can also be used with [DIALOG SET TEXT](#).

| | |
|---------------------|---|
| <i>titletext\$</i> | The caption text is specified in <i>titletext\$</i> . If the window or dialog is invalid, the operation is ignored. |
| Restrictions | <i>hDlg</i> is a dialog or window handle, so DIALOG SET TEXT works with both DDT dialogs and conventional windows and dialogs. |
| See also | Dynamic Dialog Tools , CB Callback functions , CONTROL GET TEXT , CONTROL SET TEXT , DIALOG GET TEXT , DIALOG NEW , DIALOG SET ICON |
| Example | <code>DIALOG SET TEXT hDlgMine, "This is my dialog!"</code> |

DIALOG SET USER statement

DIALOG SET USER statement

| | |
|---------------------|---|
| Purpose | Set a value in the user data area of a DDT dialog. |
| Syntax | <code>DIALOG SET USER hDlg, index&, usrval&</code> |
| Remarks | <p>Each DDT dialog has a user data area consisting of eight Long-integer values which may be used at the programmer's discretion to save relevant data. DIALOG SET USER allows one of the values to be set, based upon the index parameter value (1 through 8).</p> <p><i>hDlg</i> refers to the dialog that owns the user data area.</p> <p><i>index&</i> is the index number of the user data value to set, in the range 1 to 8 inclusive.</p> <p><i>usrval&</i> is the Long-integer data value to store in the user data area.</p> |
| Restrictions | Data in the user data area is lost when the dialog is destroyed. The data area is completely separate from the <code>%GWL_USERDATA</code> area maintained by Windows. |
| See also | Dynamic Dialog Tools , COMBOBOX SET USER , CONTROL GET USER , CONTROL SET USER , DIALOG GET USER , LISTBOX GET USER , LISTBOX SET USER , LISTVIEW GET USER , LISTVIEW SET USER , TREEVIEW GET USER , TREEVIEW SET USER |

DIALOG SHOW MODAL statement

DIALOG SHOW MODAL statement

| | |
|-----------------|---|
| Purpose | Display and activate a dialog , allowing it to receive user input and messages . The DIALOG SHOW MODAL statement blocks (halts) until the dialog is destroyed with DIALOG END . |
| Syntax | <code>DIALOG SHOW MODAL hDlg [[,] CALL callback] [TO lResult&]</code> |
| Remarks | <p><i>hDlg</i> identifies a dialog created using DIALOG NEW. You can specify a Callback Function for all dialog messages using the CALL keyword, followed by the name of the Callback Function.</p> <p>When a modal dialog is displayed, the DIALOG SHOW MODAL statement is blocked until the dialog is destroyed with DIALOG END. During the duration of the dialog, the Callback Function code is executed in response to messages for the dialog.</p> <p>If a parent was specified in the DIALOG NEW statement, the parent window is disabled until the modal dialog is destroyed.</p> |
| <i>callback</i> | <p>If specified, dialog messages are routed to the nominated Callback Function.</p> <p>Just before a dialog is initially displayed, the dialog Callback Function is sent a %</p> |

WM_INITDIALOG message. By processing this message within the dialog callback, an application can take the opportunity to load controls with data before the controls become visible to the user. For example, a [list box](#) control could be loaded with a list of items so that the control appears populated with data when initially displayed.

The nominated callback function name must be a [CALLBACK FUNCTION](#) or a compile-time [Error 547](#) ("Callback function required") will occur.

IResult& When the modal dialog is destroyed using the DIALOG END statement, the resulting value is assigned to the *IResult&* variable, if specified. *IResult&* is excluded from becoming a [Register](#) variable by the compiler, since this value can be assigned from outside of the function containing the DIALOG SHOW MODAL statement, and this may only be performed with a memory variable. However, if the target variable is explicitly declared as a register variable, PowerBASIC raises a compile-time [Error 491](#) ("Invalid register variable").

See also [Dynamic Dialog Tools](#), [DIALOG END](#), [DIALOG NEW](#), [DIALOG SHOW MODELESS](#)

DIALOG SHOW MODELESS statement

DIALOG SHOW MODELESS statement

Purpose Display and activate a [dialog](#), allowing it to receive user input and [messages](#). Execution of the code continues at the same time as the dialog is displayed. [Modeless](#) dialogs require a message pump to be running for the duration of the dialog.

Syntax `DIALOG SHOW MODELESS hDlg [[,] CALL callback] [TO IResult&]`

Remarks *hDlg* identifies a dialog created using [DIALOG NEW](#). You can specify a Callback Function for all dialog messages, using the [CALL](#) keyword followed by the name of the Callback Function.

Once a modeless dialog is displayed, the DIALOG SHOW MODELESS statement completes, and execution of the code continues. At the same time, the dialog can receive messages and process them via the Callback Function. A DIALOG SHOW MODELESS statement is usually followed by a message pump loop. For more information, please refer to the examples under [DIALOG DOEVENTS](#).

callback If specified, dialog messages are routed to the nominated Callback Function.

The nominated callback function name must be a [CALLBACK FUNCTION](#) or a compile-time [Error 547](#) ("Callback function required") will occur.

IResult& When the modeless dialog is destroyed using the [DIALOG END](#) statement, the resulting value is assigned to the *IResult&* [variable](#), if specified. *IResult&* is excluded from becoming a [Register variable](#) by the compiler, since this value can be assigned from outside of the function containing the DIALOG SHOW MODELESS statement, and this may only be performed with a memory variable. However, if the target variable is explicitly declared as a [register](#) variable, PowerBASIC raises a compile-time [Error 491](#) ("Invalid register variable").

See also [Dynamic Dialog Tools](#), [DIALOG DOEVENTS](#), [DIALOG END](#), [DIALOG NEW](#), [DIALOG SHOW MODAL](#)

DIALOG SHOW STATE statement

DIALOG SHOW STATE statement

Purpose Change the visible state of a [dialog](#).

Syntax `DIALOG SHOW STATE hDlg, showstate& [TO IResult&]`

| | |
|----------------|---|
| Remarks | DIALOG SHOW STATE changes the visible state of the dialog identified by <i>hDlg</i> . <i>showstate&</i> can be one of the following values: |
| | %SW_HIDE Hide the dialog. |
| | %SW_MAXIMIZE Maximize the specified dialog. |
| | %SW_MINIMIZE Minimize the specified dialog. |
| | %SW_RESTORE Activate and display the dialog. If the dialog is minimized or maximized, Windows restores it to its original size and position. An application should specify this flag when restoring a minimized dialog. |
| | %SW_SHOW Activate the dialog and displays it in its current size and position. |
| | %SW_SHOWMAXIMIZED Synonym of %SW_MAXIMIZE. |
| | %SW_SHOWMINIMIZED Activate the dialog and minimize it. |
| | %SW_SHOWNA Display the dialog in its current state without activating it. The currently active window remains active. |
| | %SW_SHOWNOACTIVATE Display the dialog in its most recent size and position without activating it. The currently active window remains active. |
| | %SW_SHOWNORMAL Activate and display the dialog. If the dialog is minimized or maximized, Windows restores it to its original size and position. |

If the optional *IResult&* parameter is used, it will contain the previous visibility state. If *IResult&* is set to [TRUE](#) (non-zero), the dialog was visible. If the dialog was previously hidden, *IResult&* is set to [FALSE](#) (zero).

Restrictions In previous versions of PowerBASIC, the DIALOG SHOW STATE was not permitted to be executed before a [DIALOG SHOW MODAL](#) or [DIALOG SHOW MODELESS](#) statement had been executed for that specific dialog. Starting with this version of PowerBASIC, DIALOG SHOW STATE may be executed before or after the dialog is activated with DIALOG SHOW MODAL or DIALOG SHOW MODELESS statement.

When utilized prior to dialog activation, the attributes %SW_HIDE, %SW_MAXIMIZE, and %SW_MINIMIZE are remembered for use when activated. All other possible attributes are translated to the standard %SW_SHOW. Generally speaking, it is unwise to use %SW_HIDE with a modal dialog.

DIALOG SHOW STATE can be used to show a dialog before the [message](#) pump for a [modeless](#) dialog begins operating (i.e., after the DIALOG SHOW MODELESS statement, etc). However, until the message pump begins its operation, the dialog may not be drawn or displayed completely.

For more information on message pumps, see [DIALOG DOEVENTS](#) and [DIALOG SHOW MODELESS](#).

See also [Dynamic Dialog Tools](#), [CONTROL SHOW STATE](#), [DIALOG DOEVENTS](#), [DIALOG HIDE](#), [DIALOG MAXIMIZE](#), [DIALOG MINIMIZE](#), [DIALOG NONSTABLE](#), [DIALOG NORMALIZE](#), [DIALOG SHOW MODAL](#), [DIALOG SHOW MODELESS](#), [DIALOG STABILIZE](#)

DIALOG STABILIZE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

DIALOG STABILIZE statement New!

Purpose Make a [Dialog](#) stabilized (non-closeable).

Syntax `DIALOG STABILIZE hDlg`

Remarks The Dialog identified by the [handle](#) *hDlg* is stabilized, meaning that it cannot be closed by the user. If there is a system menu, the close option and the close box are grayed. The ALT-F4 close key is disabled. This allows you to be certain that your operations on the dialog can be completed. When a dialog is stabilized, only [DIALOG END](#) or program termination will close it.

See also [DIALOG END](#), [DIALOG NONSTABLE](#)

DIALOG UNITS statement

DIALOG UNITS statement

Purpose Convert [dialog units](#) into [pixels](#).

Syntax `DIALOG UNITS hDlg, x&, y& TO PIXELS xx&, yy&`

Remarks The dialog units specified in the *x&* and *y&* variables are converted into pixels, based on the [default font](#) of the dialog specified by *hDlg*. The resultant pixel values are stored in the *xx&* and *yy&* variables.

See also [Dynamic Dialog Tools](#), [CONTROL GET CLIENT](#), [DIALOG GET CLIENT](#), [DIALOG GET LOC](#), [DIALOG GET SIZE](#), [DIALOG PIXELS](#), [DIALOG SET LOC](#), [DIALOG SET SIZE](#)

DIM statement

DIM statement

Purpose Declare and dimension [arrays](#), scalar [variables](#), and [pointers](#).

Syntax

Arrays:

```
DIM var[(subscripts)] [AS [GLOBAL | INSTANCE | LOCAL | STATIC |
THREADED] type] [PTR | POINTER] [AT address] [, ...]
DIM var[(subscripts)] ' var may include a type-specifier
```

Scalar variables:

```
DIM var AS [GLOBAL | INSTANCE | LOCAL | STATIC | THREADED] type
[PTR | POINTER] [, ...]
DIM var ' var must include a type-specifier
```

Remarks DIM declares var to be a variable or array whose type is specified by appending a [type-specifier](#) to the name or by using the AS type keyword. If the AS clause is used, the variable name cannot end with a type-specifier character.

DIM can only be used inside a [SUB](#), [FUNCTION](#), [METHOD](#), or [PROPERTY](#). Outside of Subs, Functions, Methods, or Properties, use [GLOBAL](#) or [INSTANCE](#) to declare variables and arrays.

DIM can also be used to dimension an "absolute array" - one that occupies a specific location in memory. This can be useful to dynamically "superimpose"

one type of array directly over the top of an existing block of memory (which could be another type of array, or data structure). This would form a Union-like overlay structure. See below.

In addition, it is possible to create an array of pointers with the DIM statement, and it is also possible to do so at a specific location in memory. This is termed an "*absolute pointer array*".

Dimensioning arrays

[subscripts](#) may take one of the following forms for each array dimensioned:

(a) A comma-delimited list of one or more Long-integer expressions, each defining a dimension of the array. This form is used to declare arrays whose [subscript](#) (index) range starts at 0. For example, the following lines are equivalent ways of dimensioning the same array:

```
DIM lArray(20) AS LONG ' With an AS type clause
```

or

```
DIM lArray&(20) ' With a type-specifier
```

Both lines above define a one dimension Long-integer array that has 21 elements, from lArray(0) to lArray(20) inclusive. The second line uses a type-specifier symbol to specify the

, and this uses a simplified syntax (trailing clauses/keywords are not permitted). The simplified syntax is only valid for data types that have a type-specifier symbol (\$, !, @, @@, #, ##, %, &, &&, ?, ??, ???), or the specifier can be omitted if there is a [DEFtype](#) statement in effect. The specifier *must* be omitted if [#DIM ALL](#) is in effect.

Declarations of [multiple-dimension arrays](#) take the following forms:

```
DIM sArray(20,40,2) AS STRING
```

or

```
DIM sArray$(20,40,2)
```

These two lines of code define a [dynamic string](#) array with three dimensions, 21 elements by 41 elements by 3 elements, totaling 2583 string elements. As before, the second line uses the simplified syntax form.

(b) A comma-delimited list where both the upper and lower subscript bounds are explicitly declared for each dimension of the array. For each dimension, the lower bound is listed first, followed by the TO keyword, followed by the upper bound. For example:

```
DIM MyArray(1 TO 20) AS LONG
```

...defines an array of one dimension that has 20 elements, from MyArray(1) to MyArray(20). The lower bound does not have to be zero or one; for example:

```
DIM SalesByYear(1980 TO 2000) AS INTEGER
```

or

```
DIM SalesByYear%(1980 TO 2000)
```

Each array can access elements in the range of -2,147,483,648 to 2,147,483,647. It is recommended that an explicit [variable scope](#) clause ([GLOBAL/LOCAL/STATIC](#)) be added to each DIM statement that uses an explicit *type* clause. See Restrictions below.

Array Initialization and Absolute Arrays

PowerBASIC generates an error message when it encounters an array that hasn't been dimensioned. If the array has already been dimensioned, the DIM statement is ignored. A new array is not created and a [run-time error](#) is not generated.

When a program is first executed, PowerBASIC sets each element of a numeric array to zero, and sets each element of regular string arrays to a null string (length zero). However, when an absolute array is Dimensioned (at a specific

location in memory using the AT *address* syntax), PowerBASIC does not initialize the memory occupied by the array. Further, when an absolute array is erased, the memory is not released either. This provides a powerful mechanism to create [Union](#)-like overlay structures in memory.

The most common use of an absolute array is when manipulating Visual Basic arrays directly from a DLL. This involves obtaining a pointer to the array, the element size, and the number of elements. With this information, an absolute array can be dimensioned in PowerBASIC and the array memory manipulated directly. Another common use involves using a large dynamic or [fixed-length string](#) memory block, overlaid with an absolute numeric array.

Care must be exercised when using absolute arrays, since the contents of an absolute array can only be valid for the scope of the memory the array references. If an absolute array references memory that is LOCAL to the procedure, the array contents become invalidated if the target memory block is released. For example, by either explicitly deallocating the memory block, or exiting the procedure itself. Attempting to access absolute array memory that has been deallocated will likely trigger a General Protection Fault (GPF). On this basis, absolute arrays should be LOCAL to the procedure in which they are to be used.

While PowerBASIC supports [LBOUND](#) values that are non-zero, PowerBASIC generates the most efficient code if the LBOUND parameter is omitted (i.e., the array uses the default LBOUND of zero). You should also avoid specifying an explicit LBOUND of zero, since this imposes a small efficiency penalty with no meaningful benefits

Declaring scalar (non-array) variables

If you have specified #DIM ALL or [OPTION EXPLICIT](#), you have to declare all variables used in your programs. PowerBASIC provides a variation of the DIM statement for this job, because of the reduced level of syntax required for scalar variables. The following is a simplified syntax for DIM that just applies to scalar variables:

```
DIM var AS [GLOBAL | INSTANCE | LOCAL | STATIC | THREADED] type
[PTR | POINTER] [, ...]
DIM var ' var must include a type-specifier
```

Here are some sample variable declarations:

```
DIM a AS LOCAL INTEGER
DIM b AS STATIC WORD
DIM c AS GLOBAL DOUBLE POINTER
DIM d AS STRINGZ * 255
DIM e AS THREADED STRING
DIM f AS INSTANCE SINGLE
```

| AS type | Type |
|--------------------------|-----------------------------------|
| BYTE | Byte |
| WORD | Word |
| INTEGER | Integer |
| DWORD | Double-word |
| LONG | Long-integer |
| QUAD | Quad-integer |
| SINGLE | Single-precision floating-point |
| DOUBLE | Double-precision floating-point |
| EXT | Extended-precision floating-point |
| EXTENDED | Extended-precision floating-point |
| CUR | Currency |
| CURRENCY | Currency |
| CUX | Extended-currency |

| | |
|------------------------------|----------------------------------|
| CURRENCYX | Extended-currency |
| STRING | Dynamic (variable-length) string |
| WSTRING | Unicode Dynamic string |
| STRING * x | Fixed-length string |
| ASCIIZ * x | Nul-terminated string |
| ASCIZ * x | Nul-terminated string |
| STRINGZ * x | Nul-terminated string |
| WSTRINGZ * x | Unicode Nul-Terminated string |
| Pointer | Pointer |
| Ptr | Pointer |
| VARIANT | Variant |
| IAUTOMATION | Automation Interface |
| IDISPATCH | Dispatch Interface |
| IUNKNOWN | Direct Interface |
| GUID | 16-byte GUID string |
| FIELD | Field string |

Restrictions

LOCAL ASCIIZ, LOCAL fixed-length strings, and LOCAL [UDTs](#) are created on the [stack](#) frame of the Sub/Function/Method/Property in which they are declared. You must therefore use caution so that the combined local variable size does not exceed the allocated stack size. Unless you declare otherwise, PowerBASIC sets a default stack size of 1MB. If more stack space is required, you can allocate it with the [#STACK](#) metastatement. There are no such limitations with GLOBAL, [INSTANCE](#), [THREADED](#), or STATIC variables.

When a DIM statement is used (*without an explicit scope clause*), to declare a variable in a procedure, *and* an identical variable has already been declared as GLOBAL, the variable in the procedure will be given GLOBAL scope. For example:

```
GLOBAL xyz AS LONG
...
SUB MySub
  DIM xyz AS LONG
  ' Here, xyz is a GLOBAL variable
END SUB
```

To ensure that the variable scope is LOCAL to the Sub/Function/Method/Property, use a LOCAL statement rather than a DIM statement. Alternatively, add an explicit scope clause to the DIM statement. For example:

```
GLOBAL xyz AS LONG
[statements]
SUB MySub
  DIM xyz AS LOCAL LONG
  ' Here, xyz is a LOCAL variable
END SUB
```

Declaring pointer variables

A pointer *must* be declared before it can be used. You use the DIM statement to declare pointers, and describe the type of data to which they point. When a pointer is declared, it is automatically initialized to a value of zero. This is known as a null-pointer. You *must* remember to initialize it to a valid address, or you will get a General Protection Fault (GPF). The syntax for declaring pointer variables is similar to that of regular variables:

```
DIM var[(subscripts)] AS [GLOBAL | INSTANCE | LOCAL | STATIC |
THREADED] type [PTR | POINTER] [, ...]
```

Here are some examples of pointer variable declarations:

```
DIM a          AS BYTE PTR
DIM b          AS INTEGER POINTER
DIM c          AS STRING PTR * 25
```

```
DIM d          AS MyType POINTER
DIM e(500)     AS INTEGER PTR
```

Pointers themselves are stored as DWORD values.

Options

The scope of a variable or array is set using the GLOBAL, INSTANCE, LOCAL, STATIC, or THREADED keywords.

Restrictions

When returning a pointer to a calling Sub, Function, Method, or Property, make sure the pointer target remains valid when the current routine terminates. For example, returning a pointer to a LOCAL variable is certain to trigger a GPF, since local storage is released when the routine ends. In this case, the pointers target should be STATIC, GLOBAL, or INSTANCE, or be valid within the scope of the calling code.

IAUTOMATION, IDISPATCH, IUNKNOWN, VARIANT and GUID variables have special uses with [COM](#).

See also

[#DIM](#), [ARRAYATTR](#), [ERASE](#), [GLOBAL](#), [INSTANCE](#), [Just what is COM?](#), [LOCAL](#), [REDIM](#), [RESET](#), [STATIC](#), [THREADED](#), [Variables](#), [Variable Scope](#), [What is an object, anyway?](#)

DIR\$ function

DIR\$ function IMPROVED

Purpose Return a filename and/or directory entry that matches a file name mask and an optional attribute.

Syntax `file$ = DIR$(mask$ [, [ONLY] attribute&, TO DirDataVar])`
`file$ = DIR$([NEXT] [TO DirDataVar])`

Remarks There are two forms to the DIR\$() function. The first form, which includes a mask and optional attribute, is used to find the first filename which matches. The second form, without those parameters, returns subsequent matching filenames. When the returned string is null (zero-length), there are no further matching filenames.

The second form may optionally specify the key-word NEXT to aid in self-documentation of the source code.

mask\$ specifies a filename or path which can include a drive name and system wildcard characters (* and ?). If the numeric attribute parameter is zero (or not specified), DIR\$ returns only "Normal" files. If *mask\$* is a null (zero-length) string, the function call is equivalent to the second form of the function to find subsequent matching filenames. In that case, an optional attribute is ignored.

If an *attribute&* is specified, it must use a standard operating system numeric attribute code.

This causes DIR\$ to include filenames with specific attributes in the search, in addition to normal files. "Normal" files are those which are not hidden or system files, nor are they a directory or a volume label.

| Attribute | Description | Equate |
|-----------|--------------|---------|
| 0 | Normal | %NORMAL |
| 2 | Hidden | %HIDDEN |
| 4 | System | %SYSTEM |
| 8 | Volume Label | %VLABEL |
| 16 | Directory | %SUBDIR |

You can search for filenames with multiple attributes set by adding the attribute codes together.

For example, to search for hidden and system files, you'd add those codes together (2 and 4) to get 6. All other attribute codes (except for volume label) are normally inclusive. For example, specifying both hidden and system results in DIR\$ returning all hidden files, system files, normal files, and files that are both hidden and system.

If the ONLY option is included, normal files are excluded from the file search. For example: DIR\$(mask\$, ONLY 16) just the directory entries which match mask\$ are returned. Another useful search attribute is 6, which returns normal, hidden, and system file, but no directories.

An attribute of 8 will return the volume label, if one exists. In this case, mask\$ must reference the drive letter of the target drive, and additional path information is ignored. Additionally, you may specify a UNC name for a shared drive (subject to operating system restrictions), and retrieve the volume label, if one exists, and you have suitable access rights. You can also obtain the volume label for a 'hidden' share with NT/2000/XP by appending a trailing dollar symbol to the share name.

```
' Retrieve volume for share \\server\drive0
A$ = DIR$("\\server\drive0", 8)

' Retrieve volume for hidden share D: (\d$)
A$ = DIR$("\\server\d$", %VLABEL)
```

The DIR\$ function may optionally assign the complete directory entry to an appropriate UDT variable if you include the TO clause as a parameter. The complete directory entry contains 592 bytes of data, corresponding to the following TYPE definition. This definition (DIRDATA) is built into PowerBASIC, and need not necessarily be included in your source code. The DirData UDT is identical to the Unicode version of the Win32_Find_Data structure used by the Windows API for this purpose.

```
TYPE DirData
    FileAttributes      AS DWORD
    CreationTime        AS QUAD
    LastAccessTime      AS QUAD
    LastWriteTime       AS QUAD
    FileSizeHigh        AS DWORD
    FileSizeLow         AS DWORD
    Reserved0           AS DWORD
    Reserved1           AS DWORD
    FileName            AS WSTRINGZ * 260
    ShortName           AS WSTRINGZ * 14
END TYPE
```

You can declare a variable as DIRDATA for this purpose, or use any other user-defined type of at least 592 data bytes. The additional data may be used for any other purpose in your program.

CreationTime, LastAccessTime, and LastWriteTime members of the DIRDATA can be assigned to a [PowerTime object](#) to convert the QUAD integer (FILETIME) values for easy calculations and conversions.

```
LOCAL f AS STRING
LOCAL d AS DIRDATA
LOCAL t AS IPOWERTIME

t = CLASS "PowerTime"
...
f = DIR$("c:\*.*" TO d)
t.FileTime = d.CreationTime ' t contains the file creation time in a
localized format.
```

Previous versions of PowerBASIC used an [ANSI](#) version of DirData which was only 318 bytes in size. However, if you utilized the built-in form of DirData, your program should execute correctly under this version with no changes needed.

Restrictions PowerBASIC performs file matching with both the long (LFN) and short (SFN) filename versions of filenames. This means that DIR\$ will also return filenames that start with the specified

extension (as per standard Windows operating system behavior).

For example, A\$ = DIR\$("*.*") will match filenames such as "Index.htm", "Default.html", "Homepages.htm", "cgilib.htmlpages", etc. Similarly, A\$ = DIR\$("*.*?") and DIR\$("*.*?") will match the same filenames.

DIR\$ is thread-safe, so DIR\$ operations in one thread do not interfere with DIR\$ operations in another thread. However, you should be aware that specifying a new mask\$ parameter always starts an entirely new DIR\$ search loop.

See also [CURDIR\\$](#), [DIR\\$ CLOSE](#), [DISPLAY BROWSE](#), [DISPLAY OPENFILE](#), [FILEATTR](#), [GETATTR](#), [ISFILE](#), [PATHNAME\\$](#), [PATHSCANS\\$](#), [SETATTR](#)

Example The following code shows a typical method of retrieving filenames from a directory:

```
DIM Listing(1000) AS DirData
DIM x%, temp$
temp$ = DIR$("*.*", TO Listing(x%))
WHILE LEN(temp$) AND x% < 1000 ' max = 1000
    INCR x%
    temp$ = DIR$(NEXT, TO Listing(x%))
WEND
```

DIR\$ CLOSE statement

DIR\$ CLOSE statement

Purpose Force the release of the operating system FindNext handle.

Syntax DIR\$ CLOSE

Remarks DIR\$ CLOSE will cause the operating system FindNext handle to be closed. Each time a new [DIR\\$\(\)](#) sequence is initiated within a thread, or DIR\$() returns an empty , PowerBASIC automatically closes the FindNext handle to avoid overuse of system resources.

However, in unusual circumstances (such as a recursive directory scan with delete or rename), it may be necessary to close the FindNext handle sooner, through the use of this explicit statement, so that a directory can be removed or renamed.

Restrictions It is never necessary to execute DIR\$ CLOSE to simply avoid a "System Handle Leak".

See also [DIR\\$](#)

DISKFREE function

DISKFREE function

Purpose Return the amount of available space on a disk, in bytes.

Syntax bytes&& = DISKFREE(drive\$)

Remarks drive\$ specifies the drive letter or UNC share name (subject to operating system restrictions) of the disk to examine. If drive\$ is an empty , information on the default drive is returned.

Restrictions With Windows 95 versions before OSR2, and Windows NT versions before 4.0, DISKFREE may return a negative or inaccurate value for drives larger than 2 GB.

See also [DISKSIZE](#)

Example DisplayText "Free bytes on C: " + FORMAT\$(DISKFREE("C"), "#,###")

DISKSIZE function

DISKSIZE function

| | |
|---------------------|--|
| Purpose | Return the total amount of space on a disk, in bytes . |
| Syntax | <code>bytes&& = DISKSIZE(drive\$)</code> |
| Remarks | <code>drive\$</code> specifies the drive letter or UNC share name (subject to operating system restrictions) of the disk to examine. If <code>drive\$</code> is an empty string, information on the default drive is returned. |
| Restrictions | With Windows 95 versions before OSR2, and Windows NT versions before 4.0, DISKSIZE may return a negative or inaccurate value for drives larger than 2 GB. |
| See also | DISKFREE |
| Example | <code>DisplayText "Total bytes on C: " + FORMAT\$(DISKSIZE("C"), "#,###")</code> |

DISPLAY BROWSE statement

Keyword Template

| |
|-----------------|
| Purpose |
| Syntax |
| Remarks |
| See also |
| Example |

DISPLAY BROWSE statement

| | | | | | |
|--------------------------------|--|--------------------------------|---|------------------------|---|
| Purpose | Display a folder selection dialog to return the user's choice. | | | | |
| Syntax | <code>DISPLAY BROWSE [hParent], [xpos&], [ypos&], title\$, start\$, flags& TO folder\$</code> | | | | |
| <i>hParent</i> | Handle of the parent window or dialog . If there is no parent, use zero (0) or %HWND_DESKTOP. | | | | |
| <i>xpos&</i> | Horizontal position, in pixels , relative to the parent window. If omitted, PowerBASIC selects the position (offset from the parent, or centered if no parent). | | | | |
| <i>ypos&</i> | Vertical position, in pixels, relative to the parent window. If missing, PowerBASIC selects the position (offset from the parent, or centered if no parent). | | | | |
| <i>title\$</i> | The caption to be displayed below the caption bar of the dialog box. If this parameter is a null string, the title "Open" is displayed. | | | | |
| <i>start\$</i> | A string which specifies the starting path to be used as the initial default folder. This may be disabled by passing a null, zero-length string (""). | | | | |
| <i>flags&</i> | The style attributes of the BROWSE Dialog. The following values may be used alone or combined, and are predefined in the PowerBASIC compiler: <table> <tr> <td>%BIF_BROWSEINCLUDEFILES (4.71)</td> <td>The dialog box will display both files and folders.</td> </tr> <tr> <td>%BIF_BROWSEINCLUDEURLS</td> <td>The dialog box can display URL's if %BIF_USENEWUI and %BIF_BROWSEINCLUDEFILES are also set.</td> </tr> </table> | %BIF_BROWSEINCLUDEFILES (4.71) | The dialog box will display both files and folders. | %BIF_BROWSEINCLUDEURLS | The dialog box can display URL's if %BIF_USENEWUI and %BIF_BROWSEINCLUDEFILES are also set. |
| %BIF_BROWSEINCLUDEFILES (4.71) | The dialog box will display both files and folders. | | | | |
| %BIF_BROWSEINCLUDEURLS | The dialog box can display URL's if %BIF_USENEWUI and %BIF_BROWSEINCLUDEFILES are also set. | | | | |

| | |
|---------------------------------------|--|
| % BIF_DONTGOBELOWDO MAIN | Does not include network folders below the domain level in the treeview control. |
| %BIF_EDITBOX | Includes an edit control in the dialog box that allows the user to type the name of an item. |
| % BIF_NEWDIALOGSTYLE (5.0) | Provides the new user interface, a larger dialog box that can be resized. It also offers drag-and-drop capability within the dialog box, reordering, shortcut menus, new folders, delete, and other shortcut menu commands. This is the default style implemented by PowerBASIC. |
| % BIF_NONEWFOLDERBU TTON (6.0) | Do not include the "New Folder" button in the dialog box. |
| % BIF_NOTRANSLATETAR GETS (6.0) | When the selected item is a shortcut, return the PIDL of the shortcut itself rather than its target. |
| % BIF_RETURNFSANCEST ORS | Only returns file system ancestors. With any other selection, the OK button is grayed. |
| % BIF_RETURNONLYFSDI RS | Only returns file system directories. With any other selection, the OK button is grayed. |
| %BIF_SHAREABLE (5.0) | The dialog box can display shareable resources on remote systems. It is intended for applications that want to expose remote shares on a local system. The % BIF_NEWDIALOGSTYLE flag must also be set. |
| %BIF_UAHINT (6.0) | When this flag is combined with % BIF_NEWDIALOGSTYLE, adds a usage hint to the dialog box in place of the edit box. |
| %BIF_USENEWUI (5.0) | Use the new user interface, plus an edit box. |
| <i>folder\$</i> | Contains the drive letter and path to the folder the user selected. If an error occurs or the user clicks the cancel button, this variable is set to a nul, zero-length string. |
| See also | DISPLAY COLOR , DISPLAY FONT , DISPLAY OPENFILE , DISPLAY SAVEFILE |

DISPLAY COLOR statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

DISPLAY COLOR statement

Purpose

Display a color selection dialog to return the user's choice.

Syntax

DISPLAY COLOR [*hParent*], [*xpos&*], [*ypos&*], *firstcolor&*, *custcolors*, *flags&*
TO *colorval&*

hParent

[Handle](#) of the [parent](#) window or dialog. If there is no parent, use zero (0) or %
HWND_DESKTOP.

| | | | | | | | |
|----------------------------------|--|---------------------------|---|----------------------------------|---|---------------------------|---|
| <i>xpos&</i> | Horizontal position, in pixels , relative to the parent window. If omitted, PowerBASIC selects the position (offset from the parent, or centered if no parent). | | | | | | |
| <i>ypos&</i> | Vertical position, in pixels, relative to the parent window. If missing, PowerBASIC selects the position (offset from the parent, or centered if no parent). | | | | | | |
| <i>firstcolor&</i> | Specifies the RGB color which is initially selected when the dialog box is created. | | | | | | |
| <i>custcolors</i> | User-Defined Type variable which is used to initialize and return 16 custom colors on the dialog. The UDT must have 16 members, each of which is a long integer or dword . They may be scalar members, or a member array . | | | | | | |
| <i>flags&</i> | The style attributes of the COLOR Dialog. The following values may be used alone or combined, and are predefined in the PowerBASIC compiler: <table> <tr> <td><code>%CC_FULLOPEN</code></td> <td>Causes the entire dialog box to appear when created, including the section which allows the user to create custom colors.</td> </tr> <tr> <td><code>%CC_PREVENTFULLOPEN</code></td> <td>Disables the "Define Custom Colors" button, preventing the creation of custom colors.</td> </tr> <tr> <td><code>%CC_SHOWHELP</code></td> <td>Causes the Help Button to be displayed. The <i>hParent</i> parameter must not be zero or <code>%HWND_DESKTOP</code>.</td> </tr> </table> | <code>%CC_FULLOPEN</code> | Causes the entire dialog box to appear when created, including the section which allows the user to create custom colors. | <code>%CC_PREVENTFULLOPEN</code> | Disables the "Define Custom Colors" button, preventing the creation of custom colors. | <code>%CC_SHOWHELP</code> | Causes the Help Button to be displayed. The <i>hParent</i> parameter must not be zero or <code>%HWND_DESKTOP</code> . |
| <code>%CC_FULLOPEN</code> | Causes the entire dialog box to appear when created, including the section which allows the user to create custom colors. | | | | | | |
| <code>%CC_PREVENTFULLOPEN</code> | Disables the "Define Custom Colors" button, preventing the creation of custom colors. | | | | | | |
| <code>%CC_SHOWHELP</code> | Causes the Help Button to be displayed. The <i>hParent</i> parameter must not be zero or <code>%HWND_DESKTOP</code> . | | | | | | |
| <i>colorval&</i> | The RGB value of the selected color. If the user fails to make a color selection, or chooses CANCEL, the value -1 is assigned to the <i>colorval&</i> variable. | | | | | | |
| Remarks | If you offer the user the ability to create custom colors, it is suggested you retain the <i>custcolors&</i> UDT variable without change. It may then be used again on a later invocation of DISPLAY COLOR with the user's custom colors intact. | | | | | | |
| See also | Built In RGB Color Equates , DISPLAY BROWSE , DISPLAY FONT , DISPLAY OPENFILE , DISPLAY SAVEFILE , RGB | | | | | | |

DISPLAY FONT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

DISPLAY FONT statement

| | |
|------------------|---|
| Purpose | Display a selection dialog to return user choices. |
| Syntax | <code>DISPLAY FONT [hParent], [xpos&], [ypos&], defname\$, defpoints&, defstyle&, flags& _ TO fontname\$, points&, style& [,colorval&, charset&]</code> |
| <i>hParent</i> | Handle of the parent window or dialog. If there is no parent, use zero (0) or <code>%HWND_DESKTOP</code> . |
| <i>xpos</i> | Horizontal position, in pixels , relative to the parent window. If omitted, PowerBASIC selects the position (offset from the parent, or centered if no parent). |
| <i>ypos</i> | Vertical position, in pixels, relative to the parent window. If missing, PowerBASIC selects the position (offset from the parent, or centered if no parent). |
| <i>defname\$</i> | The name of the default, pre-selected font which will be initially highlighted when the font |

dialog is displayed. A default font may be disabled by passing a nul, zero-length ("").

defpoints& The point size of the default, pre-selected font.

defstyle& The style attribute of the default, pre-selected font. See the specific definition of *style&* below.

flags& The style attributes of the FONT Dialog. The following values may be used alone or combined, and are predefined in the PowerBASIC compiler:

| | |
|---------------------------------|---|
| <code>%CF_BOTH</code> | Causes the dialog box to list both screen and printer fonts. |
| <code>%CF_TTONLY</code> | Specifies that Font selection dialog should only enumerate and allow the selection of TrueType fonts. |
| <code>%CF_EFFECTS</code> | Specifies that Font selection dialog should enable strikeout, underline, and color effect choices. |
| <code>%CF_FIXEDPITCHONLY</code> | Specifies that Font selection dialog should select only fixed-pitch fonts. |
| <code>%CF_FORCEFONTEXIST</code> | Specifies that Font selection dialog should indicate an error condition if the user attempts to select a font or style that does not exist. |
| <code>%CF_NOSTYLESEL</code> | Specifies that Font selection dialog should not make an initial style selection. |
| <code>%CF_NOSIZESEL</code> | Specifies that Font selection dialog should not make an initial size selection. |
| <code>%CF_NOSIMULATIONS</code> | Specifies that Font selection dialog should not allow graphics device interface (GDI) font simulations. |
| <code>%CF_NOVECTORFONTS</code> | Specifies that Font selection dialog should not allow vector font selections. |
| <code>%CF_PRINTERFONTS</code> | Causes the Font selection dialog box to list only the fonts supported by the printer. |
| <code>%CF_SCALABLEONLY</code> | Specifies that Font selection dialog should allow only the selection of scalable fonts. (Scalable fonts include vector fonts, scalable printer fonts, TrueType fonts, and fonts scaled by other technologies.) |
| <code>%CF_SCREENFONTS</code> | Causes the Font selection dialog box to list only the screen fonts supported by the system. |
| <code>%CF_WYSIWYG</code> | Specifies that the Font selection dialog should allow only the selection of fonts available on both the printer and the display. If this flag is specified, the <code>%CF_BOTH</code> and <code>%CF_SCALABLEONLY</code> flags should also be specified. |

fontname\$ The name of the font selected by the user

points& The point size of the font selected by the user.

style& The style attribute of the selected font. Any of the following values can be combined or used alone:

- 0 Normal
- 1 Bold
- 2 Italic
- 4 Underline
- 8 Strikeout

For example, if a *style&* value of 3 is returned, it specifies that a combination of both bold and italic attributes was selected by the user.

colorval& The [RGB](#) value of the selected color.

charset& The chosen character set - 0 if a standard U.S. charset.

See also [CONTROL SET FONT](#), [DIALOG DEFAULT FONT](#), [DISPLAY BROWSE](#), [DISPLAY](#)

[COLOR](#), [DISPLAY OPENFILE](#), [DISPLAY SAVEFILE](#), [FONT END](#), [FONT NEW](#),
[GRAPHIC SET FONT](#), [XPRINT SET FONT](#)

DISPLAY OPENFILE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

DISPLAY OPENFILE statement

Purpose Display an OpenFile selection dialog to return user choices.

Syntax `DISPLAY OPENFILE [hParent], [xpos&], [ypos&], title$, folder$, filter$, _
start$, defextn$, flags& TO filevar$ [,countvar&]`

hParent [Handle](#) of the [parent](#) window or [dialog](#). If there is no parent, use zero (0) or %
HWND_DESKTOP.

xpos& Horizontal position, in [pixels](#), relative to the parent window. If omitted, PowerBASIC
selects the position (offset from the parent, or centered if no parent).

ypos& Vertical position, in pixels, relative to the parent window. If missing, PowerBASIC selects
the position (offset from the parent, or centered if no parent).

title\$ The title to be displayed in the title bar of the dialog box. If this parameter is a null
, the title "Open" is displayed.

folder\$ The name of the initial file directory to be displayed. If this parameter is a null string, the
current directory is used. Future invocations remember and use the ending directory,
rather than honoring a null string for the current directory.

filter\$ A [string expression](#) containing pairs of null-terminated filter strings. The first string in
each pair describes the filter, and the second the filter pattern. For example, if you wish
to display BASIC source files, you might use an expression like:

```
"BASIC" + CHR$(0) + "*.BAS" + CHR$(0)
```

A simpler method using the unique characteristics of the [CHR\\$\(\)](#) function in PowerBASIC
to achieve the same result:

```
CHR$("BASIC", 0, "*.BAS", 0)
```

Multiple filters can be designated for a single item by separating filter pattern strings with
a semicolon:

```
CHR$("BASIC", 0, "*.BAS;*.INC;*.BAK", 0)
```

start\$ A string which specifies the starting file name to be used as the initial file selection. This
may be disabled by passing a null, zero-length string ("").

defextn\$ A default extension to be appended to the selected file name if the user does not enter it.
This may be disabled by passing a null, zero-length string ("").

flags& The style attributes of the OPENFILE Dialog. The following values may be used alone or
combined, and are predefined in the PowerBASIC compiler:

| | |
|-----------------------|--|
| %OFN_ALLOWMULTISELECT | Multiple selections are allowed. If the user chooses multiple items, the return value consists of multiple file names which are null-terminated. |
| %OFN_CREATEPROMPT | The user may specify a file which does not exist. |

| | |
|-------------------------|---|
| %OFN_ENABLESIZING | The dialog may be resized by the user, but future invocations remember and use the ending size and screen location, rather than honoring <i>xpos</i> and <i>ypos</i> parameter values. The position parameters are ignored. |
| %OFN_EXPLORER | The dialog uses the Explorer style interface. This is the default condition, even if the flag is not set. |
| %OFN_FILEMUSTEXIST | The user may not specify a file which does not exist. |
| %OFN_NODEREFERENCELINKS | The dialog returns the name of the selected shortcut (.LNK) file. If this value is not given, the name of the file referenced by the shortcut is returned. |
| %OFN_NONETWORKBUTTON | Hides and disables the network button. |
| %OFN_NOTESTFILECREATE | The file is not created before the dialog is closed. |
| %OFN_NOVALIDATE | The file name is not validated for invalid characters. |
| %OFN_PATHMUSTEXIST | The user may type only valid paths and filenames. |
| %OFN_SHAREAWARE | If the dialog fails because of a network sharing violation, the error is ignored and the selected filename is returned. |
| %OFN_SHOWHELP | The help button is displayed. |

Return Values*filevar\$*

If the user selects one file, this variable receives the drive, path, and name of that file, followed by a \$NUL terminator. If the user selects no files, an error occurs, or cancel/close is chosen, this variable is set to a null, zero-length string.

If the user selects multiple files, and specified the flag %OFN_ALLOWMULTISELECT, the returned string consists of the path name (which applies to all selected files), followed by each of the file names of the selected files. Each of these text items are delimited in the returned string by a nul - [CHR\\$\(0\)](#). You can extract each of the multiple names with the [PARSE\\$\(\)](#) function or the [PARSE](#) statement.

Windows imposes a text limit of 32K (32,768 bytes) for the returned string value. If it is exceeded, a nul, zero-length string is returned.

countvar&

If this optional [long integer](#) variable is included, it receives a count of the number of file names which were selected by the user.

Remarks

The current default directory is never altered by this statement, even if the user changes the directory while searching for files.

See also

[DISPLAY BROWSE](#), [DISPLAY COLOR](#), [DISPLAY FONT](#), [DISPLAY SAVEFILE](#)

DISPLAY SAVEFILE statement**Keyword Template****Purpose****Syntax****Remarks****See also****Example****DISPLAY SAVEFILE statement****Purpose**

Display a SaveFile selection dialog to return user choices.

| | | |
|-------------------|--|---|
| Syntax | <code>DISPLAY SAVEFILE [hParent], [xpos&], [ypos&], title\$, folder\$, filter\$, _ start\$, defext\$, flags& TO filevar\$ [,countvar&]</code> | |
| <i>hParent</i> | Handle of the parent window or dialog . If there is no parent, use zero (0) or % HWND_DESKTOP. | |
| <i>xpos&</i> | Horizontal position, in pixels , relative to the parent window. If omitted, PowerBASIC selects the position (offset from the parent, or centered if no parent). | |
| <i>ypos&</i> | Vertical position, in pixels, relative to the parent window. If missing, PowerBASIC selects the position (offset from the parent, or centered if no parent). | |
| <i>title\$</i> | The title to be displayed in the title bar of the dialog box. If this parameter is a null , the title "Save As" is displayed. | |
| <i>folder\$</i> | The name of the initial file directory to be displayed. If this parameter is a null string, the current directory is used. | |
| <i>filter\$</i> | A string expression containing pairs of null-terminated filter strings. The first string in each pair describes the filter, and the second the filter pattern. For example, if you wish to display BASIC source files, you might use an expression like: <pre>"BASIC" + CHR\$(0) + "*.BAS" + CHR\$(0)</pre> A simpler method using the unique characteristics of the CHR\$() function in PowerBASIC to achieve the same result: <pre>CHR\$("BASIC", 0, "*.BAS", 0)</pre> Multiple filters can be designated for a single item by separating filter pattern strings with a semicolon: <pre>CHR\$("BASIC", 0, "*.BAS;*.INC;*.BAK", 0)</pre> | |
| <i>start\$</i> | A string which specifies the starting file name to be used as the initial file selection. This may be disabled by passing a nul, zero-length string (""). | |
| <i>defext\$</i> | A default extension to be appended to the selected file name if the user does not enter it. This may be disabled by passing a nul, zero-length string (""). | |
| <i>flags&</i> | The style attributes of the SAVEFILE Dialog. The following values may be used alone or combined, and are predefined in the PowerBASIC compiler: | |
| | <code>%OFN_ALLOWMULTISELECT</code> | Multiple selections are allowed. If the user chooses multiple items, the return value consists of multiple file names which are null-terminated. |
| | <code>%OFN_CREATEPROMPT</code> | The user may specify a file which does not exist. |
| | <code>%OFN_ENABLESIZING</code> | The dialog may be resized by the user, but future invocations remember and use the ending size and screen location, rather than honoring <i>xpos</i> and <i>ypos</i> parameter values. The position parameters are ignored. |
| | <code>%OFN_EXPLORER</code> | The dialog uses the Explorer style interface. This is the default condition, even if the flag is not set. |
| | <code>%OFN_FILEMUSTEXIST</code> | The user may not specify a file which does not exist. |
| | <code>% OFN_NODEREFERENCELINK S</code> | The dialog returns the name of the selected shortcut (.LNK) file. If this value is not given, the name of the file referenced by the shortcut is returned. |
| | <code>%OFN_NONETWORKBUTTON</code> | Hides and disables the network button. |
| | <code>%OFN_NOTESTFILECREATE</code> | The file is not created before the dialog is closed. |
| | <code>%OFN_NOVALIDATE</code> | The file name is not validated for invalid characters. |
| | <code>%OFN_PATHMUSTEXIST</code> | The user may type only valid paths and filenames. |
| | <code>%OFN_OVERWRITEPROMPT</code> | The user may select a filename that already exists. |
| | <code>%OFN_SHAREAWARE</code> | If the dialog fails because of a network sharing violation, the error is ignored and the selected |

filename is returned.

%OFN_SHOWHELP

The help button is displayed.

Return Values*filevar\$*

If the user selects one file, this variable receives the drive, path, and name of that file. If the user selects no files, an error occurs, or cancel/close is chosen, this variable is set to a nul, zero-length string.

If the user selects multiple files, and specified the flag %OFN_ALLOWMULTISELECT, the returned string consists of the path name (which applies all selected files), followed by each of the file names of the selected files. Each of these text items are delimited in the returned string by a nul - [CHR\\$\(0\)](#). You can extract each of the multiple names with the [PARSE\\$\(\)](#) function or the [PARSE](#) statement.

Windows imposes a text limit of 32K (32,768 bytes) for the returned string value. If it is exceeded, a nul, zero-length string is returned.

countvar&

If this optional [long integer](#) variable is included, it receives a count of the number of file names which were selected by the user.

Remarks

The current default directory is never altered by this statement, even if the user changes the directory while searching for files.

See also

[DISPLAY BROWSE](#), [DISPLAY COLOR](#), [DISPLAY FONT](#), [DISPLAY OPENFILE](#)

DLLMAIN function**LIBMAIN function****Purpose**

LIBMAIN (or its synonym DLLMAIN) is an optional user-defined function called by Windows each time a [DLL](#) is loaded into, and unloaded from, memory. The [PBLIBMAIN](#) function performs a similar task to LIBMAIN, but takes no parameters.

Syntax

```
FUNCTION { LIBMAIN | DLLMAIN } ( _
    BYVAL hInstance AS DWORD, _
    BYVAL lReason AS LONG, _
    BYVAL lReserved AS LONG ) AS LONG
```

In 32-bit Windows, LIBMAIN is called by Windows each time a DLL is loaded or unloaded by an application or process, and (usually) when a thread is started and stopped. Your code should never call LIBMAIN.

Remarks

The LIBMAIN / DLLMAIN function provides the following parameters:

hInstance

The unique instance handle of the DLL. This handle is used by the calling application to identify the DLL. The instance handle value is commonly used to load [resources](#) embedded within the DLL, and to obtain the actual file name of the DLL (via the GetModuleFilename API function). In these cases, it is common to copy the *hInstance* value to a [global](#) variable, allowing the instance handle value to be utilized elsewhere in the DLL.

lReason

This flag indicates why the DLL entry-point is being called. It can be one of the following values (as defined in [WIN32API.INC](#)):

%

DLL_PROCESS_ATTACH

Indicates that the DLL is being loaded by a process (another DLL or EXE is loading the DLL). DLLs can use this opportunity to initialize any instance or global data, such as [arrays](#). *lReserved* is zero if the DLL is being loaded explicitly (run-time linking) using LoadLibrary(), or non-zero if the DLL is being loaded implicitly (load-time linking) during process initialization.

%

DLL_PROCESS_DETACH

Indicates that the DLL is being cleanly unloaded or detached from the calling application. DLLs can take this opportunity to clean up all resources for all threads

| | |
|--------------------|--|
| | <p>attached and known to the DLL. This is functionally equivalent to the WEP function in 16-bit DLLs.</p> <p><i>Reserved</i> is zero if LIBMAIN was executed via the FreeLibrary API and the DLLs reference count reached zero (no further instances of the DLL are loaded), or non-zero if LIBMAIN is executed during process termination. A %DLL_PROCESS_DETACH does not generate %DLL_THREAD_DETACH for active threads.</p> |
| %DLL_THREAD_ATTACH | Indicates that the DLL is being loaded by a new thread in the calling application. DLLs can use this opportunity to initialize any Thread Local Storage (TLS). This execution occurs in the context of the new thread. |
| %DLL_THREAD_DETACH | Indicates that the thread is exiting cleanly. If the DLL has allocated any thread-specific storage (Thread Local Storage or TLS), it should be released. This may occur even if there was no matching %DLL_THREAD_ATTACH call. A %DLL_PROCESS_DETACH does not generate %DLL_THREAD_DETACH for active threads. |
| <i>Reserved</i> | The <i>Reserved</i> parameter specifies further aspects of the DLL initialization and cleanup. If <i>Reason</i> is %DLL_PROCESS_ATTACH, <i>Reserved</i> is zero (0) for explicit (dynamic) loads and non-zero for implicit loads. If <i>Reason</i> is %DLL_PROCESS_DETACH, <i>Reserved</i> is zero if LIBMAIN has been called by using the FreeLibrary API call, and non-zero if LIBMAIN has been called during process termination. |
| Return value | If LIBMAIN is called with %DLL_PROCESS_ATTACH, your LIBMAIN function should return a zero (0) if any part of your initialization process fails, or a one (1) if no errors were encountered. If a zero is returned, Windows will abort and unload the DLL from memory. When LIBMAIN is called with any other value than %DLL_PROCESS_ATTACH, the return value is ignored. |
| Restrictions | <p>Note that Windows does not guarantee that LIBMAIN will be called in a "balanced" manner. For example, a %DLL_PROCESS_ATTACH is not followed by a %DLL_THREAD_ATTACH for the primary thread. In some conditions, %DLL_THREAD_DETACH may not occur at all. Further discussion on these Windows traits are beyond the scope of this documentation; however, an excellent source of information can be found in "Win32 Programming", Rector/Newcomer, ISBN 0-201-63492-9.</p> <p>At the point where a DLL is loaded into memory during process startup, Windows only guarantees that the KERNEL32.DLL system library will be loaded in memory. On this basis, API calls made from within LIBMAIN must be restricted to the range of API functions present in KERNEL32.DLL, with the exception of the LoadLibrary, LoadLibraryEx, and FreeLibrary API functions.</p> <p>In addition, code within LIBMAIN must not call API functions in any other DLL (for example, USER32.DLL, SHELL32.DLL, ADVAPU32.DLL, GDI32.DLL, etc), because some API functions in those DLLs may attempt to load other libraries via LoadLibrary, etc. For example, never call the MessageBox API function from within LIBMAIN, nor use the related MSGBOX function or MSGBOX statement.</p> <p>Failure to observe these restrictions will result in Access Violation or General Protection Faults (GPFs), typically caused by the execution of code in DLLs that has yet to be initialized.</p> |
| See also | DLLMAIN , PBLIBMAIN , PBMMAIN , THREAD CREATE , WINMAIN |
| Example | <pre>#DIM ALL #COMPILE DLL "LIBTEST.DLL" #include "WIN32API.INC" GLOBAL gNumOfTimes AS DWORD FUNCTION LIBMAIN(BYVAL hInstance AS DWORD, _ BYVAL lReason AS LONG, _</pre> |

```

BYVAL lReserved AS LONG) AS LONG

INCR gNumOfTimes

SELECT CASE AS LONG lReason

CASE %DLL_PROCESS_ATTACH
    ' This DLL has been mapped into the memory context of
    ' the calling program, and can be initialized as required.
    ' Here we return a non-zero LIBMAIN result to indicate success.
    LIBMAIN = 1
    EXIT FUNCTION

CASE %DLL_PROCESS_DETACH
    ' This DLL is about to be unloaded
    EXIT FUNCTION

CASE %DLL_THREAD_ATTACH
    ' A [New] thread is starting (see THREADID)
    EXIT FUNCTION

CASE %DLL_THREAD_DETACH
    ' This thread is closing (see THREADID)
    EXIT FUNCTION

END SELECT

' Theoretically execution should never get to this point.
' However, if the DLL is being implicitly linked then return
' Zero (0) and the process (program) will fail to start
' running. For Explicit linking, returning Zero (0) will
' simply cause the LoadLibrary/LoadLibraryEx API call to fail.
LIBMAIN = 0 ' Indicate failure to initialize the DLL!
END FUNCTION

SUB TestIt ALIAS "TestIt" () EXPORT
    MSGBOX "TestIt" + $CRLF + "_"gNumOfTimes =" + STR$(gNumOfTimes)
END SUB

```

DO/LOOP statements

DO/LOOP statements

| | |
|----------------|---|
| Purpose | Define a group of program statements that are executed repetitively as long as a certain condition is met. |
| Syntax | <pre> DO [{WHILE UNTIL} <i>expression</i>] [<i>statements</i>] [EXIT LOOP] [<i>statements</i>] [ITERATE LOOP] [<i>statements</i>] LOOP [{WHILE UNTIL} <i>expression</i>] </pre> |
| Remarks | <p><i>expression</i> is a numeric expression, in which non-zero values represent logical TRUE, and zero values represent logical FALSE. If a string expression is used (i.e., A\$ <> ""), PowerBASIC returns TRUE if the length of result of the string expression is greater than zero.</p> <p>DO/LOOP statements are extremely flexible. They can be used to create loops for</p> |

almost any imaginable programming situation. They allow you to create loops with the test for the terminating condition at the top of the loop, the bottom of the loop, both places, or none of the above.

A DO statement must always be paired with a matching LOOP statement at the bottom of the loop. Failure to match each DO with a LOOP results in either a compile-time [Error 448](#) ("DO loop expected") or an [Error 456](#) ("LOOP/WEND expected").

The WHILE and UNTIL keywords are used to add tests to a DO/LOOP. Use the WHILE if the loop should be repeated if *expression* is TRUE, and terminated if *expression* is FALSE. UNTIL has the opposite effect; that is, the loop will be terminated if *expression* is TRUE, and repeated if FALSE.

For example:

```
DO WHILE a = 13
  [statements]
LOOP
```

executes the statements between DO and LOOP as long as *a* is 13. If *a* is not 13 initially, the statements in the loop are never executed. Conversely:

```
DO UNTIL a = 13
  [statements]
LOOP
```

executes the statements between DO and LOOP as long as *a* is not 13. If *a* equals 13 initially, the loop is never executed.

At any point in a DO/LOOP, you can include an [EXIT LOOP](#) or [ITERATE LOOP](#) statement. EXIT LOOP causes the loop to terminate, so that execution continues *after* the terminating loop statement. ITERATE LOOP causes the loop to continue *at* the terminating loop statement.

The [WHILE/WEND](#) statements can be used in many cases to perform the same functions as DO/LOOP. For example, this DO/LOOP:

```
DO WHILE a < b
  [statements]
LOOP
```

has the same effect as this WHILE/WEND loop:

```
WHILE a < b
  [statements]
WEND
```

When using nested loops, be careful that inner loops do not modify variables that are used by the outer loop's terminating condition test. For example, the following code was intended to get all 20 elements of a 10x2 [array](#) (dimensioned *arry(9,1)*):

```
Count1 = 0
DO WHILE Count1 < 10
  FOR Count2 = 0 TO 1
    x = arry(Count1,Count2)
    Count1 = Count1 + 1
  NEXT Count2
LOOP
```

Because *Count1* is incremented within the inner loop, which executes twice for each pass through the outer loop, this code would not get all the array values, but would only get the values for *arry(0,0)*, *arry(1,1)*, *arry(2,0)*, *arry(3,1)* and so on. By moving the *Count1 = Count1 + 1* statement to just below the [NEXT](#) *Count2* statement, the code functions as intended.

If an EXIT LOOP statement is used within nested loops, it exits only the current loop, not the entire nest. Similarly, an ITERATE within nested loops iterates the current loop. For advice on exiting nested block structures, please refer to the EXIT statement. The PowerBASIC

can be used to construct multiple test conditions for loop control. For example:

```
DO WHILE x < 10 AND y < 10
  [statements]
LOOP
```

is executed only as long as both *x* and *y* are less than 10. Similarly, the loop:

```
DO UNTIL X > 10 OR Y > 10
  [statements]
LOOP
```

is executed until either *x* or *y* (or both) is (are) greater than 10. See the

and [Arithmetic Operators](#) topics for more information about using logical operators.

Although the compiler doesn't care about such things, it is a good idea when writing your source code to indent the statements between DO and LOOP. The same is true of [FOR/NEXT](#) loops, WHILE/WEND loops, and multi-line [IF](#) statements. Such indenting makes the appearance of your source code reflect the logical structure of your program, resulting in greater readability. Indenting is particularly valuable when nesting multiple loops of the same type, since it makes it easier to see which LOOP goes with which DO.

Also see the discussion on the IF statement for notes on PowerBASIC's Short-circuit evaluation and its possible side effects.

See also [#OPTIMIZE](#), [EXIT](#), [FOR EACH/NEXT](#), [FOR/NEXT](#),
, [ITERATE](#), [WHILE/WEND](#)

ENUM/END ENUM statements

Keyword Template

Purpose

Syntax

Remarks

See also

Example

ENUM/END ENUM statements New!

Purpose Creates a group of logically related [numeric equates](#).

Syntax

```
ENUM Name [SINGULAR] [BITS] [AS COM]
  EquateName [= value]
  EquateName [= value]
  ...
END ENUM
```

Remarks PowerBASIC allows you to refer to integral numeric constants by name. These names are called equates, and are visible throughout your program. If you need a set of equates which are logically related, you can define them as a group in an enumeration. This provides meaningful names for the enumeration, its members, and therefore the name by which it is referenced.

When an equate is created in an enumeration, its name is composed of a leading percent sign (%), the enumeration name, a period (.), and then the member name. For example:

```
ENUM abc
  count = 7
END ENUM
```

In the above example, the equate is referenced as `%abc.count`, and returns the value

seven (7).

Each member of an enumeration may be assigned a specific integral value (in the range of a 64-bit [quad](#) integer) by using the optional [=value] syntax. In this case, only a constant value (or a simple constant/literal expression) may be assigned to it. If an expression is used, all of the terms in the expression must be constants; numeric equates; bitwise operators like [AND](#), [OR](#), [NOT](#); arithmetic operators +, -, *, /, \; the relational operators >, <, >=, <=, <>, =; and the [CVQ](#) function.

If the [=value] option is omitted, each member of the enumeration is assigned an integral value in sequence beginning with the value 0. If one or more equates are assigned an explicit value, equates which follow are assigned the next value in the sequence. For example:

```
ENUM abc
  direction
  count = 8
  scope
END ENUM
```

In the above example, `%abc.direction = 0`, `%abc.count = 8`, and `%abc.scope = 9`.

BITS

If the BITS option is included, the members are auto-assigned values suitable for use as a bit mask, increasing as integral powers of two. The first member is auto-assigned the value 0, the next is 1, then 2, 4, 8, 16, etc. If one or more are assigned an explicit value, equates which follow are assigned the next value in the sequence. For example:

```
ENUM abc BITS
  direction = 1
  count = 8
  scope
END ENUM
```

In the above example, `%abc.direction = 1`, `%abc.count = 8`, and `%abc.scope = 16`.

SINGULAR

If the SINGULAR option is included, the member name is the complete name, without the ENUM name or the period. The equate is referenced by just the member name with a percent (%) prepended. For example:

```
ENUM abc SINGULAR
  count = 7
END ENUM
```

In the above example, the equate would normally be referenced by the compound name `%abc.count`. However, since it includes the SINGULAR option, it is referenced by the simplified name `%count`.

AS COM

If you are using a version of PowerBASIC which creates COM servers, you can easily include these equates in your type library; just append the words AS COM to the ENUM definition.

END statement

END statement **New!**

| | |
|----------------|---|
| Purpose | Terminate program immediately. |
| Syntax | <code>END [nErrorLevel&]</code> |
| Remarks | Normally, PowerBASIC programs are terminated when you exit the PBMAIN or WINMAIN() function. It should always be your goal to end programs in this fashion, so that the compiler and the operating system can do everything possible to leave things in an orderly state. |

The END statement is an alternative termination method which should only be used in limited circumstances. It may be helpful in emergency situations, such as a fatal error

like "out of memory". It's also useful (temporarily) in the conversion of DOS programs, just for the sake of compatibility. However, once conversion is complete, you should eliminate it as soon as possible.

The optional *nErrorLevel*& value has an effective range of 0 to 255. Batch files may act on the result through the IF [NOT] ERRORLEVEL batch command.

Restrictions END may not be used in a [DLL](#). END is intended only for temporary use in converting DOS programs to Windows. You should convert it to the standard [EXIT FUNCTION](#) method as soon as possible. It should be avoided while any [COM objects](#) are active.

See also [EXIT](#), [PBMAIN](#), [WINMAIN](#)

ENVIRON statement

ENVIRON statement

Purpose Modify the current program's environment table.

Syntax `ENVIRON envstring$`

Remarks Modify the environment table for the current program and any subsequent child programs that are launched. A single [string expression](#) parameter sets both the name of the environment variable and its value, delimited by an equal ("=") sign. If a value is not specified, the variable is removed from the environment table.

See also [ENVIRON\\$](#)

Example

```
ENVIRON "SETMODE=YES"      ' SETMODE = "YES"
ENVIRON "SETMODE="        ' Removes SETMODE
```

ENVIRON\$ function

ENVIRON\$ function

Purpose Retrieve information from the current program's environment table.

Syntax `s$ = ENVIRON$({parameter_string / n})`

Remarks *parameter_string* is a [string expression](#) denoting which environment parameter is to be retrieved. *n* is an

expression, starting at 1.

If a

argument is used, ENVIRON\$ returns the text that follows *parameter_string* (after the equal sign) in the environment table. If *parameter_string* is not found, or no text follows the equal sign in the environment string table, an empty string is returned.

If the numeric argument is used, it acts as an index into the environment table. ENVIRON\$ returns a string containing the *n*th parameter from the start of the table. If there is no *n*th parameter, an empty string is returned. If the index is negative, private Windows variables are returned.

When launching a program from within the [IDE](#), PowerBASIC sets the "PBIDE" environment variable with the IDE name and version number. For example, "CCEDIT 5.00" or "PBEDIT 9.00". Similarly, when running in the [debugger](#), the "PBDEBUG" environment string will return the IDE name and version.

Programs can use these environment strings to detect their "mode" of operation, for example, to signal a program to save internal data to a disk file, and when to display helpful debugging information. [DLLs](#) created with [PB/Win](#) can also examine these environment strings and adapt behavior accordingly. This will be of particular interest to

3rd-party DLL programmers who create libraries and add-ons for other PowerBASIC programmers.

Restrictions When a program (process) starts, it is given its own local environment table, which is typically a copy of the parent program's environment table. ENVIRON\$ works with this local table, not the parent's table.

See also [ENVIRON](#)

Example ' Retrieve the PATH environment variable

```
Path$ = ENVIRON$("PATH")

IF LEN(ENVIRON$("PBDEBUG")) THEN _
  CALL DisplayMyDebugData()

' Enumerate all Environment strings
RESET x&
DO
  INCR x&
  a$ = ENVIRON$(x&)
  ' process a$ here
LOOP WHILE LEN(a$)
```

EOF function

EOF function

Purpose Return the end-of-file status of an opened file or [TCP/UDP](#) transmission.

Syntax *y* = EOF([#] *filenum*&)

Remarks Use EOF to determine when the end of a file has been reached while reading its data. *filenum*& is the file number specified when the file was Opened. EOF returns -1 (TRUE) if the end of the specified file has been reached, or if an error occurs trying to check for the end of the file. Otherwise, EOF returns 0 (FALSE).

If *filenum*& is not a valid, open file, a run-time [Error 53](#) will occur ("File not found"). If *filenum*& is for a [binary file](#), EOF returns TRUE only if the most recent file operation was a read operation, and that operation could not read the requested number of bytes.

The EOF function may also be used with the [COMM LINE](#) and [TCP LINE](#) statements to detect that an incomplete line was received. Normally, these statements read data until a [\\$CRLF](#) character pair is found, and in that case, EOF will return 0 (FALSE). However, even if no \$CRLF has been found, the statements will end when no additional data is available. In that case, they will return whatever data has already been accumulated, and set EOF to -1 (TRUE).

In many cases, it would be prudent to test EOF after every COMM LINE and TCP LINE to verify that a full line has been received. In some cases, you may wish to execute the statement one or more additional times, combining the data, in order to obtain a full line of text.

See also [COMM LINE](#), [LOC](#), [LOF](#), [OPEN](#), [TCP LINE](#)

Example ' Open an ASCII text file and read it

```
hFile = FREEFILE
OPEN "TEXTFILE.TXT" FOR INPUT AS hFile
WHILE ISFALSE EOF(hFile)
  LINE INPUT# hFile, x$
WEND
CLOSE hFile
```

EQV operator

EQV operator

Purpose The EQV operator works as both a logical and a bitwise [arithmetic operator](#).

Syntax `p EQV q`

Remarks **Using EQV as a logical operator**

EQV returns TRUE (non-zero) if *at least* one bit in one operand contains the same value as the identical bit position in the other operand. Further, EQV will return zero if and only if there are no matching bit values between the two operands. This can occur when one operand is equal to the bitwise [NOT](#) value of the other operand. For example:

```
IF x EQV y = 0 THEN statement
```

...is equivalent to:

```
IF x = NOT y THEN statement
```

The EQV operator can be used for comparing signed and unsigned values of the same bit size, such as [Long-integer](#) and [Double-word](#). This use of EQV is similar to using the BITS functions; however, care must be exercised to test the return value of EQV correctly, since EQV will return an unsigned value with all bits set *only* if the bit patterns of the two operands are an *exact match*.

The EQV truth table looks like this:

| Truth table | | |
|-------------|---|---------|
| x | y | x EQV y |
| T | T | T |
| T | F | F |
| F | T | F |
| F | F | T |

Using EQV as a bitwise arithmetic operator

The EQV operator is seldom used as a bitwise arithmetic operator, but here is an example:

```

      1001 0111 0000 0000 = &H09700
EQV  0011 1111 1111 1111 = &H03FFF (the mask)
-----
      0101 0111 0000 0000 = &H05700 (result)
MSB  ↑                               ↑  LSB (bit 0)

```

See also [Arithmetic Operators](#), [AND](#), [IMP](#), [ISFALSE](#), [ISTRUE](#), [LET](#), [NOT](#), [OR](#), [XOR](#)

Example

```

IF (Var1& EQV Var2???) = BITS???(~1&) THEN ...
IF (Val1% EQV Var2???) = &H0FFFF?? THEN ...
IF ~1& EQV BITS???(~1&) = &H0FFFFFFF THEN ...
IF ~1% EQV BITS???(~1%) = &H0FFFF THEN ...

```

ERASE statement

ERASE statement

Purpose Deallocate [array](#) memory and release it from memory.

Syntax `ERASE array[()] [, array[()]] ...`

Remarks Any memory assigned to the individual elements (if they are [dynamic strings](#), [Objects](#), [Variants](#), etc.) is also released. ERASE deallocates all the memory for [LOCAL](#), [STATIC](#), and [GLOBAL](#) arrays. After an array is erased, attempting to access the array may produce a General Protection Fault (GPF). Local arrays are implicitly erased upon exit from the [Sub/Function/Method/Property](#) that created them.

array The name of the array to deallocate. Parentheses are optional, but are recommended for clarity of the source code.

One method to check if an array has been dimensioned without triggering a GPF is to use the [LBOUND](#) and [UBOUND](#) functions, as follows:

```
IF UBOUND(array) - LBOUND(array) = -1 THEN
  ' array() is not allocated
END IF
```

ERASE can deallocate an array that was passed as a parameter to a procedure, but only if the array was passed by reference (BYREF). To clear the contents of an array back to its initialized state, use [REDIM](#) or [RESET](#).

Restrictions Absolute arrays (those created by [DIM...AT](#)) are handled differently by ERASE. An explicit ERASE will release the individual elements of an absolute array, if needed, but the full data block is left as-is because no assumptions can be made as to its origin. It is the programmer's responsibility to ensure that the memory block overlaid by the absolute array is handled correctly. In an implied ERASE (Sub/Function/Method/Property exit) of a LOCAL absolute array, the internal array descriptor is deactivated, but no changes of any kind are made to the individual data elements or the full block. RESET may be used to set arrays to zeroes or empty strings without releasing the data block.

See also [ARRAYATTR](#), [DIM](#), [REDIM](#), [RESET](#)

Example `ERASE Array1$(), MyArray%()`

ERL system variable

ERL system variable

Purpose Return the last [line number](#) encountered before the most recent [error](#).

Syntax `nline = ERL`

Remarks Return the last (most recent) line number that was encountered before the most recent [run-time error](#), within the current [Sub](#), [Function](#), [Method](#), or [Property](#). With ERL, line numbers are of the traditional-basic line numbering variety, not the physical source code line.

See also [ERL\\$](#), [ERR](#), [ERRCLEAR](#), [ERROR](#), [ERROR\\$](#), [Error Overview](#), [Error Trapping](#), [ON ERROR](#)

Example

```
10 ERRCLEAR
20 NAME "a nonexisting filename.txt" AS "abc.txt"
30 IF ERR THEN lErrLine = ERL      ' lErrLine = 20
```

ERL\$ function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

ERL\$ function

| | |
|-----------------|--|
| Purpose | Return the last label , line number , or name executed prior to the most recent error . |
| Syntax | <code>position\$ = ERL\$</code> |
| Remarks | Return a containing the name of the last (most recent) label, line number, or procedure that was executed prior to the most recent run-time error , within the current Sub , Function , Method , or Property . In order to maintain high efficiency levels, the returned name is limited to the first 8 characters of the actual name. |
| See also | ERL , ERR , ERRCLEAR , ERROR , ERROR\$, Error Overview , Error Trapping , ON ERROR |
| Example | <pre>MyLabel: ERRCLEAR NAME "a nonexisting filename.txt" AS "abc.txt" IF ERR THEN Position\$ = ERL\$</pre> |

ERR system variable

ERR and ERRCLEAR system variables

| | |
|---------------------|--|
| Purpose | Return the error code of the most recent PowerBASIC run-time error. |
| Syntax | <pre>y = ERR ERR = ErrNum y = ERRCLEAR ERRCLEAR</pre> |
| Remarks | <p>ERR and ERRCLEAR return the error code of the most recent run-time error in the current Sub, Function, Method, or Property. This number can be tested after any critical operation, so that appropriate error-handling code can be executed.</p> <p>You can also assign a value to ERR. This is similar to executing an ERROR statement, except that no branch to an error trap routine is generated. Instead, subsequent tests of ERR and ERRCLEAR reflect <i>ErrNum</i>.</p> <p>ERRCLEAR returns the error code of the most recent run-time error. In addition, it resets PowerBASIC's internal error code variable ERR to zero after you reference it. Finally, it emulates RESUME FLUSH so that no RESUME execution is needed or allowed. This ensures that the next time you test ERR or ERRCLEAR, you are guaranteed to get a zero, unless a new error has actually occurred in the interim.</p> <p>ERRCLEAR can also be used as a statement to reset ERR to zero.</p> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>IMPORTANT: Be sure to study the Errors and Error Trapping.</p> </div> |
| Restrictions | Valid run-time error values are in the range 0 through 255. A value of 0 indicates no error. Attempting to set an error value (with the ERROR statement) outside of that range will convert the value to a run-time Error 5 ("Illegal function call"). |
| See also | ERROR , ERROR\$, Error Overview , Error Trapping , ON ERROR |
| Example | <pre>y = ERR ' sets y = ERR ERR = 6 ' sets ERR to 6 y = ERRCLEAR ' sets y = ERR and ERR = 0 ERRCLEAR ' sets ERR = 0</pre> |

ERRCLEAR system variable

ERR and ERRCLEAR system variables

| | |
|----------------|---|
| Purpose | Return the error code of the most recent PowerBASIC run-time error. |
|----------------|---|

| | |
|---------------------|---|
| Syntax | <pre> y = ERR ERR = ErrNum y = ERRCLEAR ERRCLEAR </pre> |
| Remarks | <p>ERR and ERRCLEAR return the error code of the most recent run-time error in the current Sub, Function, Method, or Property. This number can be tested after any critical operation, so that appropriate error-handling code can be executed.</p> <p>You can also assign a value to ERR. This is similar to executing an ERROR statement, except that no branch to an error trap routine is generated. Instead, subsequent tests of ERR and ERRCLEAR reflect <i>ErrNum</i>.</p> <p>ERRCLEAR returns the error code of the most recent run-time error. In addition, it resets PowerBASIC's internal error code variable ERR to zero after you reference it. Finally, it emulates RESUME FLUSH so that no RESUME execution is needed or allowed. This ensures that the next time you test ERR or ERRCLEAR, you are guaranteed to get a zero, unless a new error has actually occurred in the interim.</p> <p>ERRCLEAR can also be used as a statement to reset ERR to zero.</p> <div style="border: 1px solid black; padding: 5px; text-align: center;"> IMPORTANT: Be sure to study the Errors and Error Trapping. </div> |
| Restrictions | <p>Valid run-time error values are in the range 0 through 255. A value of 0 indicates no error. Attempting to set an error value (with the ERROR statement) outside of that range will convert the value to a run-time Error 5 ("Illegal function call").</p> |
| See also | ERROR , ERROR\$, Error Overview , Error Trapping , ON ERROR |
| Example | <pre> y = ERR ' sets y = ERR ERR = 6 ' sets ERR to 6 y = ERRCLEAR ' sets y = ERR and ERR = 0 ERRCLEAR ' sets ERR = 0 </pre> |

ERROR statement

ERROR statement

| | |
|-----------------|---|
| Purpose | Cause a run-time error to be generated and sets ERR to the specified error number. |
| Syntax | <code>ERROR ErrNum</code> |
| Remarks | <p>ERROR <i>ErrNum</i> causes a run-time error to be generated and sets ERR to the specified number. Run-time errors are only caught (through the branch to your error trap routine) if you have an active ON ERROR GOTO or a TRY/END TRY block in your code.</p> <p>Valid errors are in the range 1 through 255. Attempting to set an error value outside of that range will convert the value to a run-time Error 5 ("Illegal function call").</p> <p>The compiler reserves codes 0 through 150, and 241 through 255 for run-time errors. You may freely use error codes 151 through 240 for your own purposes.</p> |
| See also | #DEBUG DISPLAY , ERL , ERR , ERRCLEAR , ERROR\$, Error Overview , Error Trapping , ON ERROR |
| Example | <code>ERROR 5 ' generates error 5 "Illegal Function Call"</code> |

ERROR\$ function

ERROR\$ function

| | |
|----------------|--|
| Purpose | Return a containing the descriptive name of a specified PowerBASIC run-time error code. |
|----------------|--|

| | |
|-----------------|---|
| Syntax | <code>msg\$ = ERROR\$(ErrNum)</code> |
| Remarks | <p>ERROR\$ returns the verbose text title of a PowerBASIC run-time error identified by <i>ErrNum</i>.</p> <p><i>ErrNum</i> must be in the range 1 to 255 inclusive. Values outside of this range return "No error". If <i>ErrNum</i> is not specified, ERROR\$ returns the description of the current value of ERR.</p> |
| See also | #DEBUG DISPLAY , ERL , ERR , ERRCLEAR , ERROR , Error Overview , Error Trapping , ON ERROR |
| Example | <code>a\$ = ERROR\$(5) ' Returns "Illegal function call"</code> |

EVENT SOURCE statement

Keyword Template

| |
|-----------------|
| Purpose |
| Syntax |
| Remarks |
| See also |
| Example |

EVENT SOURCE statement

| | |
|----------------------|---|
| Purpose | Declare an event interface within a Class definition |
| Syntax | <code>EVENT SOURCE InterfaceName</code> |
| Remarks | <p>With objects, normally a client module calls a server module to perform specific operations as they are needed. However, in many situations, it's convenient and efficient for a server to notify its client of a condition or event immediately, without forcing the client to inquire about the status. At the appropriate time, the server calls back to a client method, passing information via the method parameters. This is the exact opposite of normal communication, because the server module is now calling the client module. In effect, the client is acting as a server for the purpose of handling these events. In the world of objects, a server which can call such "Event Methods" is said to offer a "Connection Point". A Connection Point can be used with COM objects or internal objects. Further, it may use either a direct interface or the DISPATCH interface. Event methods may take parameters, but may not return a result.</p> <p>Each server class created by PowerBASIC may offer up to four event interfaces. A client module may subscribe to any or all of these event interfaces. When it's time for the server object to notify the client of an event, the RAISEEVENT statement is used. For the Dispatch interface, OBJECT RAISEEVENT is used instead. RAISEEVENT may only appear within a class which declares the Event Source interface.</p> <p>The client must initiate a connection to the server with EVENTS FROM statement, and disconnect when done with EVENTS END statement.</p> <p>A Connection Point may be attached to one Event Method, multiple Event Methods, or no Event Method at all. Whenever a RAISEEVENT statement or OBJECT RAISEEVENT statement is executed, all Event Methods attached to the source object are called, one after another. There is no guarantee of the sequence of the calls, and you must consider the possibility that RAISEEVENT with a ByRef parameter could change the value of a parameter variable before any particular Event Method is executed.</p> |
| <i>InterfaceName</i> | Specifies the "Event Source" Interface name. If <i>InterfaceName</i> is DISPATCH, you can reference it with the OBJECT RAISEEVENT statement -- otherwise, regular Method references are used. |

See also [EVENTS](#), [INTERFACE \(Direct\)](#), [INTERFACE \(IDBind\)](#), [Just what is COM?](#), [METHOD](#), [OBJECT RAISEEVENT](#), [RAISEEVENT](#), [What are Connection Points?](#)

Example

```
' Direct Interface Example
#COMPILE EXE
#DIM ALL
CLASS EvClass AS EVENT
    INTERFACE IStatus AS EVENT
        INHERIT IUNKNOWN
        METHOD Done
            ? "Done!"
        END METHOD
    END INTERFACE
END CLASS

CLASS MyClass
    INTERFACE IMath
        INHERIT IUNKNOWN
        METHOD DoMath
            ? "Calculating..." ' Do some math calculations here
            RAISEEVENT IStatus.Done()
        END METHOD
    END INTERFACE
    EVENT SOURCE IStatus
END CLASS

FUNCTION PBMAIN()
    LOCAL oMath AS IMath
    LOCAL oStatus AS IStatus

    oMath = CLASS "MyClass"
    oStatus = CLASS "EvClass"

    EVENTS FROM oMath CALL oStatus

    oMath.DoMath

    EVENTS END oStatus
END FUNCTION

' Dispatch Interface Example
#COMPILE EXE
#DIM ALL
CLASS EvClass AS EVENT
    INTERFACE IStatus AS EVENT
        INHERIT IDISPATCH
        METHOD Done
            ? "Done!"
        END METHOD
    END INTERFACE
END CLASS

CLASS MyClass
    INTERFACE IMath
        INHERIT IDISPATCH
        METHOD DoMath
            ? "Calculating..." ' Do some math calculations here
            OBJECT RAISEEVENT IStatus.Done()
        END METHOD
    END INTERFACE
```

```

EVENT SOURCE DISPATCH
END CLASS

FUNCTION PBMAIN()
  LOCAL oMath AS IMath
  LOCAL oStatus AS DISPATCH

  oMath = CLASS "MyClass"
  oStatus = CLASS "EvClass"

  EVENTS FROM oMath CALL oStatus

  oMath.DoMath

  EVENTS END oStatus
END FUNCTION

```

EVENTS statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

EVENTS statement

Purpose Attach or detach an [event handler](#) to/from an event source.

Syntax

```

DIM oSource AS InterfaceName
DIM oEvent AS EventInterface
LET oSource = NEWCOM CLSID $ClassId
LET oEvent = CLASS "EventClass"
EVENTS FROM oSource CALL oEvent
[statements]
EVENTS END oEvent

```

Remarks In the above source code sample, *oEvent* is an [object](#) variable which references an event handler object, and *oSource* is an object variable which references an [event source](#) object which generates events.

The EVENTS FROM statement attaches event handler code to an event source object variable. The object variable *oEvent* must be declared as a supported event interface, while "*EventClass*" specifies the class which implements the event handler code. The object variable *oSource* specifies the event source. EVENTS END detaches the event handler from the event source.

Generally speaking, a server object "sources" events, and a client object "handles" events by supplying a [METHOD](#) which is called by the server to perform a user-defined notification. This event handler is code in the client object, which is sometimes referred to as an "event sink" (analogous to the electrical engineering terms source/sink).

One or more clients may choose to "subscribe" to events from a server object by executing the EVENTS FROM statement. The subscription is terminated by execution of the EVENTS END statement. When the server executes [RAISEEVENT](#) or [OBJECT RAISEEVENT](#), all clients which have unsubscribed to these events are called.

PowerBASIC servers support up to 32 concurrent client subscribers per server object.

Event sources and event handlers may be used within a single module, or through [COM](#) services supplied by the Windows operating system.

See also

[CLASS](#), [EVENT SOURCE](#), [INTERFACE \(Direct\)](#), [INTERFACE \(IDBind\)](#), [Just what is COM?](#), [OBJECT RAISEEVENT](#), [RAISEEVENT](#), [What is an object, anyway?](#), [What are Connection Points?](#)

Example

```
#COMPILE EXE

CLASS EvClass AS EVENT
    INTERFACE EvStatus AS EVENT
        INHERIT IUNKNOWN

        METHOD Done
            MSGBOX "Done!"
        END METHOD
    END INTERFACE
END CLASS

CLASS MyClass
    INTERFACE MyMath
        INHERIT IUNKNOWN

        METHOD DoMath
            MSGBOX "Calculating..." ' Do some math calculations here
            RAISEEVENT EvStatus.Done()
        END METHOD
    END INTERFACE

    EVENT SOURCE EvStatus
END CLASS

FUNCTION PBMAIN()
    DIM oMath AS MyMath
    DIM oStatus AS EvStatus

    LET oMath = CLASS "MyClass"
    LET oStatus = CLASS "EvClass"

    EVENTS FROM oMath CALL oStatus

    oMath.DoMath

    EVENTS END oStatus
END FUNCTION
```

EXE.Inst member

Keyword Template

Purpose

Syntax

Remarks

See also

Example

EXE read-only user defined type IMPROVED

| | |
|-----------------|--|
| Purpose | Return information about the executing program. |
| Syntax | <pre> <i>h&</i> = EXE.Inst <i>f\$</i> = EXE.Extn\$ <i>f\$</i> = EXE.Full\$ <i>f\$</i> = EXE.Name\$ <i>f\$</i> = EXE.Namex\$ <i>f\$</i> = EXE.Path\$ </pre> |
| Remarks | <p>You can use EXE to retrieve information about the executing program, including the complete path and file name, or just a selected part of it. If the reference is physically located within a DLL, the returned data describes the executable program which loaded it.</p> <p>EXE.Inst This returns the instance handle (a DWord) of the program which is currently executing.</p> <p>EXE.Extn\$ This returns the extension (with a leading period) of the program which is currently executing.</p> <p>EXE.Full\$ This returns the complete drive, path, file name, and extension of the program which is currently executing.</p> <p>EXE.Name\$ This returns just the file name of the program which is currently executing.</p> <p>EXE.Namex\$ This returns the file name and the extension of the program which is currently executing.</p> <p>EXE.Path\$ This returns the complete drive and path of the program which is currently executing.</p> |
| See also | COMMAND\$, PATHNAME\$, PATHSCAN\$ |

EXE.Extn\$ member

Keyword Template

| |
|-----------------|
| Purpose |
| Syntax |
| Remarks |
| See also |
| Example |

EXE read-only user defined type IMPROVED

| | |
|----------------|---|
| Purpose | Return information about the executing program. |
| Syntax | <pre> <i>h&</i> = EXE.Inst <i>f\$</i> = EXE.Extn\$ <i>f\$</i> = EXE.Full\$ <i>f\$</i> = EXE.Name\$ <i>f\$</i> = EXE.Namex\$ <i>f\$</i> = EXE.Path\$ </pre> |
| Remarks | <p>You can use EXE to retrieve information about the executing program, including the complete path and file name, or just a selected part of it. If the reference is physically located within a DLL, the returned data describes the executable program which loaded it.</p> <p>EXE.Inst This returns the instance handle (a DWord) of the program which is currently executing.</p> |

| | |
|-------------|--|
| EXE.Extn\$ | This returns the extension (with a leading period) of the program which is currently executing. |
| EXE.Full\$ | This returns the complete drive, path, file name, and extension of the program which is currently executing. |
| EXE.Name\$ | This returns just the file name of the program which is currently executing. |
| EXE.Namex\$ | This returns the file name and the extension of the program which is currently executing. |
| EXE.Path\$ | This returns the complete drive and path of the program which is currently executing. |

See also [COMMAND\\$](#), [PATHNAME\\$](#), [PATHSCAN\\$](#)

EXE.Full\$ member

Keyword Template

Purpose

Syntax

Remarks

See also

Example

EXE read-only user defined type

IMPROVED

Purpose Return information about the executing program.

Syntax

```

h& = EXE.Inst
f$ = EXE.Extn$
f$ = EXE.Full$
f$ = EXE.Name$
f$ = EXE.Namex$
f$ = EXE.Path$

```

Remarks You can use EXE to retrieve information about the executing program, including the complete path and file name, or just a selected part of it. If the reference is physically located within a DLL, the returned data describes the executable program which loaded it.

| | |
|-------------|--|
| EXE.Inst | This returns the instance handle (a DWord) of the program which is currently executing. |
| EXE.Extn\$ | This returns the extension (with a leading period) of the program which is currently executing. |
| EXE.Full\$ | This returns the complete drive, path, file name, and extension of the program which is currently executing. |
| EXE.Name\$ | This returns just the file name of the program which is currently executing. |
| EXE.Namex\$ | This returns the file name and the extension of the program which is currently executing. |
| EXE.Path\$ | This returns the complete drive and path of the program which is currently executing. |

See also [COMMAND\\$](#), [PATHNAME\\$](#), [PATHSCAN\\$](#)

EXE.Name\$ member

Keyword Template

Purpose

Syntax

Remarks

See also

Example

EXE read-only user defined type

IMPROVED

Purpose Return information about the executing program.

Syntax

```

h& = EXE.Inst
f$ = EXE.Extn$
f$ = EXE.Full$
f$ = EXE.Name$
f$ = EXE.Namex$
f$ = EXE.Path$

```

Remarks You can use EXE to retrieve information about the executing program, including the complete path and file name, or just a selected part of it. If the reference is physically located within a DLL, the returned data describes the executable program which loaded it.

| | |
|-------------|--|
| EXE.Inst | This returns the instance handle (a DWord) of the program which is currently executing. |
| EXE.Extn\$ | This returns the extension (with a leading period) of the program which is currently executing. |
| EXE.Full\$ | This returns the complete drive, path, file name, and extension of the program which is currently executing. |
| EXE.Name\$ | This returns just the file name of the program which is currently executing. |
| EXE.Namex\$ | This returns the file name and the extension of the program which is currently executing. |
| EXE.Path\$ | This returns the complete drive and path of the program which is currently executing. |

See also [COMMAND\\$](#), [PATHNAME\\$](#), [PATHSCAN\\$](#)

EXE.Namex\$ member

Keyword Template

Purpose

Syntax

Remarks

See also

Example

EXE read-only user defined type

IMPROVED

Purpose Return information about the executing program.

Syntax

```

h& = EXE.Inst
f$ = EXE.Extn$

```

```
f$ = EXE.Full$
f$ = EXE.Name$
f$ = EXE.Namex$
f$ = EXE.Path$
```

Remarks You can use EXE to retrieve information about the executing program, including the complete path and file name, or just a selected part of it. If the reference is physically located within a DLL, the returned data describes the executable program which loaded it.

| | |
|-------------|--|
| EXE.Inst | This returns the instance handle (a DWord) of the program which is currently executing. |
| EXE.Extn\$ | This returns the extension (with a leading period) of the program which is currently executing. |
| EXE.Full\$ | This returns the complete drive, path, file name, and extension of the program which is currently executing. |
| EXE.Name\$ | This returns just the file name of the program which is currently executing. |
| EXE.Namex\$ | This returns the file name and the extension of the program which is currently executing. |
| EXE.Path\$ | This returns the complete drive and path of the program which is currently executing. |

See also [COMMAND\\$](#), [PATHNAME\\$](#), [PATHSCAN\\$](#)

EXE.Path\$ member

Keyword Template

Purpose

Syntax

Remarks

See also

Example

EXE read-only user defined type IMPROVED

Purpose Return information about the executing program.

Syntax

```
h& = EXE.Inst
f$ = EXE.Extn$
f$ = EXE.Full$
f$ = EXE.Name$
f$ = EXE.Namex$
f$ = EXE.Path$
```

Remarks You can use EXE to retrieve information about the executing program, including the complete path and file name, or just a selected part of it. If the reference is physically located within a DLL, the returned data describes the executable program which loaded it.

| | |
|------------|--|
| EXE.Inst | This returns the instance handle (a DWord) of the program which is currently executing. |
| EXE.Extn\$ | This returns the extension (with a leading period) of the program which is currently executing. |
| EXE.Full\$ | This returns the complete drive, path, file name, and extension of the program which is currently executing. |
| EXE.Name\$ | This returns just the file name of the program which is currently executing. |

| | |
|------------|---|
| EXE.Name | This returns the file name and the extension of the program which is currently executing. |
| x\$ | |
| EXE.Path\$ | This returns the complete drive and path of the program which is currently executing. |

See also [COMMANDS](#), [PATHNAME\\$](#), [PATHSCAN\\$](#)

EXIT statement

EXIT statement IMPROVED

Purpose Transfer program execution out of a block structure.

Syntax

| | |
|-----------------|---|
| EXIT FASTPROC | ' FastProc / End FastProc |
| EXIT FOR | ' For / Next Loop |
| EXIT FUNCTION | ' Function / End Function |
| EXIT IF | ' If / End If |
| EXIT DO | ' Do / Loop or While / Wend |
| EXIT LOOP | ' Do / Loop or While / Wend |
| EXIT MACRO | ' Macro / End Macro |
| EXIT METHOD | ' Method / End Method |
| EXIT PROPERTY | ' Property / End Property |
| EXIT SELECT | ' Select / End Select |
| EXIT SUB | ' Sub / End Sub |
| EXIT TRY | ' Try / End Try |
| EXIT [,ITERATE] | ' Exit one loop and immediately iterate another |
| EXIT [,EXIT...] | ' The nearest enclosing block structure |

Remarks The EXIT statement allows you to leave a code section block immediately. Using EXIT by itself will leave the most recently executed structure, but not an outer block. EXIT, EXIT will leave two block structures, and EXIT, EXIT, EXIT will leave three levels. For example:

```
FOR ix = 1 TO 10
  DO UNTIL x > 10
    EXIT FOR ' will exit from the DO LOOP
  LOOP
NEXT
```

EXIT is preferred over [GOTO](#) for this purpose. If you want to exit a structure other than the one most recently executed, you may include the type of structure, or you can use multiple EXITs. The following two examples are functionally identical:

```
FOR ix = 1 TO 10
  DO UNTIL x > 10
    EXIT FOR ' will exit DO and FOR NEXT loop
  LOOP
NEXT

FOR ix = 1 TO 10
  DO UNTIL x > 10
    EXIT, EXIT ' will exit DO and FOR NEXT loop
  LOOP
NEXT
```

You can also exit one loop and immediately iterate another:

```
FOR x = 1 TO 10
  DO
    EXIT, ITERATE
  LOOP
NEXT
```

See also [DO/LOOP](#), [FASTPROC](#), [FOR EACH/NEXT](#), [FOR/NEXT](#), [FUNCTION/END FUNCTION](#), [IF/END IF block](#), [ITERATE](#), [MACRO/END MACRO](#), [METHOD](#), [PROPERTY](#), [SELECT](#),

[SUB/END SUB](#), [TRY/END TRY](#), [WHILE/WEND](#)

EXP function

EXP, EXP2 and EXP10 functions

| | |
|-----------------|---|
| Purpose | Return a base number raised to a power. The base is <i>e</i> for EXP, 2 for EXP2, and 10 for EXP10. |
| Syntax | $y = \text{EXP}(n)$ $y = \text{EXP2}(n)$ $y = \text{EXP10}(n)$ |
| Remarks | <p>EXP returns <i>e</i> to the <i>n</i>th power, where <i>n</i> is a numeric variable or expression and <i>e</i> is the base for natural logarithms, approximately 2.718282. Among other uses, this provides a simple way to obtain the value of <i>e</i> itself:</p> $e = \text{EXP}(1)$ <p>EXP2(<i>n</i>) returns 2 to the <i>n</i>th power, where <i>n</i> is a numeric variable or expression.</p> <p>EXP10(<i>n</i>) returns 10 to the <i>n</i>th power, where <i>n</i> is a numeric variable or expression.</p> <p>The EXP functions provide a convenient alternative to the ^ operator, which works with any base. The EXP functions return results in Extended-precision.</p> |
| See also | LOG , LOG2 , LOG10 , SQR , Arithmetic Operators |

EXP2 function

EXP, EXP2 and EXP10 functions

| | |
|-----------------|---|
| Purpose | Return a base number raised to a power. The base is <i>e</i> for EXP, 2 for EXP2, and 10 for EXP10. |
| Syntax | $y = \text{EXP}(n)$ $y = \text{EXP2}(n)$ $y = \text{EXP10}(n)$ |
| Remarks | <p>EXP returns <i>e</i> to the <i>n</i>th power, where <i>n</i> is a numeric variable or expression and <i>e</i> is the base for natural logarithms, approximately 2.718282. Among other uses, this provides a simple way to obtain the value of <i>e</i> itself:</p> $e = \text{EXP}(1)$ <p>EXP2(<i>n</i>) returns 2 to the <i>n</i>th power, where <i>n</i> is a numeric variable or expression.</p> <p>EXP10(<i>n</i>) returns 10 to the <i>n</i>th power, where <i>n</i> is a numeric variable or expression.</p> <p>The EXP functions provide a convenient alternative to the ^ operator, which works with any base. The EXP functions return results in Extended-precision.</p> |
| See also | LOG , LOG2 , LOG10 , SQR , Arithmetic Operators |

EXP10 function

EXP, EXP2 and EXP10 functions

| | |
|----------------|---|
| Purpose | Return a base number raised to a power. The base is <i>e</i> for EXP, 2 for EXP2, and 10 for EXP10. |
| Syntax | $y = \text{EXP}(n)$ $y = \text{EXP2}(n)$ $y = \text{EXP10}(n)$ |

- Remarks** EXP returns e to the n th power, where n is a numeric [variable](#) or expression and e is the base for natural logarithms, approximately 2.718282. Among other uses, this provides a simple way to obtain the value of e itself:
- ```
e = EXP(1)
```
- EXP2( $n$ ) returns 2 to the  $n$ th power, where  $n$  is a numeric variable or expression.
- EXP10( $n$ ) returns 10 to the  $n$ th power, where  $n$  is a numeric variable or expression.
- The EXP functions provide a convenient alternative to the ^ operator, which works with any base. The EXP functions return results in Extended-precision.
- See also** [LOG](#), [LOG2](#), [LOG10](#), [SQB](#), [Arithmetic Operators](#)

## EXTRACT\$ function

# EXTRACT\$ function

- Purpose** Extract characters from a  
up to a character or group of characters.
- Syntax** `x$ = EXTRACT$( [start,] MainStr, [ANY] MatchStr)`
- Remarks** EXTRACT\$ returns a sub-string of *MainStr*, starting with its first character (or the character specified by *start*) and up to (but not including) the first occurrence of *MatchStr*. If *MatchStr* is not present in *MainStr*, or either string parameter is nul, all of *MainStr* is returned.
- start* is the optional starting position to begin extracting. If *start* is not specified, it will start at position 1. If *start* is zero, or beyond the length of *MainStr*, a nul string is returned. If *start* is negative, the starting position is counted from right to left: if -1, the search begins at the last character; if -2, the second to last, and so forth.
- MainStr* is the [string expression](#) from which to extract. *MatchStr* is the string expression to extract up to. EXTRACT\$ is case-sensitive.
- If the ANY keyword is included, *MatchStr* specifies a list of single characters to be searched for individually, a match on any one of which will cause the extract operation to be performed up to that character.
- EXTRACT\$ is especially useful when parsing a string containing arguments to a program, or when manipulating nul-terminated or delimited strings received from a routine written in another language.
- The complementary function to EXTRACT\$ is [REMAINS](#), which returns the part of the string that EXTRACT\$ leaves behind. A similar function to EXTRACT\$ is [PARSE](#), which extracts delimited substrings from a string.
- See also** [CLIP\\$](#), [INSTR](#), [JOIN\\$](#), [LEFT\\$](#), [LTRIM\\$](#), [MID\\$](#), [PARSE](#), [PARSE\\$](#), [PARSECOUNT](#), [REMAINS](#), [REMOVE\\$](#), [RETAIN\\$](#), [RIGHT\\$](#), [RTRIM\\$](#), [TALLY](#), [TRIM\\$](#), [UNWRAP\\$](#), [VERIFY](#)
- Example**
- ```
' x$ = first command-line argument, assuming spaces,
' commas, periods, and tabs are valid delimiters
x$ = EXTRACT$(COMMAND$, ANY " ,. "+CHR$(9))

' the following line returns "aba" (match on "cad")
x$ = EXTRACT$("abacadabra","cad")

' the following line returns nothing (match on first character "a")
x$ = EXTRACT$("abacadabra", ANY "a")
```

FASTPROC/END FASTPROC statements

Keyword Template

Purpose

Syntax

Remarks

See also

Example

FASTPROC/END FASTPROC statements New!

Purpose Define a FastProc code section.

Syntax `FASTPROC ProcName [(arguments)] [THREADSAFE] [AS LONG]
[statements...]
END FASTPROC [= ReturnValue]`

Remarks A Fast Procedure (FASTPROC) is a highly simplified form of [SUB](#) or [FUNCTION](#) which executes much faster than its fully-featured counterparts. It allows a maximum of two LONG arguments, and may optionally return a [LONG](#) result. The arguments are always processed as [register](#) variables for maximum execution speed. No [stack](#) frame is ever created, so there are other limitations detailed below. The programmer may then decide when it is appropriate to accept these trade-offs in exchange for maximum efficiency.

All executable code must reside in a [Sub](#), [Function](#), [Method](#), FastProc, or [Property](#) block. You cannot define a procedure inside another procedure. A FASTPROC is a subroutine-like block of statements which is invoked with the [CALL](#) statement. A FASTPROC may also be invoked without the word CALL, which is then implied. If the CALL word is omitted, the parentheses around the argument list must also be omitted.

ProcName must be unique: no variable, Function, Sub, Method, FastProc, Property or [label](#) can share the same name.

THREADSAFE If you include the option THREADSAFE, PowerBASIC automatically establishes a semaphore which allows only one [thread](#) to execute it at a time. Others must wait until the first thread exits the THREADSAFE procedure before they are allowed to begin.

Restrictions Most of the restrictions of a FASTPROC stem from the fact that no stack frame is created.

- A maximum of two parameters are allowed, and they must be defined as BYVAL LONG integers. An optional return value, if used, must be defined as LONG integer.
- [LOCAL](#) variables are not available because there is no stack frame. This includes [Register](#) variables, which are by definition, Local variables. Instead, one or two parameters are automatically given status as Register Variables. By default, all new variables are assigned STATIC scope.
- [ON ERROR GOTO](#), [RESUME](#), and [TRY](#) blocks are not available. You should explicitly test for errors with [IF ERR THEN...](#)
- [DATA](#) and [READ\\$](#) are not available.
- [FUNCNAME\\$](#) is not available.
- [COMMON](#), [IMPORT](#), and [EXPORT](#) options are not available.

See also [DECLARE](#), [EXIT](#), [FUNCNAME\\$](#), [GLOBAL](#), [INSTANCE](#), [ISMISSING](#), [LOCAL](#), [METHOD](#), [PROPERTY](#), [STATIC](#), [SUB](#), [THREAD CREATE](#), [THREADID](#), [THREASAFE](#)

FIELD statement

FIELD statement

| | |
|----------------|--|
| Purpose | Bind a field string variable to a random file buffer or a dynamic string variable. |
| Syntax | <pre>FIELD # <i>filenum</i>, <i>nSize</i> AS <i>fieldvar</i>, [FROM] <i>nStart</i> TO <i>nEnd</i> AS <i>fieldvar</i> [, ...] FIELD <i>DynamicStr</i>, <i>nSize</i> AS <i>fieldvar</i>, [FROM] <i>nStart</i> TO <i>nEnd</i> AS <i>fieldvar</i> [, ...] FIELD RESET <i>fieldvar</i> [, ...] FIELD STRING <i>fieldvar</i> [, ...]</pre> |
| Remarks | <p>A field variable is a special form of variable which may be used just like a standard dynamic string variable, or it may be declared to reference a particular sub-section of a random file buffer or a dynamic string variable. Because of the added capabilities, it requires 12 bytes more storage space (16 vs 4) than a standard string variable. A field variable may not be used as a member of a User-Defined TYPE or UNION.</p> <p>By default, a field variable mimics a dynamic string variable, and may be considered a virtual replacement. Then, at any time, the FIELD statement can be used to declare that the field variable now refers to a specific portion of a random file buffer or a dynamic string. FIELD RESET is used to change it back to a nul (zero-length) dynamic string. FIELD STRING also changes it back to a dynamic string, but first assigns the current sub-section data to it. This last action is particularly useful in the case where the sub-section data might be lost when the bound random file is closed.</p> <p>In the first form, FIELD binds a field string variable to a specific sub-section of a random-access file buffer. In the second form, FIELD binds a field string variable to a specific sub-section of a dynamic string variable. If the sub-section extends beyond the actual size of the file buffer or string, that portion of the FIELD is empty. Otherwise, it represents a fixed size string, and may be referenced as any other string variable.</p> <p>When used with a file:</p> <p>A random-access file buffer is automatically created for use when GET or PUT are used without a target variable. In this case, the file data is read or written using this buffer, which is accessed with one or many field variables.</p> <p>If a field is defined by a single field (size) parameter, it represents the length of the field in characters, with the start position implied by the preceding field within the statement. If two parameters are used, they represent the start (<i>nStart</i>) and end (<i>nEnd</i>) positions in characters, indexed to one.</p> <p>If a string value shorter than the declared size is assigned to a field string, it is padded with blank spaces as it is placed into the file buffer. There is no requirement to use LSET for assignment.</p> <p>Finally, it should be noted that FIELD statements are tied to an open file, i.e. they are valid only as long as the file is open. Once the file is closed, any field strings that had been defined for the file will return nul (empty), not a string of the previously specified length.</p> |

```
LOCAL sFirst AS FIELD, sSecond AS FIELD
OPEN "ABC.TXT" FOR RANDOM AS #1 LEN=20
FIELD #1, 10 AS sFirst, 10 AS sSecond
sFirst = "0123456789"
sSecond = "9876543210"
Put #1 ' creates a record of: 01234567899876543210
```

When used with a dynamic string:

A field variable bound to a dynamic string works very much like a pointer, so the

programmer must use care in field variable selection. For example, if you bind a [GLOBAL FIELD](#) variable to a [LOCAL](#) string variable, then attempt to reference the global string after the local is destroyed (i.e., released when the owning [Sub/Function/Method/Property](#) exits), a fatal exception error (GPF) is likely to occur. The same could happen after an [array](#) has been [erased](#), or a [REDIM](#) is used to change the memory allocation.

To avoid problems with [scope](#), it is suggested that field variables be bound only with strings within the same scope (LOCAL, GLOBAL, etc.).

```
LOCAL x$, sFirst AS FIELD, sSecond AS FIELD
FIELD x$, 3 AS sFirst, 3 AS sSecond
x$ = SPACE$(6) ' Allocate the space for the field
sFirst = "111"
sSecond = "222"
? x$           ' Displays 111222
x$ = "abcd"
? sFirst       ' Displays abc
? sSecond     ' Displays d
```

Restrictions Field string variables must be explicitly declared using DIM, [INSTANCE](#), LOCAL, [STATIC](#), GLOBAL, or [THREADED](#). Attempting to bind a variable other than a declared field variable results in a compile-time [Error 544](#) ("Field variable expected"). Field strings cannot be used in [UDT](#) or [UNION](#) structures. Attempting to do so results in a compile-time [Error 485](#) ("Dynamic/Field strings not allowed").

See also [Field Strings](#), [GET](#), [PUT](#), [TYPE/END TYPE](#), [User-Defined Types](#), [Unions](#), [UNION/END UNION](#)

FILEATTR function

FILEATTR function

Purpose Return information about an [open file](#).

Syntax `lResult& = FILEATTR([#] filename&, fattr)`

Remarks *filename*& is the handle of a currently open file. *fattr* is an [integer](#) between -3 and 3 that specifies the type of information required, according to the following table:

fattr Definition

- 3 The device type. Returns 1 for a [file](#), 2 for a device. [COMM](#), [TCP and UDP](#) are classified as devices.
- 2 Logical first byte (base) position of a disk file. By default, PowerBASIC opens files with a default first location of 1, but this can be overridden via the BASE= clause of the [OPEN](#) statement. This function can be useful when the base is not known or when performing SEEK operations.
- 1 The minimum amount of data that can be read or written at one time. For [RANDOM files](#), it is the record length. For [INPUT files](#), it is the input buffer length (set with LEN= in the OPEN statement). For [BINARY](#), [OUTPUT](#) and [APPEND](#), there is no buffering, so it always returns 1 (1 byte).
- 0 The open state. TRUE (non-zero) if open, FALSE (zero) if closed.
- 1 The file mode (which may be a combination of the following):

| <i>result</i> & | File mode |
|-----------------|--|
| 1 | Input |
| 2 | Output |
| 4 | Random |
| 8 | Append |
| 16 | Serial Communications (COMM) |
| 32 | Binary |
| 64 | TCP Winsock |
| 128 | UDP Winsock |

(for example, an APPEND file will return $8 + 2 = 10$).

- 2 The operating system file handle for the file. This handle can be used with particular Windows API calls files to manipulate files opened with PowerBASIC, and with the [OPEN HANDLE](#) statement.
- 3 Enumerates existing file numbers. This mode enumerates existing file numbers, in the range of 1 to 32767. FILEATTR(1,3) returns the first located file number, FILEATTR(2,3) the second, and so on until -1 is returned to indicate that there are no more file numbers active. The file numbers returned are not guaranteed to be returned in any particular sequence, nor be open. You can use FILEATTR(#filenum,0) to determine whether a given file number is open or closed. The number symbol [#] is optional, but recommended for clarity.

See also [COMM OPEN](#), [EOE](#), [FILENAME\\$](#), [GETATTR](#), [LOF](#), [OPEN](#), [SEEK function](#), [SEEK statement](#), [SETATTR](#), [TCP OPEN](#), [UDP OPEN](#)

Example

```
OPEN "TEST.DOC" FOR OUTPUT AS #1 LEN = 28
x& = FILEATTR(#1,1)
Result  x& = 2
```

FILECOPY statement

FILECOPY statement

Purpose Copy a file.

Syntax FILECOPY *sourcefile*, *destfile*

Remarks Copy the file *sourcefile* to the file *destfile*. Both *sourcefile* and *destfile* must be filenames, not merely drives or directories (although it's OK to include drive and directory specifications along with the filenames). Wildcards are not supported. If you attempt to copy a file that is read locked (preventing read access), a run-time [Error 70](#) will occur ("Permission denied").

If the destination file already exists, it will be overwritten. If it is not possible to overwrite the existing destination file (for example, it is marked as read-only or in use by another program), the result will be a run-time Error 70 ("Permission denied").

The attributes of the source file are inherited by the destination file, with the exception of the Archive attribute, which is always set ON for the destination file. File attributes may be examined or modified with the [GETATTR](#) and [SETATTR](#) statements.

See also [FILEATTR](#), [GETATTR](#), [SETATTR](#)

Example

```
FILECOPY "C:\AUTOEXEC.BAT", "C:\AUTOEXEC.BAK"
```

FILENAME\$ function

FILENAME\$ function

Purpose Return the file-system name of an [open file](#).

Syntax a\$ = FILENAME\$(*filenum&*)

Remarks a\$ receives the name of the open [file](#) identified by the file number *filenum&*. This function is not valid with a file opened using [OPEN HANDLE](#), [COMM OPEN](#), [TCP OPEN](#), or [UDP OPEN](#).

See also [CLOSE](#), [FILEATTR](#), [FREEFILE](#), [GETATTR](#), [OPEN](#), [SETATTR](#)

Example

```
OPEN "MYFILE.TXT" FOR INPUT AS #1
a$ = FILENAME$(1)
CLOSE #1
```

FILESCAN statement

FILESCAN statement

| | |
|---------------------|---|
| Purpose | Rapidly scan a file opened for INPUT or BINARY mode, in order to obtain size information about variable length string data. |
| Syntax | <code>FILESCAN [#] <i>fnum</i>&, RECORDS TO <i>y</i>& [, WIDTH TO <i>x</i>&]</code> |
| Remarks | <p>FILESCAN assigns a count of the lines/records/strings to <i>y</i>&, and if the WIDTH clause is specified, the length of the longest string to <i>x</i>&.</p> <p>In INPUT mode, it is assumed the data is standard text, with lines delimited by a CR/LF (\$CR\$LF) pair. FILESCAN stops reading the file if it encounters an "end of file" (EOF) marker byte (CHR\$(26) or \$EOF). Text that occurs after the last CR/LF but before the EOF is considered the last record of the file. Use the LINE INPUT# statement to read a complete text file into an array.</p> <p>In BINARY mode, it is assumed the file was written in the PowerBASIC and/or VB packed string format using PUT of an entire string array. If a string is shorter than 65535 bytes, a 2-byte length WORD is followed by the string data. If a string is equal to or longer than 65535 bytes, a 2-byte value of 65535 is followed by a length DWORD value, then finally the string data.</p> <p>Use the GET statement to read a complete binary file into an array.</p> |
| Restrictions | If FILESCAN is applied to other file formats, the results are undefined. |
| See also | GET , GET\$, GET\$\$, LINE INPUT# , PUT , PUT\$, PUT\$\$ |
| Example | <pre>OPEN "datafile.dat" FOR INPUT AS #1 FILESCAN #1, RECORDS TO count& DIM TheData(1 TO count&) AS STRING LINE INPUT #1, TheData() TO count& CLOSE #1</pre> |
| Result | The entire text file comprising <i>y</i> & lines is read into the string array . |

FIX function

FIX function

| | |
|-----------------|---|
| Purpose | Truncate a number to an . |
| Syntax | <code><i>y</i> = FIX(<i>numeric_expression</i>)</code> |
| Remarks | FIX strips off the fractional part of its argument, and returns the integer part. Unlike CINT and INT , FIX does not perform any form of rounding or scaling. |
| See also | CEIL , CINT , INT , FRAC , ROUND |
| Example | <pre>x\$ = "The integer part of 50.67 is" + STR\$(FIX(50.67)) y\$ = STR\$(FIX(-1.1)) & ", " & STR\$(INT(-1.1)) & ", " & STR\$(CINT(-1.1)) Output The integer part of 50.67 is 50 -1, -2, -1</pre> |

FLUSH statement

FLUSH statement

| | |
|----------------|--|
| Purpose | Flush file buffers to disk, to ensure that the disk information is up-to-date. |
|----------------|--|

| | |
|---------------------|--|
| Syntax | <code>FLUSH [[#] <i>filenum&</i> [, [#] <i>filenum&</i>] ...]</code> |
| Remarks | FLUSH ensures that all data you have written to disk files has actually been written to disk. The CLOSE statement also flushes the buffers, but FLUSH has the advantage of leaving the files open. |
| <i>filenum&</i> | The file number of an OPEN file. If <i>filenum&</i> is specified, only the data for that file is flushed. Otherwise, data for all open files is flushed. The Number (#) symbol is optional, but recommended for the purposes of clarity. |
| See also | CLOSE , OPEN |

FONT END statement

Keyword Template

Purpose
Syntax
Remarks
See also
Example

FONT END statement

| | |
|----------------------|---|
| Purpose | Destroy a font when it is no longer needed. |
| Syntax | <code>FONT END <i>fonthndl&</i></code> |
| <i>fonthndl&</i> | Handle of the font to be destroyed. |
| Remarks | <p>When you have no further need for a font originally created with FONT NEW, you can destroy it and reclaim the memory space which was originally allocated for it.</p> <p>If the specified font is still in use by a , a Graphic Control, a Graphic Window, or an XPrint page, an error 5 (Illegal Function Call) will be generated. To avoid this error, you may restore the original default font with CONTROL/GRAPHIC/XPRINT SET FONT using a handle number of zero (0).</p> <p>When your program ends, any existing fonts are automatically destroyed by PowerBASIC.</p> |
| See also | CONTROL SET FONT , FONT NEW , GRAPHIC PRINT , GRAPHIC SET FONT , XPRINT , XPRINT SET FONT |

FONT NEW statement

Keyword Template

Purpose
Syntax
Remarks
See also
Example

FONT NEW statement IMPROVED

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------------------------|---|-----|----------------------------------|-----|----------------------------------|---|-----------------|-----|----------------|---|------------------|-----|--------------------------------|----|-------------|-----|----------------|----|---------------------|-----|--------------------------|---|---------|---|--|----|-----------------------------|-----|----------------------------|---|---------|---|--|----|---------------|-----|---------------------|---|---------|--|--|----|-----------------|-----|-------------|---|---------|--|--|----|---------------|--|--|---|---------|--|--|
| Purpose | Create a new font for use with , GRAPHIC PRINT , XPRINT , etc. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Syntax | <code>FONT NEW fontname\$ [,points!, style&, charset&, pitch&, escapement&] TO fhndl</code> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>fontname\$</i> | Name of the font. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>points!</i> | Size of the font, in points. This may be specified as a value for fractional point sizes. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>style&</i> | Font style attribute. Any of the following values can be combined or used alone: <table border="0" style="margin-left: 20px;"> <tr> <td>0</td><td>Normal</td><td>4</td><td>Underline</td> </tr> <tr> <td>1</td><td>Bold</td><td>8</td><td>Strikeout</td> </tr> <tr> <td>2</td><td>Italic</td><td>16</td><td>Leading</td> </tr> </table> <p>Some fonts specify "external leading" in their definition. In some cases, it only applies to certain point sizes of a font. External Leading specifies that one or more blank pixels are added to the bottom of each character when displayed. This has an impact on character position and should be considered when creating a font. Normally, the font is created without regard to external leading. That is, it's created so that the visible character face fills the requested point size. However, if the Leading Option is used, the font will be created so that the visible character face plus the external leading (if any) fills the point size. In these cases, the character may appear slightly smaller.</p> | 0 | Normal | 4 | Underline | 1 | Bold | 8 | Strikeout | 2 | Italic | 16 | Leading | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | Normal | 4 | Underline | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Bold | 8 | Strikeout | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Italic | 16 | Leading | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>charset&</i> | CharSet identifier. <table border="0" style="margin-left: 20px;"> <tr> <td>0</td><td>ANSI CharSet</td><td>162</td><td>Turkish CharSet</td> </tr> <tr> <td>1</td><td>Default CharSet</td><td>177</td><td>Hebrew CharSet</td> </tr> <tr> <td>2</td><td>Symbol CharSet</td><td>178</td><td>Arabic CharSet</td> </tr> <tr> <td>77</td><td>Mac CharSet</td><td>186</td><td>Baltic CharSet</td> </tr> <tr> <td>12</td><td>Shiftjis CharSet</td><td>204</td><td>Russian CharSet</td> </tr> <tr> <td>8</td><td>CharSet</td><td></td><td></td> </tr> <tr> <td>12</td><td>Hangeul CharSet</td><td>222</td><td>Thai CharSet</td> </tr> <tr> <td>9</td><td>CharSet</td><td></td><td></td> </tr> <tr> <td>13</td><td>Johab CharSet</td><td>238</td><td>East Europe CharSet</td> </tr> <tr> <td>0</td><td>CharSet</td><td></td><td></td> </tr> <tr> <td>13</td><td>Chinese CharSet</td><td>255</td><td>OEM CharSet</td> </tr> <tr> <td>6</td><td>CharSet</td><td></td><td></td> </tr> <tr> <td>16</td><td>Greek CharSet</td><td></td><td></td> </tr> <tr> <td>1</td><td>CharSet</td><td></td><td></td> </tr> </table> | 0 | ANSI CharSet | 162 | Turkish CharSet | 1 | Default CharSet | 177 | Hebrew CharSet | 2 | Symbol CharSet | 178 | Arabic CharSet | 77 | Mac CharSet | 186 | Baltic CharSet | 12 | Shiftjis CharSet | 204 | Russian CharSet | 8 | CharSet | | | 12 | Hangeul CharSet | 222 | Thai CharSet | 9 | CharSet | | | 13 | Johab CharSet | 238 | East Europe CharSet | 0 | CharSet | | | 13 | Chinese CharSet | 255 | OEM CharSet | 6 | CharSet | | | 16 | Greek CharSet | | | 1 | CharSet | | |
| 0 | ANSI CharSet | 162 | Turkish CharSet | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Default CharSet | 177 | Hebrew CharSet | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Symbol CharSet | 178 | Arabic CharSet | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 77 | Mac CharSet | 186 | Baltic CharSet | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | Shiftjis CharSet | 204 | Russian CharSet | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | CharSet | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | Hangeul CharSet | 222 | Thai CharSet | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | CharSet | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13 | Johab CharSet | 238 | East Europe CharSet | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | CharSet | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13 | Chinese CharSet | 255 | OEM CharSet | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | CharSet | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | Greek CharSet | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | CharSet | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>pitch&</i> | Pitch and Font Family attribute. One of each group of values can be combined or used alone: <table border="0" style="margin-left: 20px;"> <tr> <td>0</td><td>Default</td><td>3</td><td>Swiss font (Helvetica, Swiss...)</td> </tr> <tr> <td></td><td></td><td>2</td><td></td> </tr> <tr> <td>1</td><td>Fixed width font</td><td>4</td><td>Modern font (Pica, Courier...)</td> </tr> <tr> <td></td><td></td><td>8</td><td></td> </tr> <tr> <td>2</td><td>Variable width font</td><td>6</td><td>Script font (Cursive...)</td> </tr> <tr> <td></td><td></td><td>4</td><td></td> </tr> <tr> <td>16</td><td>Roman font (Times Roman...)</td><td>8</td><td>Decorative (OldEnglish...)</td> </tr> <tr> <td></td><td></td><td>0</td><td></td> </tr> </table> | 0 | Default | 3 | Swiss font (Helvetica, Swiss...) | | | 2 | | 1 | Fixed width font | 4 | Modern font (Pica, Courier...) | | | 8 | | 2 | Variable width font | 6 | Script font (Cursive...) | | | 4 | | 16 | Roman font (Times Roman...) | 8 | Decorative (OldEnglish...) | | | 0 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | Default | 3 | Swiss font (Helvetica, Swiss...) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Fixed width font | 4 | Modern font (Pica, Courier...) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Variable width font | 6 | Script font (Cursive...) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | Roman font (Times Roman...) | 8 | Decorative (OldEnglish...) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>escapement&</i> | Specifies the angle, in tenths of degrees, between the character base line and the x axis. Allows printing of text on an angle. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>fhndl</i> | Upon successful creation of a new font, a unique PowerBASIC handle is assigned to this Long Integer or DWord variable. This handle is used with other statements and functions to specify the created font. If the font creation fails, the value zero (0) is assigned to <i>fhndl</i> . | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

- Remarks** This is the preferred method of creating and specifying fonts in PowerBASIC. Using FONT NEW, you can create a group of fonts, in advance, and switch between them easily using [CONTROL SET FONT](#), [GRAPHIC SET FONT](#), and [XPRINT SET FONT](#).
- If the requested font is not available on the computer, Windows will search for a substitute font, which is similar to the attributes specified (CharSet, Font Family, etc.).
- You may use the value zero (0) for any of the numeric parameters to designate that the compiler should use the default for that item. If parameters are missing, the compiler substitutes the default value for all remaining parameters.
- See also** [CONTROL SET FONT](#), [FONT END](#), [GRAPHIC PRINT](#), [GRAPHIC SET FONT](#), [XPRINT](#), [XPRINT SET FONT](#)

FOR EACH/NEXT statements

Keyword Template

- Purpose**
- Syntax**
- Remarks**
- See also**
- Example**

FOR EACH/NEXT statements New!

- Purpose** Define a loop of program statements which can sequentially examine and act upon each member of a [PowerCollection](#) or [LinkListCollection](#).
- Syntax**
- ```
FOR EACH VariantVar IN CollectionObjectVar
 [statements]
NEXT
```
- VariantVar* A simple scalar [variant](#) variable ([Local](#), [Static](#), [Global](#)) which receives successive collection items at the beginning of each loop iteration.
- CollectionObjectVar* A simple scalar [object](#) variable which contains a [PowerCollection](#) or a [LinkListCollection](#).
- Remarks** The FOR EACH loop allows you to examine each member of a collection in sequence, to perform needed operations with that data. If there are no member items in the collection, the loop is skipped.
- When the loop begins, the first member variant in the collection is assigned to the *VariantVar*. Statements in the loop can act upon or with that data to perform whatever functions are needed. When the NEXT statement is reached, the next member item is assigned to the *VariantVar*, and the loop is repeated. This repetition continues until there are no more member items.
- VariantVar* contains a copy of the variant in the collection. You can alter the value of *VariantVar*, but these changes do not affect the member variant in the collection.
- See also** [EXIT FOR](#), [FOR/NEXT](#), [ITERATE FOR](#), [LINKLISTCOLLECTION](#), [POWERCOLLECTION](#)

## FOR/NEXT statements

# FOR/NEXT statements

**Purpose** Define a loop of program statements whose execution is controlled by an automatically incrementing or decrementing counter.

**Syntax**

```
FOR Counter = start TO stop [STEP increment]
 [statements]
 [EXIT FOR]
 [statements]
 [ITERATE FOR]
 [statements]
NEXT [Counter]
```

**Remarks** *Counter* is a numeric [variable](#) serving as the loop counter.

*start* is a numeric expression specifying the value initially assigned to *Counter*.

*stop* is a numeric expression giving the value that *Counter* must reach for the loop to be terminated.

*increment* is an optional numeric expression defining the amount by which *Counter* is incremented with each loop execution. If not specified, *increment* defaults to 1.

Note that *increment* must be the same data type or in the same range as *Counter*. For example:

```
FOR x?? = 50 TO 1 STEP -1
```

will fail because -1 is not within the range of an unsigned Word variable.

When a FOR statement is encountered, *start* is assigned to *Counter*, and *Counter* is tested to see if it is greater than (or, for negative *increment*, less than) *stop*. If not, the statements within the FOR/NEXT loop are executed, *increment* is added to *Counter*, and *Counter* again tested against *stop*. The statements in the loop are executed repeatedly until the test fails, at which time control passes to the statement immediately following the NEXT.

If *increment* is equal to the maximum value of a variable class (255 for a [byte](#), 32767 for an [Integer](#), 65535 for a [Word](#), etc), the compiler will generate an [error](#). If *step* is zero, an infinite loop can be created.

When using

values with FOR/NEXT, be sure to allow for round-off errors when mixing numbers of different precision. Using [constants](#) or variables of the same type throughout will help solve this problem:

```
FOR n# = 1.0 TO 1.5 STEP 0.1
 x$ = STR$(n#)
NEXT n#
```

executes 5 times and returns:

```
1
1.10000000149012
1.20000000298023
1.30000000447035
1.40000000596046
```

while:

```
FOR n@ = 1.0@ TO 1.5@ STEP 0.1@
 x$ = STR$(n@)
NEXT n@
```

executes 6 times and returns:

```
1
1.1
1.2
1.3
1.4
1.5
```

FOR/NEXT loops run fastest when *Counter* is a [Long-integer](#) variable, and *start* and *increment* are Long-integer constants. The value of *Counter* is available like any other variable within the loop. It is wise to avoid explicitly modifying the value of *Counter* within the loop. If you need to exit the loop prematurely, use an [EXIT FOR](#) statement. Keep range considerations in mind. For example, if *Counter* is an Integer variable, you may not use the maximum value for an Integer for *stop*, as *Counter* would be incremented outside the Integer range at the end of the loop.

The body of the loop is skipped altogether if the initial value of *Counter* is greater than *stop* (or, for a negative *increment*, if *Counter* is less than *stop*).

FOR/NEXT loops can be nested within other FOR/NEXT loops. Be sure to use unique counter variables. Note that PowerBASIC allows the *Counter* in the NEXT keyword simply as a comment, which is ignored. For example, the following will compile, even though the counter variables are "crossed":

```
FOR n = 1 TO 10
 FOR m = 1 TO 20
 .
 .
 .
 NEXT n
NEXT m
```

You can omit the counter variable in the NEXT statement altogether. For example:

```
FOR n = 1 TO 10
 .
 .
 .
NEXT
```

If a NEXT is encountered without a corresponding FOR (or vice versa), a [compile-time error](#) is generated.

**Previous version of PowerBASIC supported a single NEXT statement used with multiple nested FOR/NEXT loops, such as NEXT c, b, a. This is no longer supported and you will need to update your code to use multiple NEXT statements.**

In certain situations, previous versions of PowerBASIC optimized FOR/NEXT loops to count down instead of up for improved execution speed. This optimization could cause the counter variable to contain a value which was not expected when execution of the loop was complete. This optimization has been improved so that the counter variable value is always correct upon loop completion, even if EXIT FOR was used to force an early termination.

Although the compiler does not care about such things, it is considered good programming practice to indent the statements between FOR and NEXT by two or three spaces to set off the structure of the loop.

For additional performance, use a [REGISTER](#) variable for the loop counter variable.

#### Restrictions

The counter variable must be a simple numeric scalar variable, such as [LOCAL](#), [STATIC](#), [GLOBAL](#), or [REGISTER](#). This aids in maintaining high performance levels for a simple loop structure. [Variables](#) which require multiple operations to access are specifically disallowed: [THREADED](#), [INSTANCE](#),

Parameters, [POINTER](#) Targets, and [ARRAY](#).

#### See also

[#OPTIMIZE](#), [#REGISTER](#), [DO/LOOP](#), [EXIT](#), [FOR EACH/NEXT](#), [ITERATE](#), [WHILE/WEND](#), [REGISTER](#)

## FORMAT\$ function

# FORMAT\$ function

|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>        | Format data according to instructions contained in a format expression.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Syntax</b>         | <code>x\$ = FORMAT\$(num_expression [, [digits&amp;   fmt\$])</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Remarks</b>        | FORMAT\$ has the following parts:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <i>num_expression</i> | The numeric expression, <a href="#">variable</a> , or <a href="#">literal</a> value to be formatted. This argument is converted to full ( <a href="#">Extended</a> ) precision before formatting commences.                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <i>digits&amp;</i>    | The maximum number of significant digits, in the range of 1 to 18. If not included, PowerBASIC supplies a default value of 7 for <a href="#">single precision</a> values, or 16 for more precise values. This form of the function is very similar to the <a href="#">STR\$( )</a> function, except that it never supplies any leading or trailing spaces. Use care that <i>digits&amp;</i> is large enough to contain the whole part of a number, or scientific notation must be used to estimate it. For example, <code>FORMAT\$(123.456, 2)</code> returns the string "1.2E+2", while <code>FORMAT\$(123.456, 5)</code> returns the string "123.45". |
| <i>fmt\$</i>          | Format characters that will determine how the numeric expression should be formatted. This expression is termed the <i>mask</i> . There may be up to 18 digit-formatting digits on either side of the decimal point. The mask may not contain literal characters unless each character is preceded with a backslash (\) escape character, or the literal characters are enclosed in quotes.<br><br><i>fmt\$</i> may contain one, two or three formatting masks, separated by semicolon (;) characters:                                                                                                                                                  |
| <b>One mask</b>       | If <i>fmt\$</i> contains just one format mask, the mask is used to format all possible values of <i>num_expression</i> . For example:<br><code>x\$ = FORMAT\$(z!, "000.00")</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Two masks</b>      | If <i>fmt\$</i> contains two format masks, the first mask is used for positive values ( $\geq 0$ ), and the second mask is used for negative values ( $< 0$ ). For example:<br><code>x\$ = FORMAT\$(-100, "+00000.00;-000")</code>                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Three masks</b>    | If <i>fmt\$</i> contains three masks, the first mask is used for positive values ( $> 0$ ), the second mask for negative values ( $< 0$ ), and the third mask is used if <i>num_expression</i> is zero (0). For example:<br><code>FOR y! = -0.5! TO 0.5! STEP 0.5!<br/>  x\$ = FORMAT\$(y!, "+.0;- .0; .0")<br/>NEXT y!</code>                                                                                                                                                                                                                                                                                                                          |
|                       | Digit placeholders in a mask do not have to be contiguous. This allows you to format a single number into multiple displayed parts. For example:<br><code>A\$ = FORMAT\$(123456, "00\:00\:00") ' 12:34:56</code>                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                       | The following table shows the characters you can use to create the user-defined format strings (masks) and the definition of each formatting character:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Character</b>      | <b>Definition</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Empty string          | [null string] No formatting takes place. The number is converted to Extended-precision and formatted similarly to STR\$, but without the leading space that STR\$ applies to non-negative numbers.<br><code>A\$=FORMAT\$(0.2) ' .200000002980232</code><br><code>A\$=FORMAT\$(0.2!, "") ' .200000002980232</code><br><code>A\$=FORMAT\$(0.2#) ' .2</code><br><code>A\$=FORMAT\$(0.2#, "") ' .2</code>                                                                                                                                                                                                                                                   |
| 0                     | <b>[zero]</b> Digit placeholder. PowerBASIC will insert a digit or 0 in that position.<br><br>If there is a digit in <i>num_expression</i> in the position where the 0 appears in the format string, return that digit. Otherwise, return "0". If the number being formatted has fewer digits than there are zeros (on either side of the decimal point) in the format expression, leading or trailing zeros are                                                                                                                                                                                                                                        |

added. If the number has more digits to the right of the decimal point than there are zeros to the right of the decimal point in the format expression, the number is rounded to as many decimal places as there are zeros in the mask.

If the number has more digits to the left of the decimal point than there are zeros to the left of the decimal point in the format expression, the extra digits are displayed without truncation. If the numeric value is negative, the negation symbol will be treated as a decimal digit. Therefore, care should be exercised when displaying negative values with this placeholder style. In such cases, it is recommended that multiple masks be used.

' Numeric padded with leading zero characters

```
A$ = FORMAT$(999%, "00000000") ' 00000999
```

# [Number symbol] Digit placeholder. If there is a digit for this position, PowerBASIC replaces this placeholder with a digit, nothing, or a user-specified character.

Unlike the 0 digit placeholder, if the numeric value has the fewer digits than there are # characters on either side of the decimal placeholder, PowerBASIC will either:

a) Omit this character position from the final formatted string; or  
Substitute a user-specified replacement character if one has been defined (see the asterisk (\*) character for more information). To specify leading spaces, prefix the mask with " " (asterisk and a space character).

For example:

' No leading spaces and trailing spaces

```
A$ = FORMAT$(0.75!, "#####.###") ' 0.75
```

' Up to 3 Leading spaces before decimal

```
A$ = FORMAT$(0.75!, "* ##.###") ' 0.75
```

' Using asterisks for padding characters

```
A$ = FORMAT$(0.75!, "*-###.###") ' ===0.75=
```

FORMAT\$ may also return a string that is larger than the number of characters in the mask:

```
A$ = FORMAT$(999999.9, "#.#") ' 999999.9
```

[period] Decimal placeholder. Determines the position of the decimal point in the resultant formatted string.

If any numeric field is specified to the left of the decimal point, at least one digit will always result, even if only a zero. The zero is not considered to be a "leading" zero if it is the only digit to the left of the decimal. Placing more than one period character in the *fmt\$* string will produce undefined results.

% [percent] Percentage placeholder. PowerBASIC multiplies *num\_expression* by 100, and adds a trailing percent symbol. For example:

```
x$ = FORMAT$(1 / 5!, "0.0%") ' 20.0%
```

[comma] Thousand separator. Used to separate thousands from hundreds within a number that has four or more digits to the left of the decimal point. In order to be recognized as a format character, the comma must be placed immediately after a digit placeholder character (also see Restrictions below).

```
A$ = FORMAT$(1234567@, "#,") ' 1,234,567
```

```
A$ = FORMAT$(12345@, "#,.00") ' 12,345.00
```

```
A$ = FORMAT$(12345@, "#.00,") ' 12,345.00
```

```
A$ = FORMAT$(1212.46, "$00,000.00") ' $01,212.46
```

```
A$ = FORMAT$(1000%, ""#"##",") ' #1,000
```

```
A$ = FORMAT$(1234567@, "0,") ' 1,234,567
```

\*x [asterisk] Digit placeholder and fill-character. Instructs PowerBASIC to insert a digit or character "x" in that position. If there is a digit in

*num\_expression* at the position where the \* appears in the format string, that digit is used; otherwise, the "x" character is used (where "x" represents your own choice of character). The \*x specifier acts as two digit (#) fields.

```
A$ = FORMAT$(9999.9@,"$*#####,.00") ' $**9,999.90
```

```
A$ = FORMAT$(0@,"$*#####0,.00#") ' $====0.00=
```

```
A$ = FORMAT$(0@,"$* #####0,.00") ' $ 0.00
```

E- e- E+ e+ [e] Scientific format. PowerBASIC will use scientific notation in the formatted output. Use E- or e- to place a minus sign in front of negative exponents. Use E+ or e+ to place a minus sign in front of negative exponents and a plus sign in front of non-negative exponents.

In order to be recognized as a format sequence, the E-, e-, E+, or e+ must be placed between two digit placeholder characters. For example:

```
A$ = FORMAT$(99.999, "0.0E-##") ' 1.0E2
```

```
A$ = FORMAT$(-99.999, "0.0E-##") ' -1.0E2
```

```
A$ = FORMAT$(99.999, "0.0E+##") ' 1.0E+2
```

```
A$ = FORMAT$(-99.999, "0.0E+##") ' -1.0E+2
```

```
A$ = FORMAT$(0.1!, "0.0e+##") ' 1.0e-1
```

" [double-quote] Quoted string. PowerBASIC treats all characters up to the next quotation mark as-is, without interpreting them as digit placeholders or format characters. Also see backslash. For example:

```
A$ = FORMAT$(12, $DQ+"##"+$DQ+"##") ' ##12
```

```
A$ = FORMAT$(5.55, ""XYZ="".##\##") ' XYZ=5.55#
```

```
A$ = FORMAT$(25, ""x="###") ' x=25
```

```
A$ = FORMAT$(999, ""Total "##") ' Total 999
```

```
A$ = FORMAT$(5, $DQ+"x="+$DQ+"##") ' x=5
```

\x [backslash] Escaped character prefix. PowerBASIC treats the character "x" immediately following the backslash (\) as a literal character rather than a digit placeholder or a formatting character. Many characters in a mask have a special meaning and cannot be used as literal characters unless they are preceded by a backslash.

The backslash itself is not copied. To display a backslash, use two backslashes (\). To display a literal double-quote, use two double-quote characters.

To simplify the mask string for common numeric formats, FORMAT\$ permits the dollar symbol, the left and right parenthesis symbols, the plus and minus symbols, and the space character ("\$(+ - ") to pass through from the mask string into the formatted output string, without requiring an escape (\) prefix character.

```
A$ = FORMAT$(23, "(* 0%)") ' (23%)
```

```
A$ = FORMAT$(99999, "#\##") ' 99999#
```

```
A$ = FORMAT$(5, "\"+$DQ+$DQ+"x="+$DQ+ _
"##\"+$DQ) ' "x=5"
```

```
A$ = FORMAT$(5, "\"""x=""\##\"""") ' "x=5"
```

```
A$ = FORMAT$(1000%, "#####,"") ' #####,"
```

## Restrictions

You cannot pass a [string expression](#) or string variable in *num\_expression*. Do not place more than one decimal point in the mask.

FORMAT\$ can return the maximum possible number of digits (up to 4932 for [Extended-precision](#)); however, the resulting digits will be meaningless beyond the actual precision of *num\_expression*. Consequently, the value of *num\_expression* may produce formatted strings that are wider than the length of *fmt\$*, for example:

```
A$ = FORMAT$(3e30!, "#,###") ' returns 41 characters
```

Rounding, if necessary, is implemented by the "banker's rounding" principle: if the fractional digit being rounded off is exactly five, with no trailing digits, the number is rounded to the nearest even number. This provides better results, on average, and follows

the IEEE standard. For example:

```
A$ = FORMAT$(0.5##, "0") ' 0
A$ = FORMAT$(1.5##, "0") ' 2
A$ = FORMAT$(2.5##, "0") ' 2
A$ = FORMAT$(2.51##, "0") ' 3
```

Semicolon characters, being mask delimiters, should not be used for other purposes in mask strings unless prefixed with an escaped character symbol (\).

FORMAT\$, when used with some formatting characters such as the thousands separator (comma), may not produce a "right-justified" formatted string. The simple solution is to apply separate justification with the [RSET](#) statement or the [RSET\\$](#) function. For example:

```
A$ = SPACE$(12)
RSET A$ = FORMAT$(1,"###.00") ' 1.00
RSET A$ = FORMAT$(1000,"#.00") ' 1,000.00
RSET A$ = FORMAT$(1000000,"###.00")' 1,000,000.00
B$ = RSET$(FORMAT$(1e6,"#,"),10) ' " 1,000,000"
```

One further enhancement would be to combine this into a [MACRO](#) function, for example:

```
MACRO mMoney1(d,l) = "$"+RSET$(FORMAT$(d,"#,"),l-1)
MACRO mMoney2(d,l) = RSET$(FORMAT$(d,"$#,"),l)
' code here
A$ = mMoney1(1000,10) ' "$ 1,000"
B$ = mMoney2(1000,10) ' " $1,000"
```

See also [BIN\\$](#), [GRAPHIC PRINT](#), [GUID\\$](#), [HEX\\$](#), [OCT\\$](#), [REPEAT\\$](#), [SPACES\\$](#), [STR\\$](#), [STRING\\$](#), [USING\\$](#), [VAL](#), [XPRINT](#)

## FRAC function

# FRAC function

|                 |                                                                                                                                                                                                   |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Return the fractional part of a number.                                                                                                                                                           |
| <b>Syntax</b>   | <i>h</i> = FRAC( <i>float_expression</i> )                                                                                                                                                        |
| <b>Remarks</b>  | FRAC returns the number <i>after</i> the decimal point of a floating-point number or expression. FRAC rounds the result of fit the precision of the target <i>h</i> , as per IEEE specifications. |
| <b>See also</b> | <a href="#">CEIL</a> , <a href="#">CINT</a> , <a href="#">FIX</a> , <a href="#">INT</a> , <a href="#">ROUND</a>                                                                                   |
| <b>Example</b>  | <code>h# = FRAC(10.25#)</code> ' = 0.25# (Double-precision)                                                                                                                                       |

## FREEFILE function

# FREEFILE function

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Return the next available PowerBASIC file number.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Syntax</b>  | <i>x%</i> = FREEFILE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Remarks</b> | FREEFILE returns an <a href="#">Integer</a> value in the range 1 to 32767, which dictates the next available file number that may be used to <a href="#">OPEN</a> a file or device. Using FREEFILE, your program can open files and devices without the need to keep track of which file numbers are already in use.<br><br>FREEFILE is thread-safe, returning a new file number with <i>each</i> invocation. This means that two or more consecutive calls to FREEFILE will return different file numbers regardless of whether they were used to open a file or not. This behavior differs from |

previous versions of PowerBASIC, where FREEFILE returned the same file number consistently until the file number was actually used to open a file or device.

FREEFILE is vastly superior to using hard-coded file numbers because it eliminates the possibility of a file number being used more than once in a module at any given moment.

A file number returned by FREEFILE can be used with the [COMM OPEN](#), [TCP OPEN](#) and [UDP OPEN](#) statements, as well as standard file [I/O OPEN](#) and [OPEN HANDLE](#) statements.

Use [FILENAMES](#) to return the name of the open file that corresponds to a given file number.

**Restrictions** FREEFILE returns file numbers within a predictable and convenient range of values. PowerBASIC file numbers are also *specific* (private) to the PowerBASIC module in which they are used to OPEN a file or device. This means that a file number in use in one module will have no definition or meaning if passed to another module or API function.

However, it can sometimes be necessary for a different module or even an API function to access a file that is already open. In this case, it is necessary to use the FILEATTR function to obtain the operating system file handle, and this value can be passed to other modules or API functions. These modules would use the OPEN HANDLE statement to gain access into the already-open file.

**See also** [COMM OPEN](#), [FILEATTR](#), [FILENAMES](#), [OPEN](#), [TCP OPEN](#), [UDP OPEN](#)

**Example**

```
x%= FREEFILE
OPEN MyFileName$ FOR OUTPUT AS #x%
```

## FUNCNAME\$ function

# FUNCNAME\$ function

**Purpose** Return the name of the current [Sub/Function/Method/Property](#).

**Syntax** `£$ = FUNCNAME$`

**Remarks** FUNCNAME\$ returns the name of the procedure in which it is located. If an `£$` is specified, FUNCNAME\$ returns the ALIAS name; otherwise, it returns the primary name capitalized. Returning the ALIAS name provides a mechanism to disguise sensitive internal procedure names even when reporting error conditions to a user.

FUNCNAME\$ can be useful as a [debugging](#) tool, or in situations where an [error handler](#) in a procedure passes error information on to a "central" procedure for logging and handling. FUNCNAME\$ does *not* require [#TOOLS ON](#).

**See also** [#TOOLS](#), [CALLSTK](#), [CALLSTK\\$](#), [CALLSTKCOUNT](#), [FILENAMES](#), [FUNCTION](#), [METHOD](#), [PROFILE](#), [PROPERTY](#), [SUB](#), [TRACE](#)

**Example**

```
SUB SecretEncryptionSub ALIAS "MySub" (sData$)
 x$ = FUNCNAME$ ' Returns "MySub"
END SUB
[statements]
SUB SecretDecryptionSub (sData$)
 x$ = FUNCNAME$ ' Returns "SECRETDECRYPTIONSUB"
END SUB
```

## FUNCTION/END FUNCTION statements

# FUNCTION/END FUNCTION statements

IMPROVED

**Purpose** Define a Function block.

**Syntax**

```
FUNCTION ProcName [ALIAS "AliasName"] [(arguments)] <Descriptors> AS Type
 [statements]
 [{FuncName | FUNCTION} = ReturnValue]
END FUNCTION
CALLBACK FUNCTION ProcName [AS LONG]...
THREAD FUNCTION ProcName (BYVAL var AS LONG) AS LONG...
```

**Remarks** All executable code must reside in a [Sub](#), Function, [Method](#), [Property](#), or [FastProc](#) block. Functions may not be nested. That is, you cannot define a code block (Sub, Function, Method, Property) inside another code block.

**Previous versions of PowerBASIC required that you create an explicit [DECLARE](#) statement if you wished to execute a SUB or FUNCTION which did not physically precede the reference to it. This extra work is no longer required, as PowerBASIC resolves all forward references to internal procedures automatically.**

**DECLARE statements for a Sub/Function imported from a DLL must still precede any reference to the procedure.**

*FuncName* The name of the Function. A [type-specifier](#) may be appended (just like an ordinary variable name) to specify the data type of the Function's return value, in place of the [AS *type*] clause. *FuncName* must be unique: no other variable, Function, Sub, Method, Property, or [label](#) can share it. Also see ALIAS below.

**Future versions of PowerBASIC will not support type-specifier symbols for the Function return type, so specify the return data type with an explicit AS *type* clause in all [DECLARE](#) and FUNCTION definitions, to ensure future compatibility.**

ALIAS [String literal](#) that identifies an case-sensitive alternative name for the function. This lets you export a Function by a different unique name. This can be useful if you want to abbreviate a long name, provide a more descriptive name, or if the exported name needs to contain characters that are illegal in PowerBASIC. *AliasName* is the routine's actual name as it appears in the export table, and *FuncName* is the title that you can use in PowerBASIC. For example:

```
FUNCTION ShortName ALIAS "LongFuncName"() EXPORT STATIC AS LONG
```

The ALIAS clause is very important when exporting procedures. Omitting the ALIAS clause or incorrectly capitalizing the alias name are common causes of "Missing Export" errors. Please refer to the [DECLARE](#) topic for more information.

### Descriptors

**EXPORT** This descriptor identifies a Sub or Function which may be accessed between Dynamic Link Libraries ([DLLs](#)), and/or the main executable which links them. If a procedure is not marked EXPORT, it is hidden from these other modules. The EXPORT attribute may be added to a Sub/Function defined elsewhere, by specifying EXPORT in a DECLARE statement. EXPORT can even be added to a Sub/Function in an [SLL](#) with a DECLARE in the host module.

**COMMON** A COMMON Sub/Function is one which may be referenced by and between linked unit modules (Host or SLL). If you DECLARE a Common Sub or Function which is not present in this module, it is presumed to be found in a separate linked module (Host or SLL).

**PRIVATE** A PRIVATE Sub/Function is one which may only be accessed from within the current PowerBASIC program or library. Even if not specified, this is the default mode of operation.

**THREADSAFE** With the THREADSAFE option, PowerBASIC automatically establishes a semaphore which allows only one [thread](#) to execute the Sub/Function at a time. Other callers must wait until the first thread exits the THREADSAFE procedure before they are allowed to begin.

**LOCAL** This descriptor specifies that all undeclared variables in a function are [LOCAL](#). This is the default condition if neither LOCAL nor STATIC is specified.

Local variables and arrays variables are automatically deallocated when the procedure terminates. LOCAL scalar variables (except dynamic strings) are stored on the stack, and visible only within the function.

**STATIC** This descriptor specifies that all undeclared variables in a function are [STATIC](#). Static variables retain their values as long as the program is running. They are visible only within the function.

**BDECL** Specifies that the declared procedure uses the legacy BASIC/Pascal calling convention. Parameters are pushed on the [stack](#) from left to right, and the called procedure is responsible for removing them. BDECL should only be used when necessary to match outside modules.

**CDECL** Specifies that the declared procedure uses the C calling convention. Parameters are pushed on the stack from right to left, and the calling code is responsible for removing them. CDECL should only be used when necessary to match outside modules.

**SDECL** This is the default convention, and should be used whenever possible. SDECL (and its synonym STDCALL), specifies the "Standard Calling Convention" for Windows. Parameters are pushed on the stack from right to left, and the called procedure is responsible for removing them.

**CALLBACK** Specifies that this is a [callback](#) function, which is used only to receive [messages](#) from the operating system. It may never be called directly from your code. Details about the message sent to the callback are retrieved using the [CB](#) group of PowerBASIC functions. Callback functions may not include parameters, and always return a [long integer](#) result. For example:

```
CALLBACK FUNCTION DlgProc AS LONG
 ' Callback code goes here
END FUNCTION
```

Callback functions have the unique ability to optionally return two distinct values when necessary for certain Windows messages. This allows them to return the value zero (0) as a function result, while still specifying that the message has been processed. See the section CALLBACK RETURN VALUE (below) and the [CALLBACKS](#) page for more details.

**THREAD** Specifies that this is a thread function, which is the point where execution of a new thread begins. It may never be called directly from your code. Thread functions must take exactly one long-integer or [double-word](#) parameter by value (BYVAL), and must return either a long-integer or double-word result. For example:

```
THREAD FUNCTION MyThreadFunction(BYVAL x AS LONG) AS LONG
 ' Thread code goes here
END FUNCTION
```

The [THREAD CREATE](#) statement creates and begins execution of a new thread Function.

### Passing parameters

*arguments* An optional, comma-delimited sequence of formal parameters. The parameters used in the *arguments* list serve only to define the Function; they have no relationship to other variables in the calling code with the same name.

Normally, PowerBASIC passes parameters to a Function either by reference (BYREF) or by value (BYVAL). If you do not need to modify the parameters (true in many cases), you can speed up your calls by passing the parameters by value using the BYVAL keyword. You can clarify that a parameter is passed by reference by using the optional BYREF keyword.

The type of the parameter is specified either by appending a type-specifier character to the name or by using an AS clause. For example:

```
FUNCTION Test&(A AS INTEGER) 'integer passed by ref
FUNCTION Test&(A%) 'integer passed by ref
FUNCTION Test&(BYREF A%) 'integer passed by ref
```

```
FUNCTION Test&(BYVAL A%) 'integer passed by val
```

### Parameter restrictions

PowerBASIC compilers have a limit of 32 parameters per FUNCTION. To pass more than 32 parameters to a FUNCTION, construct a [User-Defined Type](#) (UDT) and pass the UDT by reference (BYREF) instead.

[Fixed-length strings](#), [Nul-Terminated Strings](#), and [User-Defined Types/Unions](#) may also be passed as BYVAL or OPTIONAL parameters. Try to avoid passing large items BYVAL, as it's terribly inefficient, and there is a maximum size limit of 64 Kb for a given parameter list.

PowerBASIC Functions cannot return an [array](#) or [Variant](#) variable as a Function return value. Pass these variable types as BYREF parameters instead. For example:

```
lResult& = ProcessData(TheArray&(), iSize%)
[statements]
FUNCTION ProcessData(lArr() AS LONG, iSize%) AS LONG
 REDIM lArr(iSize%) AS LONG
 lArr(iSize%) = 1&
 FUNCTION = -1&
END FUNCTION
```

### Pointer parameters

When a Function definition specifies either a BYREF parameter or a [pointer](#) variable parameter, the calling code may freely pass a BYVAL DWORD or a Pointer instead. Pointer variable parameters must always be declared as BYVAL parameters.

```
' Integer Pointer (passed by value)
FUNCTION Test(BYVAL A AS INTEGER PTR) AS LONG
 @A = 56
END FUNCTION
```

Additional information on BYVAL/BYREF/BYCOPY parameter passing can be found in the [CALL](#) statement topic.

### Optional parameters

PowerBASIC supports two syntax formats for optional parameters: the classic optional parameter syntax using brackets "[.]", and the new syntax using the OPTIONAL (or OPT) keyword. We'll discuss each one in turn.

#### Using OPTIONAL/OPT

FUNCTION statements may specify one or more parameters as optional by preceding the parameter with either the keyword OPTIONAL or OPT. Optional parameters are only allowed with CDECL or SDECL calling conventions, not BDECL.

When a parameter is declared optional, all subsequent parameters in the declaration are optional as well, whether or not they specify an explicit OPTIONAL or OPT directive. The following two lines are equivalent, with both second and third parameters being optional:

```
FUNCTION sABC(a&, OPTIONAL BYVAL b&, OPTIONAL BYVAL c&) AS LONG
FUNCTION sABC(a&, OPT BYVAL b&, BYVAL c&) AS LONG
```

[VARIANT](#) variables are particularly well suited for use as an optional parameter. If the calling code omits an optional VARIANT parameter, (BYVAL or BYREF), PowerBASIC (and most other compilers) substitute a variant of type VT\_ERROR which contains an error value of %DISP\_E\_PARAMNOTFOUND (&H80020004). In this case, you can check for this value directly, or use the [ISMISSING\(\)](#) function to determine whether the parameter was physically passed or not.

When optional parameters (other than a VARIANT) are omitted in the calling code, the stack area normally reserved for those parameters is zero-filled. This allows you to test if an optional parameter was passed or not:

If the parameter is defined as a BYVAL parameter, it will have the value zero. For TYPE or UNION variables passed BYVAL, the compiler will pass a string of binary zeroes of

length [SIZEOF](#)(Type\_or\_union\_var).

If the parameter is defined as a BYREF parameter, [VARPTR](#) (*varname*) will equal zero; when this is true, any attempt to use *Var\_name* in your code will result in [Error #9](#) (null pointer); failure to detect this error using [error-trapping](#) may result in a General Protection Fault or memory corruption. You should use the [ISMISSING\(\)](#) function first to determine whether it is safe to access the parameter.

Because the FUNCTION, SUB, FASTPROC, METHOD, or PROPERTY being called does not know how many parameters are being passed at the time it is called, you should pass the number of parameters as one of the required parameters in the list.

AS type

Function blocks are constructed very much like Subs (see [SUB/END SUB](#) statement).

However, Functions differ from Subs in that they always return a result, so they can be used in assignments and expressions. Therefore, there are two ways to specify the return type of a Function:

You may specify the type of data returned by a Function to the calling code. If you do not specify a type, PowerBASIC assumes that the Function returns the data type specified by a [DEFtype](#) statement. However, if no DEFtype or AS type has been specified, a [compile-time error](#) is generated.

Therefore, there are two ways to specify the return type of a Function:

- Include a type-specifier character at the end of *FuncName*
- Include the AS type clause as the last part of the FUNCTION statement (this is the recommended syntax to ensure future compatibility).

For example, the following statements are equivalent:

```
FUNCTION aFunction?()
FUNCTION aFunction() AS BYTE
```

**While most FUNCTION calling conventions are fairly well defined throughout the industry, there are a few exceptions. In the case of functions which return a [Quad Integer](#) value, some programming languages (including PowerBASIC) return the quad value in the FPU, while others return it in EDX:EAX.**

**PowerBASIC automatically detects the method used by imported functions and adjusts accordingly for you, but that's not a feature found in other compilers. Therefore, we recommend that you do not EXPORT QUAD FUNCTIONS unless they will only be accessed by PowerBASIC programs. A simple equivalent functionality would be to return the quad-integer value to the caller in a BYREF QUAD parameter.**

## Assigning a return value

You can specify the return value of the Function by explicitly setting the value, either by assigning a value to the FUNCTION keyword, or by assigning a value to the function name. For example, the two lines within the following Function block are equivalent:

```
FUNCTION AddData() AS LONG
 [statements]
 AddData = 123& ' Assign value to function name
 FUNCTION = 123& ' Assign value to the function
END FUNCTION
```

## Default return value

If the code within the Function does not explicitly set a return value, the default return value will be zero if the function returns a numeric data type, or an empty string if the function returns a string. For example:

```
FUNCTION AddData() AS LONG
 [statements]
 IF condition THEN
 EXIT FUNCTION ' No assignment, will return 0&
 ELSE
 FUNCTION = -1& ' An explicit return value
```

```

END IF
END FUNCTION

```

PowerBASIC Functions cannot return an array as a Function return value. Pass the array as a parameter instead. For example:

```

lResult& = CheckTheData(InTheArray&())
[statements]
FUNCTION CheckTheData(lArr() AS LONG) AS LONG
[statements]
END FUNCTION

```

## CALLBACK Return Value

Callback functions always return a long integer result. The primary purpose of this return value is to tell the PowerBASIC [DDT](#) engine and the Windows operating system whether your Callback Function has processed this particular message. If you return the value [TRUE](#) (any non-zero value), you are asserting that the message was processed and no further handling is needed. If you return the value [FALSE](#) (zero), the PowerBASIC DDT engine will manage the message for you, using the default message procedures in Windows. If you do not specify a return value in the function, PowerBASIC chooses the value FALSE (zero) for you.

The term "process a message" may have many meanings. If it's a simple notification of a change in focus or style, which has no impact on your program, you may decide to consider it processed, yet do nothing. In other cases, your reaction could be quite complex and involved. As the programmer, that's your decision to make. But, regardless of your reaction, you should consider a message "processed" (returning a true value) whenever no further handling of the message (by DDT or Windows) is needed.

In some cases, especially when dealing with Common Controls and custom controls, you may be required to return a second result value through a special Windows data area named `DWL_MSGRESULT`. When you complete a Callback Function, PowerBASIC automatically copies any non-zero return value to `DWL_MSGRESULT`, if you haven't done so already. Therefore, it's generally safe to ignore this requirement in your code.

In most cases, when you process a message, you'll return a generic value for TRUE, such as: `FUNCTION = 1`. However, some messages require that you return a special value for TRUE, such as a graphical brush handle. As long as the value is non-zero, you can return it in the normal manner (with `FUNCTION = n`), since any non-zero value automatically implies that the message was processed.

That said, there are a few unique messages which may require special handling. Luckily, they're rare, but some just "break all the rules" listed above. For example, you might find one which requires a zero result, even when you have processed the message. You may find another which requires the return value be different from `DWL_MSGRESULT`. For these very special cases, you can simply specify two return values:

```

FUNCTION = 1, BrushHandle&

```

In this form, the first numeric expression specifies the value to be returned from the Callback Function. The second numeric expression tells the value to be assigned to `DWL_MSGRESULT`. When you use this double parameter assignment, the results are absolute. PowerBASIC assumes you have processed the message, regardless of the values given. PowerBASIC makes no other assumptions of any kind about these values. A double parameter function assignment is only allowed in a Callback Function.

**Previous versions of PowerBASIC did not offer a double parameter form of function return. This caused some difficulty with a few Windows messages which required a special return value of zero. If you return a value of zero (0) with the single parameter form, it implies the message was not processed at all by the Callback. This issue is totally circumvented by the double parameter form.**

## Variables within functions

[LOCAL](#) variables are created within the procedures stack frame. If a LOCAL variable

exceeds the amount of stack space available, it may become necessary to use a [STATIC](#) or [GLOBAL](#) variable instead. For example, creating a LOCAL [Nul-Terminated](#) string or LOCAL [fixed-length](#) string that is very large (say, approaching 1 MB) can trigger a General Protection Fault (GPF) because it may overrun the stack frame.

**See also** [DECLARE](#), [EXIT](#), [FASTPROC](#), [FUNCNAME\\$](#), [GLOBAL](#), [INSTANCE](#), [ISMISSING](#), [LOCAL](#), [METHOD](#), [PROPERTY](#), [STATIC](#), [SUB](#), [THREAD CREATE](#), [THREADID](#)

**Example**

```
FUNCTION HalfOf ALIAS "HalfOf" (X!) EXPORT AS SINGLE
 FUNCTION = X! / 2
END FUNCTION
```

## GET statement

# GET statement

**Purpose** Read a record from a [random-access file](#), or a [variable](#) or an [array](#) from a [binary file](#).

**Syntax**

Random-Access files:

```
GET [#] filenum&, [Rec], [ABS] Var
GET [#] filenum& [, Rec]
```

Binary files:

```
GET [#] filenum&, [RecPos], Var
GET [#] filenum&, [RecPos], Arr() [RECORDS rcds] [TO count]
```

**Remarks** A

variable used to receive data may be either [ANSI](#) or [WIDE](#), but it must match the [CHR](#) mode of the data read from the file. That is, if the data was written as an ANSI string, it should be read into an ANSI string variable. If it was written as a WIDE string, it should be read into a WIDE string variable. Failure to match this CHR mode can cause unpredictable interpretation of the data. GET never performs conversions of ANSI/WIDE characters, regardless of the CHR mode specified in the OPEN statement. It reads data from the file based upon the type of string variable you use.

It is the responsibility of the programmer to choose the correct type.

*filenum&* The [file number](#) under which the file was opened.

### Random Access files

*Rec* For random-access files, *Rec* is the record number to be read, from 1 to 2<sup>63</sup>-1 (the maximum positive value for a [Quad-integer](#)). If *Rec* is omitted, the next record in sequence (following the one specified by the most recent GET or [PUT](#)) is read. If the file was just opened, the first record is read.

*Var* If *Var* is smaller than the defined record length, GET will read enough data to fill *Var*. The remainder of the record is discarded and the file pointer is placed at the next record position. If *Var* is larger than the defined record length, GET will read one record into *Var*, and the file pointer will be moved to the next record.

When GET is used to retrieve data from a random access file into a [dynamic \(variable-length\) string](#), PowerBASIC looks for a 2-byte ([WORD](#)) size field at the beginning of each record which indicates the number of data bytes which follow. If the data is in WIDE format, the size is double the number of characters because each character occupies two bytes. This 2-byte size field is placed in the file automatically by the PUT statement when used with dynamic (variable-length) strings.

When the second form of GET is used (without a *Var* target string), GET reads the file data from the current file pointer into an internal buffer. This data can then be accessed using [FIELD](#) string variables.

**ABS** When GET is used to read a random file into a dynamic string, it normally expects the first two bytes of the record to contain the length of the valid data contained in the record. The ABS keyword specifies that no length word exists in the data, and the number of

bytes to read is defined by the current length of the dynamic string variable. If the variable length is greater than the file record length, the remainder of the string variable is filled with nul's ([CHR\\$\(0\)](#) or [\\$NUL](#)). This offers greater compatibility with the actual operation of other versions of BASIC, such as [PowerBASIC for DOS](#).

A random access file record is limited to 32768 bytes to ensure consistent behavior across all supported Win32 platforms. [GET\\$](#) and other related functions are not constrained in this manner.

### Binary files

*RecPos* For binary files, *RecPos* is the starting byte or

from where the GET should begin. The optional `BASE =` clause of the OPEN statement defines whether the first position is 0 or 1. The base position is 1 by default. If *RecPos* is greater than the number of records or bytes in the file, no error occurs but unpredictable data may be read. Use the [EOF](#) function to avoid reading past the end of the file.

*Var* When used with a binary file, GET retrieves enough data from the file to fill *Var*. The *Var* parameter can be a simple (scalar) variable like an [Integer](#) or a dynamic (variable-length) string, an element in an array, or a variable of [User-Defined Type](#).

When GET is used to read a binary file into a dynamic string, the number of bytes to read is defined by the current size of the dynamic string variable. If the variable length is greater than the file record length, the remainder of the string variable is filled with nuls ([CHR\\$\(0\)](#) or [\\$NUL](#)). This offers greater compatibility with the actual operation of other versions of BASIC, such as PowerBASIC for DOS.

*Arr()* When reading an array from the disk file, GET assigns data from the file into each element in the array, starting at the array's [LBOUND](#) subscript. GET attempts to read the number of elements specified by *rcds* in the RECORDS option, or the number of elements in the array, whichever is smaller. The actual number of elements read is assigned to the variable *count* specified in the optional TO clause.

With a dynamic [string array](#), it is assumed the file was written in the PowerBASIC and/or VB packed string format using PUT of an entire string array. If a string is shorter than 65535 bytes, a 2-byte length WORD is followed by the string data. Otherwise, a 2-byte value of 65535 is followed by a length [Double-word](#) (DWORD), then finally the string data.

With other array types, the entire data area is read as a single block. In either case, it is presumed the file was created with the complementary PUT Array statement.

[EOF](#) is set just as with other GET statements.

You can use the FILESCAN statement to determine the number of records contained in the file, allowing an array of the appropriate type to be dimensioned before using the GET statement to read the file.

**See also** [CSET](#), [CSET\\$](#), [EOF](#), [FIELD](#), [FILESCAN](#), [GET\\$](#), [GET\\$\\$](#), [LINE INPUT#](#), [LSET](#), [OPEN](#), [PRINT#](#), [PUT](#), [PUT\\$](#), [PUT\\$\\$](#), [RSET](#), [TYPE](#), [SEEK](#), [WRITE#](#)

### Example

```
' Random-access GET example
DIM uName AS STRING * 20
DIM I AS QUAD
DIM F AS LONG

F = FREEFILE
OPEN "TESTFILE.DTA" FOR RANDOM AS #F LEN = LEN(uName)
WHILE uName <> SPACE$(20)
 PUT #F,, uName
 uName = GetInput()
WEND

IF SEEK(F) > 0 THEN
 ShowText "The file contains these names:"
```

```

FOR ix = 1 TO SEEK(F)
 GET #F, ix, uName
 ShowText uName + NL
NEXT
ELSE
 ShowText "The file is empty"
END IF
CLOSE #F

' Binary GET Array example
OPEN "Data file to read.dat" FOR BINARY AS #1
FILESCAN #1, RECORDS TO count&
DIM TheData$(1 TO count&)
GET #1, 1, TheData$() TO y&
CLOSE #1

```

## GET\$ statement

# GET\$ statement IMPROVED

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>      | Read an <a href="#">ANSI</a> from a file <a href="#">opened</a> in <a href="#">binary</a> mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Syntax</b>       | GET\$ [#] <i>filenum&amp;</i> , <i>Count&amp;</i> , <i>StrgVar</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <i>filenum&amp;</i> | The <a href="#">file number</a> under which the file was opened.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <i>Count&amp;</i>   | Specifies how many <a href="#">bytes</a> to read.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <i>StrgVar</i>      | The string <a href="#">variable</a> which receives the data. It can be a <a href="#">dynamic string</a> , <a href="#">fixed-length string</a> , <a href="#">nul-terminated string</a> , or <a href="#">field string</a> . <i>StrgVar</i> may be either ANSI or <a href="#">WIDE</a> . If it is a WIDE variable, the data is automatically converted to WIDE Unicode before it is assigned.                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Remarks</b>      | <p>GET\$ reads <i>Count&amp;</i> characters from file number <i>filenum&amp;</i>, and assigns them to <i>StrgVar</i>. GET\$ and <a href="#">PUT\$</a> provide a low-level alternative to <a href="#">sequential</a> and <a href="#">random-access</a> file-processing techniques, allowing you to deal with files on a byte-by-byte basis.</p> <p>File <i>filenum&amp;</i> must have been opened in <a href="#">binary</a> mode. Characters are read starting at the current file pointer position, which can be set with the <a href="#">SEEK</a> statement. When the file is first opened, the pointer is at the beginning of the file (position 1, by default, unless <code>BASE=0</code> was specified in the OPEN statement). After GET\$, the file pointer position is automatically advanced to the position immediately following the data read.</p> |
| <b>See also</b>     | <a href="#">EOF</a> , <a href="#">GET</a> , <a href="#">GET\$\$</a> , <a href="#">INPUT#</a> , <a href="#">LINE INPUT#</a> , <a href="#">LOF</a> , <a href="#">OPEN</a> , <a href="#">PRINT#</a> , <a href="#">PUT</a> , <a href="#">PUT\$</a> , <a href="#">PUT\$\$</a> , <a href="#">SEEK</a> , <a href="#">WRITE#</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Example</b>      | <pre> ' Open binary file, write the alphabet A-Z to it OPEN "SEEK.DTA" FOR BINARY AS #1 LEN = 1 BASE = 0 FOR I&amp; = 65 TO 90   PUT\$ #1, CHR\$(I&amp;) NEXT I&amp;  ' Now read five characters at a time from the file, ' starting at different pointer positions FOR I&amp; = 0 TO 20 STEP 5   SEEK #1, I&amp;   GET\$ #1, 5, TempString\$   x\$ = "Starting at position" + STR\$(I&amp;) + \$SPC + \$DQ + TempString\$ + \$DQ NEXT I&amp; CLOSE #1 </pre>                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Result</b>       | <pre> Starting at position 0 "ABCDE" Starting at position 5 "FGHIJ" </pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

Starting at position 10 "KLMNO"  
 Starting at position 15 "PQRST"  
 Starting at position 20 "UVWXY"

## GET\$\$ statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## GET\$\$ statement New!

|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>   | Reads <a href="#">WIDE</a> data from a file <a href="#">opened</a> in <a href="#">binary</a> mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Syntax</b>    | GET\$\$ [#] <i>Filenum</i> &, <i>Count</i> &, <i>StrgVar</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <i>Filenum</i> & | The <a href="#">file number</a> under which the file was opened.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <i>Count</i> &   | Specifies how many WIDE characters to read from the file.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <i>StrgVar</i>   | The string <a href="#">variable</a> which receives the data. It can be a dynamic string, fixed-length string, nul-terminated string, or field string. <i>StrgVar</i> may be either <a href="#">ANSI</a> or WIDE. If it is an ANSI variable, the data is automatically converted to ANSI bytes before it is assigned.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Remarks</b>   | <p>GET\$\$ reads <i>Count</i>&amp; WIDE characters from file number <i>filenum</i>&amp;, and assigns them to <i>StrgVar</i>. GET\$\$ and PUT\$\$ provide a low-level alternative to <a href="#">sequential</a> and <a href="#">random-access</a> file-processing techniques, allowing you to deal with files on a character-by-character basis.</p> <p>File <i>filenum</i>&amp; must have been opened in binary mode. Characters are read starting at the current file pointer position, which can be set with the <a href="#">SEEK</a> statement. When the file is first opened, the pointer is at the beginning of the file (position 1, by default, unless BASE=0 was specified in the OPEN statement). After GET\$\$, the file pointer position is automatically advanced to the position immediately following the data read.</p> |
| <b>See also</b>  | <a href="#">EOF</a> , <a href="#">GET</a> , <a href="#">GET\$</a> , <a href="#">INPUT#</a> , <a href="#">LINE INPUT#</a> , <a href="#">LOF</a> , <a href="#">OPEN</a> , <a href="#">PRINT#</a> , <a href="#">PUT</a> , <a href="#">PUT\$</a> , <a href="#">PUT\$\$</a> , <a href="#">SEEK</a> , <a href="#">WRITE#</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

## GETATTR function

# GETATTR function

|                |                                                                                                                                                                                                                                                           |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Return the file-system attribute(s) of a disk file or directory.                                                                                                                                                                                          |
| <b>Syntax</b>  | <i>x</i> & = GETATTR( <i>filespec</i> \$)                                                                                                                                                                                                                 |
| <b>Remarks</b> | <i>filespec</i> \$ specifies a filename or directory (optionally, including a drive letter and directory path). The attribute code returned in <i>x</i> & is a standard operating system attribute code, or a combination of several codes ORed together: |

| Attribute | Description | Equate    |
|-----------|-------------|-----------|
| 0         | Normal*     | %NORMAL   |
| 1         | Read-only   | %READONLY |
| 2         | Hidden      | %HIDDEN   |

|     |              |                      |
|-----|--------------|----------------------|
| 4   | System       | %SYSTEM              |
| 8   | Volume Label | %VLABEL              |
| 16  | Directory    | %SUBDIR              |
| 32  | Archived     | %ARCHIVE             |
| 128 | Normal*      | (synonym of %NORMAL) |

\* **Some operating systems may return either 0 or 128 for normal files.**

If GETATTR returns an attribute of 0 (or 128), *filespec\$* is a regular file: not read-only, not hidden, not system, and not archived.

Additional file attributes may be supported on some file systems. See the %FILE\_ATTRIBUTE equates in your WinNT.inc file for a full list.

If you want to test for a single attribute, use the bitwise [AND](#) operator to strip out any other attributes that might be set. See the example below.

GETATTR can also be used to verify the existence of a file or directory, taking advantage of the fact that [ERR](#) will be set if the file/directory does not exist. See the example below.

#### Restrictions

If *filespec\$* cannot be found, a run-time [Error 53](#) ("File not found") occurs. You cannot obtain the attributes of the root directory (i.e., "C:\"). Windows prevents this particular operation, triggering an Error 53.

#### See also

[DIR\\$](#), [FILEATTR](#), [ISFILE](#), [PATHSCAN\\$](#), [SETATTR](#)

#### Example

```
' General GETATTR example
attr& = GETATTR("C:\CONFIG.SYS")
IF (attr& AND 32&) = 32& THEN
 x$ = "CONFIG.SYS has been modified"
ELSE
 x$ = "CONFIG.SYS hasn't been modified"
END IF
```

## GLOBAL statement

# GLOBAL statement

#### Purpose

Declare global (shared) [variables](#) between [Subs](#), [Functions](#), [Methods](#), and [Properties](#).

#### Syntax

```
GLOBAL variable[()] [AS type] [, variable[()]] [, ...]
GLOBAL variable[()] [, variable[()]] [, ...] AS type
```

#### Remarks

GLOBAL declares the specified variable(s) as global to the entire program. This gives a procedure access to variable(s), without having to pass them as parameters. To declare an [array](#) as a global variable, use an empty set of parentheses in the variable list:

```
GLOBAL MyArray%()
GLOBAL StringArray() AS STRING
```

You must then use the [DIM](#) or [REDIM](#) statements to dimension the array inside a procedure. A good place to do this is inside your [WINMAIN](#) or [PBMAIN](#) function.

If an array is defined as GLOBAL outside a procedure, you should include the GLOBAL keyword in the DIM statement for clarity, and compatibility with future versions of PowerBASIC:

```
GLOBAL a() AS STRING
FUNCTION PBMAIN
 DIM a(1 TO 500) AS GLOBAL STRING
 [statements]
END FUNCTION
```

The GLOBAL statement may accept a list of variables, all of which are defined by the type descriptor keywords which follow them. For example:

```
GLOBAL aaa, bbb, ccc AS INTEGER
GLOBAL vptr, aptr() AS LONG PTR
```

**Restrictions** GLOBAL variables are not shared between programs and [DLLs](#) or between multiple instances of the same DLL. That is, a GLOBAL variable is only global within its own module. The simplest way to expose a variable to a DLL is to pass the variable (by reference) to the target DLL. [DEFtype](#) has no effect on variables defined by a GLOBAL statement.

**See also** [DIM](#), [INSTANCE](#), [LOCAL](#), [STATIC](#), [THREADED](#)

**Example**

```
#COMPILE EXE
GLOBAL Caption AS ASCIIZ * 255

FUNCTION PBMAIN() AS LONG
 DIM Msg AS ASCIIZ * 255
 CALL SetVars
 IF Caption = "GLOBAL test" then Msg = "Success!"
END FUNCTION

SUB SetVars()
 Caption = "GLOBAL test"
END SUB
```

## GLOBALMEM ALLOC statement

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## GLOBALMEM statement

**Purpose** Allocate or release a block of global memory

**Syntax**

```
GLOBALMEM ALLOC count TO vHndl
GLOBALMEM FREE mHndl TO vHndl
GLOBALMEM LOCK mHndl TO vPtr
GLOBALMEM SIZE mHndl TO vSize
GLOBALMEM UNLOCK mHndl TO vLocked
```

**Remarks** GLOBALMEM allocates a block of global system memory of the requested size. This is always allocated as "moveable" memory, so it can be used with any facilities of Windows. It is the programmer's responsibility to release the allocated memory block when it's no longer needed.

There are five general forms of the GLOBALMEM statement:

**GLOBALMEM ALLOC** A moveable memory block of the size in [bytes](#) specified by *count* is allocated. A unique handle is assigned to this memory object (for later identification). This handle is assigned to the [LONG](#) or [DWORD](#) variable specified by *vHndl*. If the requested allocation fails for any reason, the value zero (0) is assigned to *vHndl* instead.

**GLOBALMEM FREE** A memory block is de-allocated and released for re-use. The *mHndl* parameter is a [variable](#) or expression which evaluates to the handle returned by GLOBALMEM ALLOC when the memory block was created. If the de-

allocation operation was successful, the result variable *vHndl* is set to zero (0) to indicate that the original handle is no longer valid. If the operation fails for any reason, the value of the *mHndl* parameter is assigned to *vHndl*. It may be convenient to use the same variable for both the parameter and the result, as it will then be automatically cleared to zero when the memory block is released.

|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GLOBALMEM LOCK   | The moveable memory block referenced by <i>mHndl</i> is locked at a specific memory location. A <a href="#">pointer</a> to this location is assigned to the variable specified by <i>vPtr</i> . You may only read or write the memory block while it is locked, and you use the current pointer to its location.                                                                                                                                                   |
| GLOBALMEM SIZE   | The size of the memory block referenced by <i>mHndl</i> is retrieved and assigned to the LONG or DWORD variable specified by <i>vSize</i> . The <i>mHndl</i> parameter is the handle originally returned by GLOBALMEM ALLOC.                                                                                                                                                                                                                                       |
| GLOBALMEM UNLOCK | The moveable memory block referenced by <i>mHndl</i> is unlocked, and the previous memory pointer is invalidated. If the memory block remains locked (perhaps because it had been locked more than once), the value <a href="#">TRUE</a> (non-zero) is assigned to the result variable <i>vLocked</i> . If the memory block is now unlocked, or the parameter <i>mHndl</i> was invalid, the value <a href="#">FALSE</a> (0) is assigned to <i>vLocked</i> instead. |

See also [MEMORY](#)

## GLOBALMEM FREE statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## GLOBALMEM statement

**Purpose** Allocate or release a block of global memory

**Syntax**

```
GLOBALMEM ALLOC count TO vHndl
GLOBALMEM FREE mHndl TO vHndl
GLOBALMEM LOCK mHndl TO vPtr
GLOBALMEM SIZE mHndl TO vSize
GLOBALMEM UNLOCK mHndl TO vLocked
```

**Remarks** GLOBALMEM allocates a block of global system memory of the requested size. This is always allocated as "moveable" memory, so it can be used with any facilities of Windows. It is the programmer's responsibility to release the allocated memory block when it's no longer needed.

There are five general forms of the GLOBALMEM statement:

|                 |                                                                                                                                     |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------|
| GLOBALMEM ALLOC | A moveable memory block of the size in <a href="#">bytes</a> specified by <i>count</i> is allocated. A unique handle is assigned to |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------|

|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  | this memory object (for later identification). This handle is assigned to the <a href="#">LONG</a> or <a href="#">DWORD</a> variable specified by <i>vHndl</i> . If the requested allocation fails for any reason, the value zero (0) is assigned to <i>vHndl</i> instead.                                                                                                                                                                                                                                                                                                                                                                                                    |
| GLOBALMEM FREE   | A memory block is de-allocated and released for re-use. The <i>mHndl</i> parameter is a <a href="#">variable</a> or expression which evaluates to the handle returned by GLOBALMEM ALLOC when the memory block was created. If the de-allocation operation was successful, the result variable <i>vHndl</i> is set to zero (0) to indicate that the original handle is no longer valid. If the operation fails for any reason, the value of the <i>mHndl</i> parameter is assigned to <i>vHndl</i> . It may be convenient to use the same variable for both the parameter and the result, as it will then be automatically cleared to zero when the memory block is released. |
| GLOBALMEM LOCK   | The moveable memory block referenced by <i>mHndl</i> is locked at a specific memory location. A <a href="#">pointer</a> to this location is assigned to the variable specified by <i>vPtr</i> . You may only read or write the memory block while it is locked, and you use the current pointer to its location.                                                                                                                                                                                                                                                                                                                                                              |
| GLOBALMEM SIZE   | The size of the memory block referenced by <i>mHndl</i> is retrieved and assigned to the LONG or DWORD variable specified by <i>vSize</i> . The <i>mHndl</i> parameter is the handle originally returned by GLOBALMEM ALLOC.                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| GLOBALMEM UNLOCK | The moveable memory block referenced by <i>mHndl</i> is unlocked, and the previous memory pointer is invalidated. If the memory block remains locked (perhaps because it had been locked more than once), the value <a href="#">TRUE</a> (non-zero) is assigned to the result variable <i>vLocked</i> . If the memory block is now unlocked, or the parameter <i>mHndl</i> was invalid, the value <a href="#">FALSE</a> (0) is assigned to <i>vLocked</i> instead.                                                                                                                                                                                                            |

See also [MEMORY](#)

## GLOBALMEM LOCK statement

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## GLOBALMEM statement

**Purpose** Allocate or release a block of global memory

**Syntax**

```

GLOBALMEM ALLOC count TO vHndl
GLOBALMEM FREE mHndl TO vHndl
GLOBALMEM LOCK mHndl TO vPtr
GLOBALMEM SIZE mHndl TO vSize
GLOBALMEM UNLOCK mHndl TO vLocked

```

**Remarks** GLOBALMEM allocates a block of global system memory of the requested size. This is always allocated as "moveable" memory, so it can be used with any facilities of Windows. It is the programmer's responsibility to release the allocated memory block when it's no longer needed.

There are five general forms of the GLOBALMEM statement:

|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GLOBALMEM ALLOC  | A moveable memory block of the size in <a href="#">bytes</a> specified by <i>count</i> is allocated. A unique handle is assigned to this memory object (for later identification). This handle is assigned to the <a href="#">LONG</a> or <a href="#">DWORD</a> variable specified by <i>vHndl</i> . If the requested allocation fails for any reason, the value zero (0) is assigned to <i>vHndl</i> instead.                                                                                                                                                                                                                                                                |
| GLOBALMEM FREE   | A memory block is de-allocated and released for re-use. The <i>mHndl</i> parameter is a <a href="#">variable</a> or expression which evaluates to the handle returned by GLOBALMEM ALLOC when the memory block was created. If the de-allocation operation was successful, the result variable <i>vHndl</i> is set to zero (0) to indicate that the original handle is no longer valid. If the operation fails for any reason, the value of the <i>mHndl</i> parameter is assigned to <i>vHndl</i> . It may be convenient to use the same variable for both the parameter and the result, as it will then be automatically cleared to zero when the memory block is released. |
| GLOBALMEM LOCK   | The moveable memory block referenced by <i>mHndl</i> is locked at a specific memory location. A <a href="#">pointer</a> to this location is assigned to the variable specified by <i>vPtr</i> . You may only read or write the memory block while it is locked, and you use the current pointer to its location.                                                                                                                                                                                                                                                                                                                                                              |
| GLOBALMEM SIZE   | The size of the memory block referenced by <i>mHndl</i> is retrieved and assigned to the LONG or DWORD variable specified by <i>vSize</i> . The <i>mHndl</i> parameter is the handle originally returned by GLOBALMEM ALLOC.                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| GLOBALMEM UNLOCK | The moveable memory block referenced by <i>mHndl</i> is unlocked, and the previous memory pointer is invalidated. If the memory block remains locked (perhaps because it had been locked more than once), the value <a href="#">TRUE</a> (non-zero) is assigned to the result variable <i>vLocked</i> . If the memory block is now unlocked, or the parameter <i>mHndl</i> was invalid, the value <a href="#">FALSE</a> (0) is assigned to <i>vLocked</i> instead.                                                                                                                                                                                                            |

**See also** [MEMORY](#)

## GLOBALMEM SIZE statement

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

# GLOBALMEM statement

**Purpose** Allocate or release a block of global memory

**Syntax**

```
GLOBALMEM ALLOC count TO vHndl
GLOBALMEM FREE mHndl TO vHndl
GLOBALMEM LOCK mHndl TO vPtr
GLOBALMEM SIZE mHndl TO vSize
GLOBALMEM UNLOCK mHndl TO vLocked
```

**Remarks** GLOBALMEM allocates a block of global system memory of the requested size. This is always allocated as "moveable" memory, so it can be used with any facilities of Windows. It is the programmer's responsibility to release the allocated memory block when it's no longer needed.

There are five general forms of the GLOBALMEM statement:

|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GLOBALMEM ALLOC  | A moveable memory block of the size in <a href="#">bytes</a> specified by <i>count</i> is allocated. A unique handle is assigned to this memory object (for later identification). This handle is assigned to the <a href="#">LONG</a> or <a href="#">DWORD</a> variable specified by <i>vHndl</i> . If the requested allocation fails for any reason, the value zero (0) is assigned to <i>vHndl</i> instead.                                                                                                                                                                                                                                                                |
| GLOBALMEM FREE   | A memory block is de-allocated and released for re-use. The <i>mHndl</i> parameter is a <a href="#">variable</a> or expression which evaluates to the handle returned by GLOBALMEM ALLOC when the memory block was created. If the de-allocation operation was successful, the result variable <i>vHndl</i> is set to zero (0) to indicate that the original handle is no longer valid. If the operation fails for any reason, the value of the <i>mHndl</i> parameter is assigned to <i>vHndl</i> . It may be convenient to use the same variable for both the parameter and the result, as it will then be automatically cleared to zero when the memory block is released. |
| GLOBALMEM LOCK   | The moveable memory block referenced by <i>mHndl</i> is locked at a specific memory location. A <a href="#">pointer</a> to this location is assigned to the variable specified by <i>vPtr</i> . You may only read or write the memory block while it is locked, and you use the current pointer to its location.                                                                                                                                                                                                                                                                                                                                                              |
| GLOBALMEM SIZE   | The size of the memory block referenced by <i>mHndl</i> is retrieved and assigned to the LONG or DWORD variable specified by <i>vSize</i> . The <i>mHndl</i> parameter is the handle originally returned by GLOBALMEM ALLOC.                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| GLOBALMEM UNLOCK | The moveable memory block referenced by <i>mHndl</i> is unlocked, and the previous memory pointer is invalidated. If the memory block remains locked (perhaps because it had been locked more than once), the value <a href="#">TRUE</a> (non-zero) is assigned to the result variable <i>vLocked</i> . If the memory block is now unlocked, or the parameter <i>mHndl</i> was invalid, the value <a href="#">FALSE</a> (0) is assigned to <i>vLocked</i> instead.                                                                                                                                                                                                            |

**See also** [MEMORY](#)

## GLOBALMEM UNLOCK statement

## Keyword Template

**Purpose**  
**Syntax**  
**Remarks**  
**See also**  
**Example**

## GLOBALMEM statement

**Purpose** Allocate or release a block of global memory

**Syntax**

```

GLOBALMEM ALLOC count TO vHndl
GLOBALMEM FREE mHndl TO vHndl
GLOBALMEM LOCK mHndl TO vPtr
GLOBALMEM SIZE mHndl TO vSize
GLOBALMEM UNLOCK mHndl TO vLocked

```

**Remarks** GLOBALMEM allocates a block of global system memory of the requested size. This is always allocated as "moveable" memory, so it can be used with any facilities of Windows. It is the programmer's responsibility to release the allocated memory block when it's no longer needed.

There are five general forms of the GLOBALMEM statement:

|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GLOBALMEM ALLOC  | A moveable memory block of the size in <a href="#">bytes</a> specified by <i>count</i> is allocated. A unique handle is assigned to this memory object (for later identification). This handle is assigned to the <a href="#">LONG</a> or <a href="#">DWORD</a> variable specified by <i>vHndl</i> . If the requested allocation fails for any reason, the value zero (0) is assigned to <i>vHndl</i> instead.                                                                                                                                                                                                                                                                |
| GLOBALMEM FREE   | A memory block is de-allocated and released for re-use. The <i>mHndl</i> parameter is a <a href="#">variable</a> or expression which evaluates to the handle returned by GLOBALMEM ALLOC when the memory block was created. If the de-allocation operation was successful, the result variable <i>vHndl</i> is set to zero (0) to indicate that the original handle is no longer valid. If the operation fails for any reason, the value of the <i>mHndl</i> parameter is assigned to <i>vHndl</i> . It may be convenient to use the same variable for both the parameter and the result, as it will then be automatically cleared to zero when the memory block is released. |
| GLOBALMEM LOCK   | The moveable memory block referenced by <i>mHndl</i> is locked at a specific memory location. A <a href="#">pointer</a> to this location is assigned to the variable specified by <i>vPtr</i> . You may only read or write the memory block while it is locked, and you use the current pointer to its location.                                                                                                                                                                                                                                                                                                                                                              |
| GLOBALMEM SIZE   | The size of the memory block referenced by <i>mHndl</i> is retrieved and assigned to the LONG or DWORD variable specified by <i>vSize</i> . The <i>mHndl</i> parameter is the handle originally returned by GLOBALMEM ALLOC.                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| GLOBALMEM UNLOCK | The moveable memory block referenced by <i>mHndl</i> is unlocked, and the previous memory pointer is invalidated. If the memory block remains locked (perhaps because it had been locked more than once), the value <a href="#">TRUE</a> (non-zero) is assigned to the result variable <i>vLocked</i> . If the memory block is now unlocked, or the parameter <i>mHndl</i> was invalid, the value <a href="#">FALSE</a> (0) is assigned to <i>vLocked</i> instead.                                                                                                                                                                                                            |

See also [MEMORY](#)

## GOSUB statement

# GOSUB/GOSUB DWORD statements

**Purpose** Invoke a subroutine.

**Syntax** `GOSUB {label | linenumber}`  
`GOSUB DWORD dwpointer`

**Remarks** GOSUB causes execution to branch to the statement prefaced by [label](#) or [linenumber](#), after first saving its current location on the [stack](#). The [label](#) or [linenumber](#) must be local to the [Sub](#), [Function](#), [Method](#), or [Property](#) where the GOSUB statement is located. Executing a [RETURN](#) statement returns control to the instruction immediately following the GOSUB.

When using GOSUB, be sure that each subroutine returns to its caller gracefully through a RETURN statement. Run-away (recursive) GOSUBs that loop upon themselves will eat up large chunks of stack space, reducing available memory.

All [labels and line numbers](#) are private. You cannot GOSUB to a label outside of the current procedure.

For time critical or high-performance code, using a GOSUB to perform a repetitive task is almost always faster than performing a call to a procedure, since there is no overhead in setting up a stack frame for a GOSUB.

**DWORD** GOSUB DWORD causes execution to branch to address stored in *dwpointer*, after first saving its current location on the stack. *dwpointer* must be a [Double word](#), [Long integer](#), or [pointer](#) variable that contains the address of a label that is in the same procedure as the GOSUB DWORD statement. Executing a RETURN statement returns control to the instruction immediately following the GOSUB DWORD statement.

**See also** [#STACK](#), [FUNCTION](#), [METHOD](#), [ON GOSUB](#), [PROPERTY](#), [SUB](#), [RETURN](#)

**Example**

```
FUNCTION DoCalc!(Radius!)
 pi# = ATN(1) * 4 ' calculate value of PI
 GOSUB CalcArea ' jump to subroutine Radius!
 EXIT FUNCTION

CalcArea:
 FUNCTION = pi# * Radius! ^2 ' calculate area
 RETURN ' return from subroutine
END FUNCTION
```

## GOSUB DWORD statement

# GOSUB/GOSUB DWORD statements

**Purpose** Invoke a subroutine.

**Syntax** `GOSUB {label | linenumber}`  
`GOSUB DWORD dwpointer`

**Remarks** GOSUB causes execution to branch to the statement prefaced by [label](#) or [linenumber](#), after first saving its current location on the [stack](#). The [label](#) or [linenumber](#) must be local to the [Sub](#), [Function](#), [Method](#), or [Property](#) where the GOSUB statement is located. Executing a [RETURN](#) statement returns control to the instruction immediately following the GOSUB.

When using GOSUB, be sure that each subroutine returns to its caller gracefully through a RETURN statement. Run-away (recursive) GOSUBs that loop upon themselves will eat

up large chunks of stack space, reducing available memory.

All [labels and line numbers](#) are private. You cannot GOSUB to a label outside of the current procedure.

For time critical or high-performance code, using a GOSUB to perform a repetitive task is almost always faster than performing a call to a procedure, since there is no overhead in setting up a stack frame for a GOSUB.

**DWORD** GOSUB DWORD causes execution to branch to address stored in *dwpointer*, after first saving its current location on the stack. *dwpointer* must be a [Double word](#), [Long integer](#), or [pointer](#) variable that contains the address of a label that is in the same procedure as the GOSUB DWORD statement. Executing a RETURN statement returns control to the instruction immediately following the GOSUB DWORD statement.

**See also** [#STACK](#), [FUNCTION](#), [METHOD](#), [ON GOSUB](#), [PROPERTY](#), [SUB](#), [RETURN](#)

**Example**

```
FUNCTION DoCalc!(Radius!)
 pi# = ATN(1) * 4 ' calculate value of PI
 GOSUB CalcArea ' jump to subroutine Radius!
 EXIT FUNCTION

CalcArea:
 FUNCTION = pi# * Radius! ^2 ' calculate area
 RETURN ' return from subroutine
END FUNCTION
```

## GOTO statement

# GOTO/GOTO DWORD statements

**Purpose** Transfer program execution to the statement identified by a [label or line number](#).

**Syntax**

```
GOTO {label | linenumber}
GOTO DWORD dwpointer
```

**Remarks** GOTO causes program flow to jump unconditionally to the code identified by [label](#) or [linenumber](#). The *label* or *linenumber* must be local to the [Sub](#), [Function](#), [Method](#), or [Property](#) where the GOTO statement is located. GOTO differs from [GOSUB](#) and other similar control statements, in that after execution of a GOTO, the program retains no memory of where it was before it executed the jump.

Labels and line numbers are private. You cannot GOTO a label outside of the current procedure.

**DWORD** GOTO DWORD causes execution to jump unconditionally to address stored in *dwpointer*. *dwpointer* must be a [Double word](#), [Long integer](#), or variable that contains the address of a label which is local to the procedure where the GOTO DWORD statement is located.

**See also** [CALL](#), [CALL DWORD](#), [DO/LOOP](#), [EXIT](#), [FOR/NEXT](#), [FUNCTION](#), [GOSUB](#), [IF block](#), [METHOD](#), [PROPERTY](#), [RETURN](#), [SELECT](#), [SUB](#), [WHILE/WEND](#)

**Example**

```
FUNCTION test() AS LONG
 RESET X
 Start: ' define a label
 INCR X ' increment X
 IF X < 10 THEN DoBeep
 EXIT FUNCTION
 .[statements]
DoBeep:
 BEEP
 GOTO Start ' jump back to Start
END FUNCTION
```

One method of obtaining the same results without use of GOTO is:

```
FUNCTION test() AS LONG
 FOR X = 1 TO 9
 GOSUB DoBeep
 NEXT X
 EXIT FUNCTION
 [statements]
DoBeep:
 BEEP
 RETURN
END FUNCTION
```

## GOTO DWORD statement

# GOTO/GOTO DWORD statements

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Transfer program execution to the statement identified by a <a href="#">label or line number</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Syntax</b>   | GOTO { <i>label</i>   <i>linenumber</i> }<br>GOTO DWORD <i>dwpointer</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Remarks</b>  | GOTO causes program flow to jump unconditionally to the code identified by <a href="#">label</a> or <a href="#">linenumber</a> . The <i>label</i> or <i>linenumber</i> must be local to the <a href="#">Sub</a> , <a href="#">Function</a> , <a href="#">Method</a> , or <a href="#">Property</a> where the GOTO statement is located. GOTO differs from <a href="#">GOSUB</a> and other similar control statements, in that after execution of a GOTO, the program retains no memory of where it was before it executed the jump.<br><br>Labels and line numbers are private. You cannot GOTO a label outside of the current procedure. |
| <b>DWORD</b>    | GOTO DWORD causes execution to jump unconditionally to address stored in <i>dwpointer</i> . <i>dwpointer</i> must be a <a href="#">Double word</a> , <a href="#">Long integer</a> , or variable that contains the address of a label which is local to the procedure where the GOTO DWORD statement is located.                                                                                                                                                                                                                                                                                                                          |
| <b>See also</b> | <a href="#">CALL</a> , <a href="#">CALL DWORD</a> , <a href="#">DO/LOOP</a> , <a href="#">EXIT</a> , <a href="#">FOR/NEXT</a> , <a href="#">FUNCTION</a> , <a href="#">GOSUB</a> , <a href="#">IF block</a> , <a href="#">METHOD</a> , <a href="#">PROPERTY</a> , <a href="#">RETURN</a> , <a href="#">SELECT</a> , <a href="#">SUB</a> , <a href="#">WHILE/WEND</a>                                                                                                                                                                                                                                                                     |

**Example**

```
FUNCTION test() AS LONG
 RESET X
Start: ' define a label
 INCR X ' increment X
 IF X < 10 THEN DoBeep
 EXIT FUNCTION
 .[statements]
DoBeep:
 BEEP
 GOTO Start ' jump back to Start
END FUNCTION
```

One method of obtaining the same results without use of GOTO is:

```
FUNCTION test() AS LONG
 FOR X = 1 TO 9
 GOSUB DoBeep
 NEXT X
 EXIT FUNCTION
 [statements]
DoBeep:
 BEEP
 RETURN
END FUNCTION
```

## GRAPHIC Code Group

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## GRAPHIC Code Group

Purpose

The

Code Group offers statements and functions which display text and graphics on a [GRAPHIC TARGET](#) (this could be a [Graphic Window](#), a [Graphic Control](#), or a ). In addition, it provides a wide variety of support to manage and interact with these items.

Syntax

```
GRAPHIC DirectorWord [params]
GRAPHIC DirectorWord [params] TO ReturnVariable(s)
```

*Function Form:*

```
ReturnVariable = GRAPHIC (DirectorWord [,params])
ReturnVariable$ = GRAPHIC$ (DirectorWord [,params])
```

Remarks

Some of the functionality of the GRAPHIC group was available in prior versions of PowerBASIC, but it has now been expanded. Some Graphic Procedures (namely those which return a single value) may be used in two forms, a statement with a TO clause, or a function which may be used as a term in an expression:

```
GRAPHIC GET LINES TO LineCountVar&
LineCountVar& = GRAPHIC(LINES)
```

The two examples above are functionally identical. The choice is simply a matter of your personal preference. If you use the second form (as a [function](#) which returns a value), it can be a term in any expression of any complexity. When a function form is available, it is labeled with the prefix "Function Form".

Some Graphic procedures return two or more values. As it is not possible to simultaneously inject multiple terms into a valid expression, the function option is not available for them.

### GRAPHIC TARGET

The term GRAPHIC TARGET refers to a Graphic Bitmap, a Graphic Control, or a Graphic Window. You may want to think of a graphic target as your painter's canvas, where you display any amount of text and graphics. Many graphic targets may exist simultaneously, but only one is attached to the graphic stream at a time. The attached graphic target is the one acted upon by graphic code.

|                |                                                                                                                                                                                                                                                                                                                                       |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Graphic Bitmap | This is a non-visible target typically used as a work area to construct an image prior to displaying it. You can create a new, blank bitmap with <a href="#">GRAPHIC BITMAP NEW</a> , or load one from a resource or disk file with <a href="#">GRAPHIC BITMAP LOAD</a> . At that point, other graphic code can be used to act on it. |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                 |                                                                                                                                                                                                |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Graphic Control | This is a static control/window which is placed on a DDT Dialog with <a href="#">CONTROL ADD GRAPHIC</a> . Once you attach this control, you can display all forms of text and graphics on it. |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Graphic Window This is a standalone window which can be placed at any location on the desktop. It's created with [GRAPHIC WINDOW](#) and can even be used as a graphical console window. Once you attach this window, you can display all forms of text and graphics on it.

### **GRAPHIC STREAM**

The Graphic Stream is the connection between graphic code and a graphic target. The Graphic Stream is created when you attach a particular target with [GRAPHIC ATTACH](#).

From that moment forward, all graphic code acts on that selected target. This continues until such time as you select a new graphic target. When this occurs, the graphic stream to the first target is disabled, and a new graphic stream to the new target is created.

You can redirect the graphic stream to different graphic targets as often as necessary for the logic of your program.

### **PAGE UNITS**

PAGE UNITS are used to measure the size of a graphical item, or to define a particular position on a graphic target. You can define page units to be [pixels](#), [dialog units](#), or [scaled units](#) of your choice.

Initially, each graphic target inherits the page unit size from its [parent](#): pixels or dialog units. You can change this to scaled world coordinates of your choice with [GRAPHIC SCALE](#). You can revert from dialog units or scaled units back to pixels (the most accurate form) by executing [GRAPHIC SCALE PIXELS](#).

By default, the upper left corner of a graphic target is considered to be the X,Y position 0,0 and grows larger to the right or downward. The X axis is horizontal, while the Y axis is vertical. Whenever an X,Y position is given, the X value is stated first. Both the limits and the axis direction can be altered with GRAPHIC SCALE.

### **GRAPHIC POSITION (POS)**

Each time you draw text or graphics, it is displayed at the current graphic position (POS) for that target. Upon completion, the POS is updated to the last point referenced. You can draw a relative distance from the POS (using a STEP option), or set an entirely new position with [GRAPHIC SET POS](#).

Most PowerBASIC functions specify graphic and pixel positions in Page Units as X,Y (horizontal term first, then the vertical term). This is true for both graphics and text.

When you draw text with [GRAPHIC PRINT](#), POS defines the position of the upper-left corner of the first character.

### **TEXT CELL (ROW/COLUMN POSITION)**

For ease of programming, a few procedures specify text position by row and column. In this case, the position is measured in text cells, which is the space occupied by one character. This works well with fixed width [fonts](#), which is recommended. If a variable width font is chosen, PowerBASIC must use the average character size for these calculations, which can give imprecise results.

For compatibility with most current and prior versions of BASIC (PowerBASIC included), code which references text rows and columns names the vertical term first (ROWS, COLUMNS). Rows and columns are always numbered from one upward.

See also [Graphic Commands](#), [Graphics](#)

## **GRAPHIC(CANVAS.X) function**

# **Keyword Template**

**Purpose**  
**Syntax**  
**Remarks**  
**See also**  
**Example**

## GRAPHIC GET CANVAS statement **New!**

**Purpose** Retrieves the writable size of the attached graphic [target](#).

**Syntax** GRAPHIC GET CANVAS TO *WidthVar!*, *HeightVar!*  
*Function Form:*  
*WidthVar!* = GRAPHIC(CANVAS.X)  
*HeightVar!* = GRAPHIC(CANVAS.Y)

**Remarks** GRAPHIC GET CANVAS retrieves the size of the drawing buffer for the attached graphic window, control, or bitmap. The size is specified in [Page Units](#), so it could return scaled values if they were applied with [GRAPHIC SCALE](#). If the graphic window or control is FIXED (the default), the size returned is equivalent to the [CLIENT](#) size (other than the scaling factor). The CANVAS size does not include a [caption](#), frame, scrollbars, etc. If no graphic target has been attached with [GRAPHIC ATTACH](#), the values 0,0 are returned.

**See also** [GRAPHIC GET CLIENT](#), [GRAPHIC GET CLIP](#), [GRAPHIC GET SIZE](#), [GRAPHIC GET SCALE](#), [GRAPHIC SCALE](#)

### GRAPHIC(CANVAS.Y) function

## Keyword Template

**Purpose**  
**Syntax**  
**Remarks**  
**See also**  
**Example**

## GRAPHIC GET CANVAS statement **New!**

**Purpose** Retrieves the writable size of the attached graphic [target](#).

**Syntax** GRAPHIC GET CANVAS TO *WidthVar!*, *HeightVar!*  
*Function Form:*  
*WidthVar!* = GRAPHIC(CANVAS.X)  
*HeightVar!* = GRAPHIC(CANVAS.Y)

**Remarks** GRAPHIC GET CANVAS retrieves the size of the drawing buffer for the attached graphic window, control, or bitmap. The size is specified in [Page Units](#), so it could return scaled values if they were applied with [GRAPHIC SCALE](#). If the graphic window or control is FIXED (the default), the size returned is equivalent to the [CLIENT](#) size (other than the scaling factor). The CANVAS size does not include a [caption](#), frame, scrollbars, etc. If no graphic target has been attached with [GRAPHIC ATTACH](#), the values 0,0 are returned.

**See also** [GRAPHIC GET CLIENT](#), [GRAPHIC GET CLIP](#), [GRAPHIC GET SIZE](#), [GRAPHIC GET SCALE](#), [GRAPHIC SCALE](#)

## GRAPHIC(Cell.Size.X) function

# GRAPHIC CELL SIZE statement New!

**Purpose** Retrieve the character [cell](#) size including external leading.

**Syntax** GRAPHIC CELL SIZE TO *WidthVar!*, *HeightVar!*

*Function Form:*

*WidthVar!* = GRAPHIC(Cell.Size.X)

*HeightVar!* = GRAPHIC(Cell.Size.Y)

**Remarks** GRAPHIC CELL SIZE retrieves the size of one character cell, for the current [font](#), on the attached graphic [target](#). The returned character size is specified in [PAGE UNITS](#), and allows you to calculate the number of [text](#) lines which will fit in a particular space. The height value is the size of the displayed character, including external leading (if any) for this particular font.

If the font is a fixed-width font, like Courier New or Lucida Console, the sizes returned are as exact as possible, given the fractional rounding approximations necessary for some [scaled](#) units. If the font is proportional, like Arial or Times New Roman, the width will be the average size for the entire font.

External leading is the vertical distance from the bottom of one character to the top of the character below it. This value is specified by the font in use. It may vary from zero to a larger value, depending upon the font and point size. To retrieve the exact height of characters without external leading, use [GRAPHIC CHR SIZE](#).

**See also** [GRAPHIC CELL](#), [GRAPHIC CHR SIZE](#), [GRAPHIC SET FONT](#), [GRAPHIC TEXT SIZE](#)

## GRAPHIC(Cell.Size.Y) function

# GRAPHIC CELL SIZE statement New!

**Purpose** Retrieve the character [cell](#) size including external leading.

**Syntax** GRAPHIC CELL SIZE TO *WidthVar!*, *HeightVar!*

*Function Form:*

*WidthVar!* = GRAPHIC(Cell.Size.X)

*HeightVar!* = GRAPHIC(Cell.Size.Y)

**Remarks** GRAPHIC CELL SIZE retrieves the size of one character cell, for the current [font](#), on the attached graphic [target](#). The returned character size is specified in [PAGE UNITS](#), and allows you to calculate the number of [text](#) lines which will fit in a particular space. The height value is the size of the displayed character, including external leading (if any) for this particular font.

If the font is a fixed-width font, like Courier New or Lucida Console, the sizes returned are as exact as possible, given the fractional rounding approximations necessary for some [scaled](#) units. If the font is proportional, like Arial or Times New Roman, the width will be the average size for the entire font.

External leading is the vertical distance from the bottom of one character to the top of the character below it. This value is specified by the font in use. It may vary from zero to a larger value, depending upon the font and point size. To retrieve the exact height of characters without external leading, use [GRAPHIC CHR SIZE](#).

**See also** [GRAPHIC CELL](#), [GRAPHIC CHR SIZE](#), [GRAPHIC SET FONT](#), [GRAPHIC TEXT SIZE](#)

## GRAPHIC(Chr.Size.X) function

## GRAPHIC CHR SIZE statement IMPROVED

- Purpose** Retrieve the character size on the Graphic [Target](#).
- Syntax** *GRAPHIC CHR SIZE To WidthVar!, HeightVar!*  
*Function Form:*  
*WidthVar! = GRAPHIC(Chr.Size.X)*  
*HeightVar! = GRAPHIC(Chr.Size.Y)*
- Remarks** GRAPHIC CHR SIZE retrieves the size of one character, for the current [font](#), on the attached graphic target. The returned character size is specified in [Page Units](#). The height value is the actual size of the displayed character, without including external leading (if any) for this particular font.
- If the font is a fixed-width font, like Courier New or Lucida Console, the sizes returned are as exact as possible, given the fractional rounding approximations necessary for some [scaled](#) units. If the font is proportional, like Arial or Times New Roman, the width will be the average size for the entire font.
- External leading is the vertical distance from the bottom of one character to the top of the character below it. This value is specified by the font in use. It may vary from zero to a larger value, depending upon the font and point size. To retrieve the total row height including external leading, use [GRAPHIC CELL SIZE](#) instead.
- See also** [GRAPHIC ATTACH](#), [GRAPHIC CELL](#), [GRAPHIC CELL SIZE](#), [GRAPHIC SET FONT](#), [GRAPHIC PRINT](#), [GRAPHIC TEXT SIZE](#)

### GRAPHIC(Chr.Size.Y) function

## GRAPHIC CHR SIZE statement IMPROVED

- Purpose** Retrieve the character size on the Graphic [Target](#).
- Syntax** *GRAPHIC CHR SIZE To WidthVar!, HeightVar!*  
*Function Form:*  
*WidthVar! = GRAPHIC(Chr.Size.X)*  
*HeightVar! = GRAPHIC(Chr.Size.Y)*
- Remarks** GRAPHIC CHR SIZE retrieves the size of one character, for the current [font](#), on the attached graphic target. The returned character size is specified in [Page Units](#). The height value is the actual size of the displayed character, without including external leading (if any) for this particular font.
- If the font is a fixed-width font, like Courier New or Lucida Console, the sizes returned are as exact as possible, given the fractional rounding approximations necessary for some [scaled](#) units. If the font is proportional, like Arial or Times New Roman, the width will be the average size for the entire font.
- External leading is the vertical distance from the bottom of one character to the top of the character below it. This value is specified by the font in use. It may vary from zero to a larger value, depending upon the font and point size. To retrieve the total row height including external leading, use [GRAPHIC CELL SIZE](#) instead.
- See also** [GRAPHIC ATTACH](#), [GRAPHIC CELL](#), [GRAPHIC CELL SIZE](#), [GRAPHIC SET FONT](#), [GRAPHIC PRINT](#), [GRAPHIC TEXT SIZE](#)

### GRAPHIC(Client.X) function

## GRAPHIC GET CLIENT statement IMPROVED

- Purpose** Retrieve the client size of the selected [graphic target](#).

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>   | <p><code>GRAPHIC GET CLIENT To WidthVar!, HeightVar!</code></p> <p><i>Function form:</i></p> <p><code>WidthVar! = GRAPHIC(Client.X)</code></p> <p><code>HeightVar! = GRAPHIC(Client.Y)</code></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Remarks</b>  | <p>GRAPHIC GET CLIENT retrieves the physical size of the client area (visible part) of the attached <a href="#">graphic window</a> or <a href="#">control</a>. The size is specified in <a href="#">Pixels</a> or <a href="#">Dialog Units</a>, depending upon how it was created. The sizes returned are not altered or affected by <a href="#">GRAPHIC SCALE</a>, <a href="#">VIRTUAL</a>, or <a href="#">AUTOSIZE</a> operations, as it returns the physical size of the viewable area in the terms used to create it. The client area does not include a <a href="#">caption</a>, frame, scrollbars, etc. When GRAPHIC GET CLIENT is used with a <a href="#">control</a>, it returns 0,0. You would normally use <a href="#">GRAPHIC GET CANVAS</a> with a Bitmap, or to obtain the size of the area which can be drawn. If no graphic target has been attached with <a href="#">GRAPHIC ATTACH</a>, the values 0,0 are returned.</p> |
| <b>See also</b> | <a href="#">GRAPHIC ATTACH</a> , <a href="#">GRAPHIC GET CANVAS</a> , <a href="#">GRAPHIC GET CLIP</a> , <a href="#">GRAPHIC GET SIZE</a> , <a href="#">GRAPHIC SET CLIENT</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

## GRAPHIC(Client.Y) function

# GRAPHIC GET CLIENT statement

**IMPROVED**

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Retrieve the client size of the selected <a href="#">graphic target</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Syntax</b>   | <p><code>GRAPHIC GET CLIENT To WidthVar!, HeightVar!</code></p> <p><i>Function form:</i></p> <p><code>WidthVar! = GRAPHIC(Client.X)</code></p> <p><code>HeightVar! = GRAPHIC(Client.Y)</code></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Remarks</b>  | <p>GRAPHIC GET CLIENT retrieves the physical size of the client area (visible part) of the attached <a href="#">graphic window</a> or <a href="#">control</a>. The size is specified in <a href="#">Pixels</a> or <a href="#">Dialog Units</a>, depending upon how it was created. The sizes returned are not altered or affected by <a href="#">GRAPHIC SCALE</a>, <a href="#">VIRTUAL</a>, or <a href="#">AUTOSIZE</a> operations, as it returns the physical size of the viewable area in the terms used to create it. The client area does not include a <a href="#">caption</a>, frame, scrollbars, etc. When GRAPHIC GET CLIENT is used with a <a href="#">control</a>, it returns 0,0. You would normally use <a href="#">GRAPHIC GET CANVAS</a> with a Bitmap, or to obtain the size of the area which can be drawn. If no graphic target has been attached with <a href="#">GRAPHIC ATTACH</a>, the values 0,0 are returned.</p> |
| <b>See also</b> | <a href="#">GRAPHIC ATTACH</a> , <a href="#">GRAPHIC GET CANVAS</a> , <a href="#">GRAPHIC GET CLIP</a> , <a href="#">GRAPHIC GET SIZE</a> , <a href="#">GRAPHIC SET CLIENT</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

## GRAPHIC(Clip.X) function

# Keyword Template

|                 |
|-----------------|
| <b>Purpose</b>  |
| <b>Syntax</b>   |
| <b>Remarks</b>  |
| <b>See also</b> |
| <b>Example</b>  |

# GRAPHIC GET CLIP statement

**New!**

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Retrieves the size of the <a href="#">clip area</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Syntax</b>   | <code>GRAPHIC GET CLIP TO <i>WidthVar!</i>, <i>HeightVar!</i></code><br><i>Function Form:</i><br><code><i>WidthVar!</i> = GRAPHIC(Clip.X)</code><br><code><i>HeightVar!</i> = GRAPHIC(Clip.Y)</code>                                                                                                                                                                                                                                                                                                                              |
| <b>Remarks</b>  | The clip area of a graphic <a href="#">target</a> is that space where operations can be displayed. That is, the clip area is that portion of the <a href="#">client area</a> which is not protected (clipped) by <a href="#">GRAPHIC SET CLIP</a> .<br>GRAPHIC GET CLIP retrieves the size of the clip area, and assigns these values to the variables specified by <i>WidthVar!</i> and <i>HeightVar!</i> . The size is specified in <a href="#">PAGE UNITS</a> . If no graphic target is selected, the values 0,0 are returned. |
| <b>See also</b> | <a href="#">GRAPHIC GET CANVAS</a> , <a href="#">GRAPHIC GET CLIENT</a> , <a href="#">GRAPHIC SET CLIP</a>                                                                                                                                                                                                                                                                                                                                                                                                                        |

## GRAPHIC(Clip.Y) function

### Keyword Template

|                 |
|-----------------|
| <b>Purpose</b>  |
| <b>Syntax</b>   |
| <b>Remarks</b>  |
| <b>See also</b> |
| <b>Example</b>  |

## GRAPHIC GET CLIP statement New!

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Retrieves the size of the <a href="#">clip area</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Syntax</b>   | <code>GRAPHIC GET CLIP TO <i>WidthVar!</i>, <i>HeightVar!</i></code><br><i>Function Form:</i><br><code><i>WidthVar!</i> = GRAPHIC(Clip.X)</code><br><code><i>HeightVar!</i> = GRAPHIC(Clip.Y)</code>                                                                                                                                                                                                                                                                                                                              |
| <b>Remarks</b>  | The clip area of a graphic <a href="#">target</a> is that space where operations can be displayed. That is, the clip area is that portion of the <a href="#">client area</a> which is not protected (clipped) by <a href="#">GRAPHIC SET CLIP</a> .<br>GRAPHIC GET CLIP retrieves the size of the clip area, and assigns these values to the variables specified by <i>WidthVar!</i> and <i>HeightVar!</i> . The size is specified in <a href="#">PAGE UNITS</a> . If no graphic target is selected, the values 0,0 are returned. |
| <b>See also</b> | <a href="#">GRAPHIC GET CANVAS</a> , <a href="#">GRAPHIC GET CLIENT</a> , <a href="#">GRAPHIC SET CLIP</a>                                                                                                                                                                                                                                                                                                                                                                                                                        |

## GRAPHIC(COL) function

### Keyword Template

|                 |
|-----------------|
| <b>Purpose</b>  |
| <b>Syntax</b>   |
| <b>Remarks</b>  |
| <b>See also</b> |

## Example

## GRAPHIC CELL statement New!

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Sets or retrieves the next <a href="#">print</a> position, based upon the row and column position of a <a href="#">text cell</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Syntax</b>   | <pre> GRAPHIC CELL = RowValue&amp;, ColValue&amp; GRAPHIC CELL TO RowVar&amp;, ColVar&amp; GRAPHIC COL TO ColVar&amp; GRAPHIC ROW TO RowVar&amp;  Function Form: ColVar&amp; = GRAPHIC(COL) RowVar&amp; = GRAPHIC(ROW) </pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Remarks</b>  | <p>GRAPHIC CELL is used to set or retrieve the print position, based upon the row and column position of a Text Cell. That is the row column position where the next printed text will be displayed. These operations are very similar to <a href="#">GRAPHIC GET POS</a> and <a href="#">GRAPHIC SET POS</a>, except that the position is reported in text rows and columns, rather than <a href="#">Page Units</a>. The current graphic position is translated to a row and column number, based upon the standard character size in a fixed width <a href="#">font</a>, or the average character size for a variable width font.</p> <p><i>RowValue&amp;</i> specifies the horizontal screen row (starting at 1) at which to position the cursor. <i>ColValue&amp;</i> specifies the vertical screen column (starting at 1) at which to position the cursor. Since row and column numbers start at one (1), the upper left corner of the window is considered to be cell 1,1.</p> <p>The first form of GRAPHIC CELL moves the print position to the desired row and column. If a value given is zero (0), that parameter is ignored and that position is not changed.</p> <p>The second form of GRAPHIC CELL retrieves the current print position, and assigns the values to the variables specified by <i>RowVar&amp;</i> and <i>ColVar&amp;</i>. Every point which falls within a text character cell is reported as that Row/Column position. If the graphic position is not at the upper left corner of the text character, you may get imprecise or unexpected results. This can occur if you perform a graphic operation other than <a href="#">GRAPHIC PRINT</a> which leaves the "Last Point Referenced" at a mid-cell position.</p> <p>The remaining forms allow you to retrieve just a single value, either row or column, and are supported in both statement and function form.</p> |
| <b>See also</b> | <a href="#">GRAPHIC CELL SIZE</a> , <a href="#">GRAPHIC GET POS</a> , <a href="#">GRAPHIC SET FONT</a> , <a href="#">GRAPHIC SET POS</a> , <a href="#">GRAPHIC SET SCROLLTEXT</a> , <a href="#">GRAPHIC SET WORDWRAP</a> , <a href="#">GRAPHIC SET WRAP</a> , <a href="#">GRAPHIC SPLIT</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

### GRAPHIC(DC) function

## GRAPHIC GET DC statement

|                 |                                                                                                                                                                                             |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Retrieve the handle of the DC (device context) for the selected <a href="#">graphic target</a> .                                                                                            |
| <b>Syntax</b>   | <pre> GRAPHIC GET DC TO hDC???  Function Form: DCVar??? = GRAPHIC(DC) </pre>                                                                                                                |
| <b>Remarks</b>  | The DC handle may be used with various Windows API functions to perform specialized graphic operations in the graphic target. If no graphic window is currently selected, zero is returned. |
| <b>See also</b> | <a href="#">GRAPHIC ATTACH</a>                                                                                                                                                              |

## GRAPHIC(INSTAT) function

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## GRAPHIC INSTAT statement IMPROVED

**Purpose** Determines whether a keyboard character is ready.

**Syntax** GRAPHIC INSTAT TO *NumericVar*

*Function Form:*

*InstatVar*& = GRAPHIC(INSTAT)

**Remarks** The

variable receives the keyboard buffer status for the selected [graphic target](#). The value assigned is [TRUE](#) (non-zero) if a keyboard character is ready to be retrieved, or [FALSE](#) (zero) if not.

GRAPHIC INSTAT does not remove the character from the buffer, so repeated execution will continue to return TRUE until the character is read with [GRAPHIC INKEY\\$](#), [GRAPHIC INPUT](#), etc.

**See also** [GRAPHIC INKEY\\$](#), [GRAPHIC INPUT](#), [GRAPHIC INPUT FLUSH](#), [GRAPHIC LINE INPUT](#), [GRAPHIC WAITKEY\\$](#)

## GRAPHIC(LINES) function

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## GRAPHIC GET LINES statement IMPROVED

**Purpose** Retrieves the number of [text](#) lines which will fit on the graphic [target](#).

**Syntax** GRAPHIC GET LINES TO *linecount*&

*Function Form:*

*linecount*& = GRAPHIC(LINES)

**Remarks** GRAPHIC GET LINES retrieves the number of lines of text which will fit on the graphic target, given the current selected [font](#). This value is assigned to *linecount*&.

**See also** [GRAPHIC ATTACH](#), [GRAPHIC CELL](#), [GRAPHIC CHR SIZE](#), [GRAPHIC PRINT](#), [GRAPHIC SET FONT](#), [GRAPHIC TEXT SIZE](#)

## GRAPHIC(LOC.X) function

# GRAPHIC GET LOC statement

**IMPROVED**

- Purpose** Retrieves the location of the [Graphic Window](#) on the screen.
- Syntax** `GRAPHIC GET LOC TO x&, y&`
- Function Form:**  
`x& = GRAPHIC(LOC.X)`  
`y& = GRAPHIC(LOC.Y)`
- Remarks** This statement retrieves the location of the selected Graphic Window. If no graphic object is selected, or it is not a Graphic Window, 0,0 is returned. The location is specified in pixels, relative to the upper left corner of the screen.
- See also** [GRAPHIC ATTACH](#), [GRAPHIC GET PPI](#), [GRAPHIC SET LOC](#)

## GRAPHIC(LOC.Y) function

# GRAPHIC GET LOC statement

**IMPROVED**

- Purpose** Retrieves the location of the [Graphic Window](#) on the screen.
- Syntax** `GRAPHIC GET LOC TO x&, y&`
- Function Form:**  
`x& = GRAPHIC(LOC.X)`  
`y& = GRAPHIC(LOC.Y)`
- Remarks** This statement retrieves the location of the selected Graphic Window. If no graphic object is selected, or it is not a Graphic Window, 0,0 is returned. The location is specified in pixels, relative to the upper left corner of the screen.
- See also** [GRAPHIC ATTACH](#), [GRAPHIC GET PPI](#), [GRAPHIC SET LOC](#)

## GRAPHIC(MIX) function

# GRAPHIC GET MIX statement

**IMPROVED**

- Purpose** Retrieve the color mix mode for the selected [graphic target](#).
- Syntax** `GRAPHIC GET MIX TO mixmode&`
- Function Form:**  
`mixmode& = GRAPHIC(MIX)`
- Remarks** There are 16 mix modes available to use for mixing the drawing color with the color that already exists at the drawing location.
- |                               |                                                                                              |
|-------------------------------|----------------------------------------------------------------------------------------------|
| <code>%mix_Blackness</code>   | Pixel is always 0 (black).                                                                   |
| <code>%mix_NotMergeSrc</code> | Pixel is the inverse of the MergeSrc color.                                                  |
| <code>%mix_MaskNotSrc</code>  | Pixel is a combination of the colors common to both the pixel and the inverse of the source. |
| <code>%mix_NotCopySrc</code>  | Pixel is the inverse of the pen color.                                                       |
| <code>%mix_MaskSrcNot</code>  | Pixel is a combination of the colors common to both the source and the inverse of the pixel. |
| <code>%mix_Not</code>         | Pixel is the inverse of the pixel color.                                                     |
| <code>%mix_XorSrc</code>      | Pixel is a combination of the colors in the source and in the pixel, but not in both.        |
| <code>%mix_NotMaskSrc</code>  | Pixel is the inverse of the MaskSrc color.                                                   |

|                               |                                                                                |
|-------------------------------|--------------------------------------------------------------------------------|
| <code>%mix_MaskSrc</code>     | Pixel is a combination of the colors common to both the source and the pixel.  |
| <code>%mix_NotXorSrc</code>   | Pixel is the inverse of the XorSrc color.                                      |
| <code>%mix_Nop</code>         | Pixel remains unchanged.                                                       |
| <code>%mix_MergeNotSrc</code> | Pixel is a combination of the source color and the inverse of the pixel color. |
| <code>%mix_CopySrc</code>     | Pixel is the source color (default).                                           |
| <code>%mix_MergeSrcNot</code> | Pixel is a combination of the source color and the inverse of the pixel color. |
| <code>%mix_MergeSrc</code>    | Pixel is a combination of the source color and the pixel color.                |
| <code>%mix_Whiteness</code>   | Pixel is always 1 (white).                                                     |

See also [GRAPHIC SET MIX](#)

## GRAPHIC(OVERLAP) function

# GRAPHIC GET OVERLAP statement New!

**Purpose** Retrieves the status of Graphic [Overlap Mode](#).

**Syntax** `GRAPHIC GET OVERLAP To OverlapVar&`

Function Form:

`OverlapVar& = GRAPHIC(OVERLAP)`

**Remarks** GRAPHIC GET OVERLAP retrieves the status of overlap mode and assigns it to the variable specified by *OverlapVar&*. If Overlap Mode is enabled, the value [true](#) (non-zero) is assigned. If it's disabled, the value [false](#) (zero) is assigned instead. The value returned reflects the status of the graphic [target](#) which is currently attached to the graphic [stream](#).

With Overlap Mode, you control how PowerBASIC treats graphic operations which involve a RECT structure in their definition. Windows graphic conventions consider the bottom and right coordinates of a RECT to be exclusive. In other words, the [pixels](#) at the bottom and right edges lie immediately outside the rectangle. They are not drawn, but are ignored. For example:

```
GRAPHIC BOX (0,0) - (50,50)
```

In this case, a box is drawn from 0,0 to 49,49. The final pixels at the bottom and right edge are simply not drawn. However, if Overlap Mode is enabled with [GRAPHIC SET OVERLAP](#), the box is drawn from 0,0 to 50,50.

The Overlap Mode affects drawing operations involving [GRAPHIC SCALE](#), [GRAPHIC BOX](#), [GRAPHIC ELLIPSE](#), [GRAPHIC LINE](#), [GRAPHIC POLYLINE](#), etc.

See also [GRAPHIC SET OVERLAP](#)

## GRAPHIC(PIXEL...) function

# GRAPHIC GET PIXEL statement IMPROVED

**Purpose** Retrieve the color of the [pixel](#) at the specified point in the selected [graphic target](#).

**Syntax** `GRAPHIC GET PIXEL [STEP] (x!, y!) To PixelVar&`

Function Form:

`PixelVar& = GRAPHIC(PIXEL [STEP], x!, y!)`

**Remarks** The coordinate points *x!*, *y!* are specified in [Page Units](#).

See also [GRAPHIC ATTACH](#), [GRAPHIC COLOR](#), [GRAPHIC SCALE](#), [GRAPHIC SET PIXEL](#)

## GRAPHIC(POS.X) function

# GRAPHIC GET POS statement

**IMPROVED**

- Purpose** Retrieve the POS (last point referenced) by a statement.
- Syntax** `GRAPHIC GET POS To XVar!, YVar!`  
*Function Form:*  
`XVar! = GRAPHIC(POS.X)`  
`YVar! = GRAPHIC(POS.Y)`
- Remarks** The coordinate points *XVar!*, *YVar!* are specified in the same terms ([pixels](#) or [dialog units](#)) as the [parent](#) dialog (or world coordinates, if those were chosen with [GRAPHIC SCALE](#)).
- See also** [GRAPHIC ATTACH](#), [GRAPHIC CELL](#), [GRAPHIC SCALE](#), [GRAPHIC SET POS](#)

## GRAPHIC(POS.Y) function

# GRAPHIC GET POS statement

**IMPROVED**

- Purpose** Retrieve the POS (last point referenced) by a statement.
- Syntax** `GRAPHIC GET POS To XVar!, YVar!`  
*Function Form:*  
`XVar! = GRAPHIC(POS.X)`  
`YVar! = GRAPHIC(POS.Y)`
- Remarks** The coordinate points *XVar!*, *YVar!* are specified in the same terms ([pixels](#) or [dialog units](#)) as the [parent](#) dialog (or world coordinates, if those were chosen with [GRAPHIC SCALE](#)).
- See also** [GRAPHIC ATTACH](#), [GRAPHIC CELL](#), [GRAPHIC SCALE](#), [GRAPHIC SET POS](#)

## GRAPHIC(PPI.X) function

# GRAPHIC GET PPI statement

**IMPROVED**

- Purpose** Retrieve the resolution of the display device, in points per inch.
- Syntax** `GRAPHIC GET PPI TO XVar&, YVar&`  
*Function Form:*  
`XVar& = GRAPHIC(PPI.X)`  
`YVar& = GRAPHIC(PPI.Y)`
- Remarks** The resolution is always specified in [pixels](#). This statement is particularly useful in drawing items such as rulers and graphs to a representative physical size". There are 25.4 millimeters per inch, so just divide by 25.4 to convert from pixels per inch to pixels per millimeter.
- "Representative physical size" means that the actual image may be close to a particular physical size, but is subject to factors including Windows default PPI setting, the driver's DPI to PPI ratio and even how the monitor has been adjusted. By using the GRAPHIC GET PPI, results, you can construct a representative graphic image that can be saved and later output at the intended scale by more precise means, for example a higher resolution Windows printer.
- See also** [GRAPHIC ATTACH](#), [GRAPHIC SCALE](#)

## GRAPHIC(PPI.Y) function

# GRAPHIC GET PPI statement IMPROVED

**Purpose** Retrieve the resolution of the display device, in points per inch.

**Syntax** GRAPHIC GET PPI TO *XVar&*, *YVar&*

*Function Form:*

*XVar&* = GRAPHIC(PPI.X)

*YVar&* = GRAPHIC(PPI.Y)

**Remarks** The resolution is always specified in [pixels](#). This statement is particularly useful in drawing items such as rulers and graphs to a representative physical size". There are 25.4 millimeters per inch, so just divide by 25.4 to convert from pixels per inch to pixels per millimeter.

"Representative physical size" means that the actual image may be close to a particular physical size, but is subject to factors including Windows default PPI setting, the driver's DPI to PPI ratio and even how the monitor has been adjusted. By using the GRAPHIC GET PPI, results, you can construct a representative graphic image that can be saved and later output at the intended scale by more precise means, for example a higher resolution Windows printer.

**See also** [GRAPHIC.ATTACH](#), [GRAPHIC.SCALE](#)

## GRAPHIC(ROW) function

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

# GRAPHIC CELL statement New!

**Purpose** Sets or retrieves the next [print](#) position, based upon the row and column position of a [text cell](#).

**Syntax** GRAPHIC CELL = *RowValue&*, *ColValue&*  
GRAPHIC CELL TO *RowVar&*, *ColVar&*  
GRAPHIC COL TO *ColVar&*  
GRAPHIC ROW TO *RowVar&*

*Function Form:*

*ColVar&* = GRAPHIC(COL)

*RowVar&* = GRAPHIC(ROW)

**Remarks** GRAPHIC CELL is used to set or retrieve the print position, based upon the row and column position of a Text Cell. That is the row column position where the next printed text will be displayed. These operations are very similar to [GRAPHIC GET POS](#) and [GRAPHIC SET POS](#), except that the position is reported in text rows and columns, rather than [Page Units](#). The current graphic position is translated to a row and column number, based upon the standard character size in a fixed width [font](#), or the average character size for a variable width font.

*RowValue&* specifies the horizontal screen row (starting at 1) at which to position the cursor. *ColValue&* specifies the vertical screen column (starting at 1) at which to position

the cursor. Since row and column numbers start at one (1), the upper left corner of the window is considered to be cell 1,1.

The first form of GRAPHIC CELL moves the print position to the desired row and column. If a value given is zero (0), that parameter is ignored and that position is not changed.

The second form of GRAPHIC CELL retrieves the current print position, and assigns the values to the variables specified by *RowVar&* and *ColVar&*. Every point which falls within a text character cell is reported as that Row/Column position. If the graphic position is not at the upper left corner of the text character, you may get imprecise or unexpected results. This can occur if you perform a graphic operation other than [GRAPHIC PRINT](#) which leaves the "Last Point Referenced" at a mid-cell position.

The remaining forms allow you to retrieve just a single value, either row or column, and are supported in both statement and function form.

**See also** [GRAPHIC CELL SIZE](#), [GRAPHIC GET POS](#), [GRAPHIC SET FONT](#), [GRAPHIC SET POS](#), [GRAPHIC SET SCROLLTEXT](#), [GRAPHIC SET WORDWRAP](#), [GRAPHIC SET WRAP](#), [GRAPHIC SPLIT](#)

## GRAPHIC(SCROLLTEXT) function

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## GRAPHIC GET SCROLLTEXT statement New!

**Purpose** Retrieves the status of Graphic [ScrollText Mode](#).

**Syntax** `GRAPHIC GET SCROLLTEXT To ScrollVar&`

*Function Form:*

`ScrollVar& = GRAPHIC(SCROLLTEXT)`

**Remarks** GRAPHIC GET SCROLLTEXT retrieves the status of ScrollText mode and assigns it to the variable specified by *ScrollVar&*. If ScrollText Mode is enabled, the value [true](#) (non-zero) is assigned. If it's disabled, the value [false](#) (zero) is assigned instead. The value returned reflects the status of the graphic [target](#) which is currently attached to the graphic [stream](#).

With ScrollText Mode, you can control how PowerBASIC prints [text](#) on a graphic target when it reaches the end of a page. Since a graphic target operates on a full page basis, the default is to ignore text which is printed past the end of the page. This can be modified under program control by using [GRAPHIC SET SCROLLTEXT](#).

When ScrollText Mode is enabled, scrolling of a page is triggered only by [GRAPHIC PRINT](#). If the [POS](#) (last point referenced) is located on the bottom row of the graphic target, and a GRAPHIC PRINT statement moves the POS off of the page, the entire contents of the graphic target is scrolled one row, and a new blank row is opened at the bottom.

**See also** [GRAPHIC CELL](#), [GRAPHIC SET SCROLLTEXT](#)

## GRAPHIC(SIZE.X) function

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## GRAPHIC GET SIZE statement **New!**

**Purpose** Retrieves the overall size of the selected graphic [target](#).

**Syntax** GRAPHIC GET SIZE To *WidthVar&*, *HeightVar&*

*Function Form:*

*WidthVar&* = GRAPHIC(SIZE.X)

*HeightVar&* = GRAPHIC(SIZE.Y)

**Remarks** GRAPHIC GET SIZE retrieves overall physical size of the selected [graphic window](#) or [control](#). The size is specified in [Pixels](#) or [Dialog Units](#), depending upon how it was created. The size always includes any [caption](#), frame, scrollbars, etc. If no graphic target is attached, the values 0,0 are returned.

**See also** [GRAPHIC GET CANVAS](#), [GRAPHIC GET CLIENT](#), [GRAPHIC GET CLIP](#), [GRAPHIC GET LINES](#), [GRAPHIC SET SIZE](#)

## GRAPHIC(SIZE.Y) function

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## GRAPHIC GET SIZE statement **New!**

**Purpose** Retrieves the overall size of the selected graphic [target](#).

**Syntax** GRAPHIC GET SIZE To *WidthVar&*, *HeightVar&*

*Function Form:*

*WidthVar&* = GRAPHIC(SIZE.X)

*HeightVar&* = GRAPHIC(SIZE.Y)

**Remarks** GRAPHIC GET SIZE retrieves overall physical size of the selected [graphic window](#) or [control](#). The size is specified in [Pixels](#) or [Dialog Units](#), depending upon how it was created. The size always includes any [caption](#), frame, scrollbars, etc. If no graphic target is attached, the values 0,0 are returned.

**See also** [GRAPHIC GET CANVAS](#), [GRAPHIC GET CLIENT](#), [GRAPHIC GET CLIP](#), [GRAPHIC GET LINES](#), [GRAPHIC SET SIZE](#)

## GRAPHIC(STRETCHMODE) function

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## GRAPHIC GET STRETCHMODE statement New!

**Purpose** Retrieves the default bitmap stretching mode for the attached [DC](#).

**Syntax** `GRAPHIC GET STRETCHMODE TO ModeVar&`

*Function Form:*

`ModeVar& = GRAPHIC(STRETCHMODE)`

**Remarks** There are several operations in PowerBASIC which involve stretching or condensing images on bitmaps, most notably [GRAPHIC STRETCH](#). As individual pixels must be added or removed, there is a good chance that the quality of the image will be degraded. However, if you describe the nature of the image by defining a StretchMode, you can substantially enhance the appearance.

The default StretchMode is maintained individually for each DC. You can retrieve the default mode with this statement, or set it with GRAPHIC GET STRETCHMODE. Of course, you can also override the default StretchMode when you execute one of the affected statements.

The 4 stretch mode equates are predefined in PowerBASIC.

| Equate        | Value | Description                                                                                                                                                                                                                                 |
|---------------|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| %BLACKONWHITE | 1     | This is the default Windows stretch mode, and is most appropriate for monochrome bitmaps, or those with blocks of color. Performs a boolean OR of eliminated and existing pixels. It preserves black pixels at the expense of white pixels. |
| %WHITEONBLACK | 2     | Performs a boolean OR of eliminated and existing pixels. It preserves white pixels at the expense of black pixels.                                                                                                                          |
| %COLORONCOLOR | 3     | Deletes eliminated lines of pixels without trying to preserve their information.                                                                                                                                                            |
| %HALFTONE     | 4     | This provides the highest quality for complex color bitmaps. The average color of the destination pixel block is kept approximately the same as the source pixel block.                                                                     |

**See also** [GRAPHIC BITMAP LOAD](#), [GRAPHIC COPY](#), [GRAPHIC RENDER](#), [GRAPHIC SET STRETCHMODE](#), [GRAPHIC STRETCH](#)

## GRAPHIC(TEXT.SIZE.X...) function

## GRAPHIC TEXT SIZE statement IMPROVED

|                 |                                                                                                                                                                                                                                                                                                                                             |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Calculate the size of text to be <a href="#">printed</a> .                                                                                                                                                                                                                                                                                  |
| <b>Syntax</b>   | <code>GRAPHIC TEXT SIZE txt\$ TO WidthVar!, HeightVar!</code><br><br><i>Function Form:</i><br><code>WidthVar! = GRAPHIC(TEXT.SIZE.X, txt\$)</code><br><code>HeightVar! = GRAPHIC(TEXT.SIZE.Y, txt\$)</code>                                                                                                                                 |
| <b>Remarks</b>  | This statement calculates the total size of the printed text, based upon the current <a href="#">font</a> for the <a href="#">graphic target</a> . The sizes returned are specified in <a href="#">Page Units</a> .<br><br>This allows you to easily calculate the appropriate print position, particularly when using a proportional font. |
| <b>See also</b> | <a href="#">FONT NEW</a> , <a href="#">GRAPHIC CELL</a> , <a href="#">GRAPHIC CELL SIZE</a> , <a href="#">GRAPHIC CHR SIZE</a> , <a href="#">GRAPHIC PRINT</a> , <a href="#">GRAPHIC SET FONT</a> , <a href="#">GRAPHIC SCALE</a> , <a href="#">GRAPHIC SET WORDWRAP</a> , <a href="#">GRAPHIC SET WRAP</a> , <a href="#">GRAPHIC SPLIT</a> |

### GRAPHIC(TEXT.SIZE.Y...) function

## GRAPHIC TEXT SIZE statement IMPROVED

|                 |                                                                                                                                                                                                                                                                                                                                             |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Calculate the size of text to be <a href="#">printed</a> .                                                                                                                                                                                                                                                                                  |
| <b>Syntax</b>   | <code>GRAPHIC TEXT SIZE txt\$ TO WidthVar!, HeightVar!</code><br><br><i>Function Form:</i><br><code>WidthVar! = GRAPHIC(TEXT.SIZE.X, txt\$)</code><br><code>HeightVar! = GRAPHIC(TEXT.SIZE.Y, txt\$)</code>                                                                                                                                 |
| <b>Remarks</b>  | This statement calculates the total size of the printed text, based upon the current <a href="#">font</a> for the <a href="#">graphic target</a> . The sizes returned are specified in <a href="#">Page Units</a> .<br><br>This allows you to easily calculate the appropriate print position, particularly when using a proportional font. |
| <b>See also</b> | <a href="#">FONT NEW</a> , <a href="#">GRAPHIC CELL</a> , <a href="#">GRAPHIC CELL SIZE</a> , <a href="#">GRAPHIC CHR SIZE</a> , <a href="#">GRAPHIC PRINT</a> , <a href="#">GRAPHIC SET FONT</a> , <a href="#">GRAPHIC SCALE</a> , <a href="#">GRAPHIC SET WORDWRAP</a> , <a href="#">GRAPHIC SET WRAP</a> , <a href="#">GRAPHIC SPLIT</a> |

### GRAPHIC(View.X) function

## Keyword Template

|                 |
|-----------------|
| <b>Purpose</b>  |
| <b>Syntax</b>   |
| <b>Remarks</b>  |
| <b>See also</b> |
| <b>Example</b>  |

## GRAPHIC GET VIEW statement New!

|                |                                                                                                                                 |
|----------------|---------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Retrieves the position of the <a href="#">virtual</a> graphic viewport.                                                         |
| <b>Syntax</b>  | <code>GRAPHIC GET VIEW To WidthVar!, HeightVar!</code><br><br><i>Function Form:</i><br><code>WidthVar! = GRAPHIC(View.X)</code> |

*HeightVar!* = GRAPHIC(View.Y)

**Remarks** Retrieves the [position](#) of the viewport on a virtual graphic [target](#). The size is specified in [Page Units](#). If no graphic target has been selected, or no virtual window has been created, the values 0,0 are returned.

**See also** [GRAPHIC SET VIEW](#), [GRAPHIC SET VIRTUAL](#)

## GRAPHIC(View.Y) function

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## GRAPHIC GET VIEW statement New!

**Purpose** Retrieves the position of the [virtual](#) graphic viewport.

**Syntax** GRAPHIC GET VIEW TO *WidthVar!*, *HeightVar!*

*Function Form:*

*WidthVar!* = GRAPHIC(View.X)

*HeightVar!* = GRAPHIC(View.Y)

**Remarks** Retrieves the [position](#) of the viewport on a virtual graphic [target](#). The size is specified in [Page Units](#). If no graphic target has been selected, or no virtual window has been created, the values 0,0 are returned.

**See also** [GRAPHIC SET VIEW](#), [GRAPHIC SET VIRTUAL](#)

## GRAPHIC(WORDWRAP) function

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## GRAPHIC GET WORDWRAP statement New!

**Purpose** Retrieves the status of Graphic [WordWrap](#) Mode.

**Syntax** GRAPHIC GET WORDWRAP TO *WrapVar&*

*Function Form:*

*WrapVar&* = GRAPHIC(WORDWRAP)

**Remarks** GRAPHIC GET WORDWRAP retrieves the status of wordwrap mode and assigns it to the [variable](#) specified by *WrapVar&*. If WordWrap Mode is enabled, the value [true](#) (non-zero) is assigned. If it's disabled, the value [false](#) (zero) is assigned instead. The value returned

reflects the status of the graphic [target](#) which is currently attached to the graphic [stream](#).

With WordWrap Mode, you can control how PowerBASIC [prints](#) text on a graphic target when it reaches the end of a line. Since a graphic target operates on a full page basis, the default is to ignore text which is printed past the end of the line. This can be modified under program control by using [GRAPHIC SET WORDWRAP](#).

When WordWrap mode is enabled, it affects only [GRAPHIC PRINT](#) operations. If GRAPHIC PRINT attempts to display a word beyond the end of a row, the entire word is automatically wrapped to the first column of the next row.

**See also** [GRAPHIC CELL](#), [GRAPHIC GET WRAP](#), [GRAPHIC SET WORDWRAP](#), [GRAPHIC SET WRAP](#), [GRAPHIC SPLIT](#)

## GRAPHIC(WRAP) function

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

# GRAPHIC GET WRAP statement New!

**Purpose** Retrieves the status of Graphic [Wrap Mode](#).

**Syntax** `GRAPHIC GET WRAP TO WrapVar&`

*Function Form:*

`WrapVar& = GRAPHIC(WRAP)`

**Remarks** GRAPHIC GET WRAP retrieves the status of wrap mode and assigns it to the [variable](#) specified by *WrapVar*&. If Wrap Mode is enabled, the value [true](#) (non-zero) is assigned. If it's disabled, the value [false](#) (zero) is assigned instead. The value returned reflects the status of the graphic [target](#) which is currently attached to the graphic [stream](#).

With Wrap Mode, you can control how PowerBASIC [prints](#) text on a graphic target when it reaches the end of a line. Since a graphic target operates on a full page basis, the default is to ignore text which is printed past the end of the line. This can be modified under program control by using [GRAPHIC SET WRAP](#).

When Wrap Mode is enabled, it affects only [GRAPHIC PRINT](#) operations. If GRAPHIC PRINT attempts to display a character beyond the end of a row, it is automatically wrapped to the first column of the next row.

**See also** [GRAPHIC CELL](#), [GRAPHIC GET WORDWRAP](#), [GRAPHIC SET WORDWRAP](#), [GRAPHIC SET WRAP](#), [GRAPHIC SPLIT](#)

## GRAPHIC\$(CAPTION) function

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

See also

Example

## GRAPHIC GET CAPTION statement **New!**

**Purpose** Retrieves the caption from a [Graphic Window](#).

**Syntax** GRAPHIC GET CAPTION TO *CaptionVar\$*

*Function form:*

*CaptionVar\$* = GRAPHIC\$(CAPTION)

**Remarks** GRAPHIC GET CAPTION retrieves the text (if any) which is currently displayed as the caption of the selected Graphic [Target](#). This area is also called the "title bar". A Graphic Window is the only form of Graphic Target which may have a caption, so other forms will return a null (zero-length) string.

**See also** [GRAPHIC SET CAPTION](#), [GRAPHIC WINDOW](#)

### GRAPHIC\$(INKEY\$) function

## Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## GRAPHIC INKEY\$ statement **IMPROVED**

**Purpose** Reads a keyboard character if one is ready.

**Syntax** GRAPHIC INKEY\$ TO *InkeyVar\$*

*Function Form:*

*InkeyVar\$* = GRAPHIC\$(INKEY\$)

**Remarks** GRAPHIC INKEY\$ returns a  
of 0, 1, or 2 characters that reflects the status of the keyboard buffer for the selected graphic target. A null string (LEN=0) means that the buffer is empty - no key pressed. A string length of one means that an [ASCII](#) key was pressed and the string contains the ASCII character. An ASCII value between 1 and 31 indicate a control code.  
A string length of two means that an extended key was pressed. In this case, the first character in the string has an ASCII value of zero, and the second is the extended keyboard code.

**See also** [GRAPHIC INPUT](#), [GRAPHIC INPUT FLUSH](#), [GRAPHIC INSTAT](#), [GRAPHIC LINE INPUT](#), [GRAPHIC WAITKEY\\$](#)

### GRAPHIC\$(WAITKEY\$) function

## Keyword Template

**Purpose**

Syntax  
Remarks  
See also  
Example

## GRAPHIC WAITKEY\$ statement IMPROVED

**Purpose** Reads a keyboard character or extended key, waiting until one is ready.

**Syntax** GRAPHIC WAITKEY\$ [To WaitVar\$]  
GRAPHIC WAITKEY\$ ([KeyMask\$] [,TimeOut&]) [TO WaitVar\$]

*Function Form:*

WaitVar\$ = GRAPHIC\$(WAITKEY\$)

WaitVar\$ = GRAPHIC\$(WAITKEY\$, [KeyMask\$] [,TimeOutVal&])

**Remarks** Reads a character or extended key from the keyboard without echoing anything to the screen. If no data is available, GRAPHIC WAITKEY\$ will wait for an event to occur. It is very similar to GRAPHIC INKEY\$, except that it waits for input to be available. While waiting, time slices are released to the operating system to reduce CPU load.

It returns a

of one or two characters if a key was pressed. If the TO clause is omitted, the keyboard character is discarded.

If the optional *KeyMask\$* expression is included, only a limited set of keys are recognized. *KeyMask\$* may include any number of Sub-Masks, one for each key to observe. For example, GRAPHIC WAITKEY\$("YyNn") will recognize upper-case or lower-case Y or N (for yes/no answers), while any other key will be ignored. If *KeyMask\$* is omitted, or evaluates to a zero-length string, any key event will be recognized.

If the optional *TimeOutVal&* expression is included, it tells the maximum number of milliseconds to wait for a key. GRAPHIC WAITKEY\$(5000) will wait a maximum of 5 seconds. The specified TimeOut period will only be approximate, so you should not rely upon precision accuracy. If the TimeOut period is exceeded, a zero-length string is returned. If the *TimeOutVal&* parameter is omitted, or evaluates to zero (0), it will wait an infinite length of time. The maximum *TimeOut&* permitted is one hour.

A string length of one (`LEN(i$) = 1`) means that a standard character key was pressed.

The result string contains the character. An `ASC()` value between 1 and 31 indicates a control code.

A string length of two (`LEN(i$) = 2`) means that an extended key was pressed. In this case, the first character in the result string has an `ASC()` value of zero (0), and the second is the extended keyboard scan code. For example, pressing the F1 key will return `CHR$(0, 59)`.

**See also** [GRAPHIC INKEY\\$](#), [GRAPHIC INPUT](#), [GRAPHIC INPUT FLUSH](#), [GRAPHIC INSTAT](#), [GRAPHIC LINE INPUT](#)

### GRAPHIC\$(WAITKEY\$...) function

## Keyword Template

Purpose  
Syntax  
Remarks  
See also

## Example

# GRAPHIC WAITKEY\$ statement IMPROVED

**Purpose** Reads a keyboard character or extended key, waiting until one is ready.

**Syntax** `GRAPHIC WAITKEY$ [To WaitVar$]  
GRAPHIC WAITKEY$ ([KeyMask$] [,TimeOut&]) [TO WaitVar$]`

*Function Form:*

`WaitVar$ = GRAPHIC$(WAITKEY$)`

`WaitVar$ = GRAPHIC$(WAITKEY$, [KeyMask$] [,TimeOutVal&])`

**Remarks** Reads a character or extended key from the keyboard without echoing anything to the screen. If no data is available, GRAPHIC WAITKEY\$ will wait for an event to occur. It is very similar to GRAPHIC INKEY\$, except that it waits for input to be available. While waiting, time slices are released to the operating system to reduce CPU load.

It returns a

of one or two characters if a key was pressed. If the TO clause is omitted, the keyboard character is discarded.

If the optional *KeyMask\$* expression is included, only a limited set of keys are recognized. *KeyMask\$* may include any number of Sub-Masks, one for each key to observe. For example, GRAPHIC WAITKEY\$("YyNn") will recognize upper-case or lower-case Y or N (for yes/no answers), while any other key will be ignored. If *KeyMask\$* is omitted, or evaluates to a zero-length string, any key event will be recognized.

If the optional *TimeOutVal&* expression is included, it tells the maximum number of milliseconds to wait for a key. GRAPHIC WAITKEY\$(5000) will wait a maximum of 5 seconds. The specified TimeOut period will only be approximate, so you should not rely upon precision accuracy. If the TimeOut period is exceeded, a zero-length string is returned. If the *TimeOutVal&* parameter is omitted, or evaluates to zero (0), it will wait an infinite length of time. The maximum *TimeOut&* permitted is one hour.

A string length of one (`LEN(i$) = 1`) means that a standard character key was pressed. The result string contains the character. An `ASC()` value between 1 and 31 indicates a control code.

A string length of two (`LEN(i$) = 2`) means that an extended key was pressed. In this case, the first character in the result string has an `ASC()` value of zero (0), and the second is the extended keyboard scan code. For example, pressing the F1 key will return `CHR$(0, 59)`.

**See also** [GRAPHIC INKEY\\$](#), [GRAPHIC INPUT](#), [GRAPHIC INPUT FLUSH](#), [GRAPHIC INSTAT](#), [GRAPHIC LINE INPUT](#)

## GRAPHIC ARC statement

# GRAPHIC ARC statement

**Purpose** Draw an arc in the selected [graphic target](#).

**Syntax** `GRAPHIC ARC (x1!, y1!) - (x2!, y2!), arcStart!, arcEnd! [, rgbColor&]`

**Remarks** An arc is a section of a circle or an ellipse. To specify a particular arc, you would first define the full circle or ellipse of which it is a part, and then specify the points on the ellipse where the arc starts and stops.

The full circle or ellipse is defined by its bounding rectangle, which is defined as the smallest rectangle which can be drawn around the circle or ellipse. For example, if the circle is centered at position (400,400), with a radius of 100 pixels, the upper left corner (*x1!*, *y1!*) of the bounding rectangle is (300,300), and the lower right corner (*x2!*, *y2!*) is

(500,500). The start point and end point of the arc are specified by their angle, which must be given in radians. A complete circle or ellipse is  $2\pi$  radians. On a 12-hour clock-face, the values 0 and  $2\pi$  both refer to the position of 3 o'clock, while the value  $1\pi$  refers to the position of 9 o'clock. Other positions are specified by a radian value relative to these. In PowerBASIC, arcs are always drawn counter-clockwise from the starting point to the ending point.

Prior to any graphical operations, the graphic target must first be selected with [GRAPHIC ATTACH](#). The Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog (or world coordinates, if those were chosen with [GRAPHIC SCALE](#)). Line width can be set using [GRAPHIC WIDTH](#). If line width is set to 1 (the default), the line style can be set with [GRAPHIC STYLE](#). Because of the nature of an arc, GRAPHIC ARC neither uses, nor updates, [GRAPHIC POS](#) (last point referenced).

*x1!*, *y1!* The upper left corner of the bounding rectangle of the full circle or ellipse.  
*x2!*, *y2!* The lower right corner of the bounding rectangle of the full circle or ellipse.  
*ArcStart!* The starting angle of the arc, in radians, from 0 to  $2\pi$ .  
*ArcEnd!* The ending angle of the arc, in radians, from 0 to  $2\pi$  radians. Note that arcs are always drawn counter-clockwise from *arcStart!* to *arcEnd!*. Compared with a 12-hour clock-face, 0 or  $2\pi$  radians is at 3 o'clock, and  $1\pi$  radians is at 9 o'clock.  
*rgbColor&* Optional [RGB](#) color for the arc. If omitted (or -1), the current foreground color for the graphic window is used.

**See also** [Built In RGB Color Equates](#), [GRAPHIC ATTACH](#), [GRAPHIC COLOR](#), [GRAPHIC ELLIPSE](#), [GRAPHIC PIE](#), [GRAPHIC SET OVERLAP](#), [GRAPHIC STYLE](#), [GRAPHIC WIDTH](#)

**Example**

```
' Draw two arcs that combine into a circle.
' The upper half uses the default foreground color.
' The lower half is drawn in red.
LOCAL Pi AS DOUBLE
Pi = 4 * ATN(1) ' Calculate Pi
GRAPHIC ARC (5, 5) - (105, 105), 0, Pi ' Upper half
GRAPHIC ARC (5, 5) - (105, 105), Pi, 0, %RED ' Lower half
```

## GRAPHIC ATTACH statement

# GRAPHIC ATTACH statement

**Purpose** Select the graphic target ([window](#), [control](#), or ) on which future drawing operations will take place.

**Syntax** `GRAPHIC ATTACH hWin, id [, REDRAW]`

**Remarks** This statement chooses a graphic target. All further graphic operations will be directed to this target until another GRAPHIC ATTACH or [GRAPHIC DETACH](#) statement is executed, or the graphic target is deleted. All PowerBASIC graphical displays are persistent -- they will be automatically redrawn even if minimized or temporarily covered by another window.

By default, all graphic operations are displayed immediately upon execution of a graphic statement. In many cases, this is a good choice, because the display is always up-to-date. However, as the complexity of graphic operations increases, this continuous update process does not afford the best performance. It is usually better to use the REDRAW option described below, as it will generally provide a dramatic improvement in overall performance.

Only one thread may be attached to a particular Graphic Target at a time. An attempt to attach more than one will generate an Illegal Function Call [Error 5](#).

*hWin* Handle of the [GRAPHIC WINDOW](#), [DIALOG](#), or BITMAP to be used with statements.

*id* The control id, if the target is a [GRAPHIC CONTROL](#), or zero if the target is a GRAPHIC WINDOW or GRAPHIC BITMAP.

REDRAW This option can provide a dramatic improvement in the execution speed of graphic statements, as it eliminates repetitive updates to the display. If this option is included, all drawing statements are buffered until a [GRAPHIC REDRAW](#) statement is executed, or the operating system chooses to update the target window. Without REDRAW, all graphical statements (Line, Box, Print, etc.) are performed immediately. However, in most cases, it's better to defer the display until a number of statements have been performed.

While the REDRAW option defers update of the display, it does not guarantee that no interim updates will be performed. There are times when the operating system, or other factors, may intervene. If update must be suppressed until complete, you should create your graphic invisibly using a GRAPHIC BITMAP, then display it by using [GRAPHIC COPY](#).

**Example**

```
' Draw a blue gradient fill.
' Each line is displayed as it's drawn.
GRAPHIC ATTACH hDlg, %IDC_GRAPHIC1
FOR y& = 0 TO 255
 GRAPHIC LINE (0, y&) - (255, y&), RGB(0, 0, y&)
NEXT
```

```
' Draw a buffered, blue gradient fill.
' Nothing is displayed before GRAPHIC REDRAW,
' this enhancing performance dramatically.
GRAPHIC ATTACH hDlg, %IDC_GRAPHIC2, REDRAW
FOR y& = 0 TO 255
 GRAPHIC LINE (0, y&) - (255, y&), RGB(0, 0, y&)
NEXT
GRAPHIC REDRAW
```

**See also** [CONTROL ADD GRAPHIC](#), [GRAPHIC BITMAP LOAD](#), [GRAPHIC BITMAP NEW](#), [GRAPHIC DETACH](#), [GRAPHIC WINDOW](#)

## GRAPHIC BITMAP END statement

# GRAPHIC BITMAP END statement

**Purpose** Close the selected graphic bitmap.

**Syntax** `GRAPHIC BITMAP END`

**Remarks** You must close every memory bitmap (that was created with [GRAPHIC BITMAP LOAD](#) or [GRAPHIC BITMAP NEW](#)) when you are finished using them for graphical operations. To close a bitmap, select it with the [GRAPHIC ATTACH](#) statement, then execute GRAPHIC BITMAP END.

**See also** [GRAPHIC ATTACH](#), [GRAPHIC BITMAP LOAD](#), [GRAPHIC BITMAP NEW](#)

## GRAPHIC BITMAP LOAD statement

# GRAPHIC BITMAP LOAD statement

**Purpose** Create a memory bitmap and load an image into it.

**Syntax** `GRAPHIC BITMAP LOAD BmpName$, nWidth&, nHeight& [, stretch&] TO hBmp???`

*BmpName*\$ The name of the bitmap image to load.

*nWidth*& The width of the bitmap, in pixels.

*nHeight&* The height of the bitmap, in pixels.

*stretch&* Stretch mode if the bitmap is to be resized.

*hBmp???* The bitmap handle.

**Remarks** GRAPHIC BITMAP LOAD creates a new memory bitmap, loading a bitmap image from a [resource](#) or a disk file. This bitmap works just like a [GRAPHIC WINDOW](#), except that it is not visible. The parameter *BmpName\$* specifies the name of the image to be loaded. If *BmpName\$* contains a period, it is presumed to be the name of a disk file. Otherwise, an attempt is made to load it from a resource -- if not found, it is then presumed to be a disk file.

The parameters *nWidth&* and *nHeight&* specify the width and height of the bitmap, in [pixels](#). If either of the size parameters are zero (0), the bitmap is loaded at its natural size. If either of the size parameters is different from the natural size, the bitmap is stretched or condensed to the requested size.

If the bitmap creation is successful, the bitmap [handle](#) is assigned to the variable *hbmpp???*. If not successful, *hbmpp???* is set to zero. When you are finished using this memory bitmap, you must delete it with [GRAPHIC BITMAP END](#).

If the *stretch&* parameter is included, it is one of the values in the following table. If not included, or it is the value zero (0), the stretch mode is unchanged. An appropriate choice of stretch mode can substantially enhance the quality of bitmaps which are changed in size. The stretch mode equates are predefined in PowerBASIC.

The 4 stretch modes are:

|                   |                                                                                                                                                                                                                                             |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| %BLACKONWHITE     | This is the default Windows stretch mode, and is most appropriate for monochrome bitmaps, or those with blocks of color. Performs a boolean OR of eliminated and existing pixels. It preserves black pixels at the expense of white pixels. |
| %WHITEONBLACK     | Performs a boolean OR of eliminated and existing pixels. It preserves white pixels at the expense of black pixels.                                                                                                                          |
| %<br>COLORONCOLOR | Deletes eliminated lines of pixels without trying to preserve their information.                                                                                                                                                            |
| %HALFTONE         | This provides the highest quality for complex color bitmaps. The average color of the destination pixel block is kept approximately the same as the source pixel block.                                                                     |

The following code will retrieve the natural size of an image in a bitmap file, in pixels:

```
nFile& = FREEFILE
OPEN "myimage.bmp" FOR BINARY AS nFile&
GET #nFile&, 19, nWidth&
GET #nFile&, 23, nHeight&
CLOSE nFile&
```

**See also** [GRAPHIC BITMAP END](#), [GRAPHIC BITMAP NEW](#), [GRAPHIC GET STRETCHMODE](#), [GRAPHIC IMAGELIST](#), [GRAPHIC RENDER](#), [GRAPHIC SET STRETCHMODE](#), [GRAPHIC STRETCH](#)

## GRAPHIC BITMAP NEW statement

# GRAPHIC BITMAP NEW statement

**Purpose** Create a new memory bitmap.

**Syntax** GRAPHIC BITMAP NEW *nWidth&*, *nHeight&* TO *hBmp???*

**Remarks** GRAPHIC BITMAP NEW creates a new memory bitmap, which may be manipulated and drawn just as if it were a [GRAPHIC WINDOW](#), except that it is not visible. The parameters *nWidth&* and *nHeight&* specify the width and height of the bitmap, in pixels. If the bitmap creation is successful, the bitmap handle is assigned to the variable *hBmp???*

. If not successful, *hBmp???* is set to zero. When you are finished using this memory bitmap, you must delete it with [GRAPHIC BITMAP END](#).

**See also** [GRAPHIC ATTACH](#), [GRAPHIC BITMAP END](#), [GRAPHIC BITMAP LOAD](#), [GRAPHIC IMAGELIST](#)

## GRAPHIC BOX statement

# GRAPHIC BOX statement

|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>        | Draw a box with square or rounded corners in the selected <a href="#">graphic target</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Syntax</b>         | <code>GRAPHIC BOX (x1!, y1!) - (x2!, y2!) [, [corner&amp;] [, [rgbColor&amp;] [, [fillcolor&amp;] [, [fillstyle&amp;]]]]]</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Remarks</b>        | The coordinates are specified in <a href="#">Page Units</a> . Line width can be set using <a href="#">GRAPHIC WIDTH</a> . If line width is set to 1 (the default), the line style can be set with <a href="#">GRAPHIC STYLE</a> . Because of the nature of a box, GRAPHIC BOX neither uses, nor updates, the last point referenced (POS). Windows graphic conventions consider the bottom and right coordinates of a BOX to be exclusive. The pixels at the bottom and right edges are not drawn unless Overlap Mode is enabled. See <a href="#">GRAPHIC SET OVERLAP</a> for details.              |
| <i>x1!, y1!</i>       | The upper left corner of the box.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <i>x2!, y2!</i>       | The lower right corner of the box.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <i>corner&amp;</i>    | The percentage of roundness of the corners, in the range of 0 to 100. A value of zero creates square corners, while 100 creates a circle/oval. A value of 20 being most common for a pleasant, rounded appearance. If <i>corner&amp;</i> is omitted, the default is 0, which creates a rectangle with square corners.                                                                                                                                                                                                                                                                              |
| <i>rgbColor&amp;</i>  | Optional <a href="#">RGB</a> color of the box edge. If omitted (or -1), the edge <a href="#">color</a> defaults to the current foreground color for the selected graphic target.                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <i>fillcolor&amp;</i> | Optional RGB color of the box interior. If <i>fillcolor&amp;</i> is omitted (or -2), the interior of the box is not filled, allowing the background to show through. If <i>fillcolor&amp;</i> is -1, the interior is painted with the same color as the edge. Otherwise, <i>fillcolor&amp;</i> specifies the RGB color to be used.                                                                                                                                                                                                                                                                 |
| <i>fillstyle&amp;</i> | Optional fill style (pattern) to be used. If <i>fillstyle&amp;</i> is omitted, the default fill style is solid (0). If a hatch pattern is chosen (1 to 6), the foreground color is specified by the <i>fillcolor&amp;</i> , while the background is specified by the default background color. The optional <i>fillstyle&amp;</i> may be: <ul style="list-style-type: none"> <li>0 Solid (default)</li> <li>1 Horizontal Lines</li> <li>2 Vertical Lines</li> <li>3 Upward Diagonal Lines</li> <li>4 Downward Diagonal Lines</li> <li>5 Crossed Lines</li> <li>6 Diagonal Crossed Lines</li> </ul> |
| <b>See also</b>       | <a href="#">Built In RGB Color Equates</a> , <a href="#">GRAPHIC ATTACH</a> , <a href="#">GRAPHIC COLOR</a> , <a href="#">GRAPHIC LINE</a> , <a href="#">GRAPHIC SET OVERLAP</a> , <a href="#">GRAPHIC STYLE</a> , <a href="#">GRAPHIC WIDTH</a>                                                                                                                                                                                                                                                                                                                                                   |
| <b>Example</b>        | <pre>' Draw rectangle with square corners and default colors. GRAPHIC BOX (10, 10) - (100, 80)  ' Draw a blue rectangle with 20% rounded corners, ' filled with a light-gray, diagonal cross pattern GRAPHIC BOX (15, 15) - (95, 75), 20, %BLUE, RGB(191,191,191), 6</pre>                                                                                                                                                                                                                                                                                                                         |

## GRAPHIC CELL SIZE statement

## GRAPHIC CELL SIZE statement New!

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Retrieve the character <a href="#">cell</a> size including external leading.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Syntax</b>   | <pre>GRAPHIC CELL SIZE TO WidthVar!, HeightVar!</pre> <p><i>Function Form:</i></p> <pre>WidthVar! = GRAPHIC(Cell.Size.X) HeightVar! = GRAPHIC(Cell.Size.Y)</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Remarks</b>  | <p>GRAPHIC CELL SIZE retrieves the size of one character cell, for the current <a href="#">font</a>, on the attached graphic <a href="#">target</a>. The returned character size is specified in <a href="#">PAGE UNITS</a>, and allows you to calculate the number of <a href="#">text</a> lines which will fit in a particular space. The height value is the size of the displayed character, including external leading (if any) for this particular font.</p> <p>If the font is a fixed-width font, like Courier New or Lucida Console, the sizes returned are as exact as possible, given the fractional rounding approximations necessary for some <a href="#">scaled</a> units. If the font is proportional, like Arial or Times New Roman, the width will be the average size for the entire font.</p> <p>External leading is the vertical distance from the bottom of one character to the top of the character below it. This value is specified by the font in use. It may vary from zero to a larger value, depending upon the font and point size. To retrieve the exact height of characters without external leading, use <a href="#">GRAPHIC CHR SIZE</a>.</p> |
| <b>See also</b> | <a href="#">GRAPHIC CELL</a> , <a href="#">GRAPHIC CHR SIZE</a> , <a href="#">GRAPHIC SET FONT</a> , <a href="#">GRAPHIC TEXT SIZE</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

### GRAPHIC CELL statement

## Keyword Template

|                 |
|-----------------|
| <b>Purpose</b>  |
| <b>Syntax</b>   |
| <b>Remarks</b>  |
| <b>See also</b> |
| <b>Example</b>  |

## GRAPHIC CELL statement New!

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Sets or retrieves the next <a href="#">print</a> position, based upon the row and column position of a <a href="#">text cell</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Syntax</b>  | <pre>GRAPHIC CELL = RowValue&amp;, ColValue&amp; GRAPHIC CELL TO RowVar&amp;, ColVar&amp; GRAPHIC COL TO ColVar&amp; GRAPHIC ROW TO RowVar&amp;</pre> <p><i>Function Form:</i></p> <pre>ColVar&amp; = GRAPHIC(COL) RowVar&amp; = GRAPHIC(ROW)</pre>                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Remarks</b> | <p>GRAPHIC CELL is used to set or retrieve the print position, based upon the row and column position of a Text Cell. That is the row column position where the next printed text will be displayed. These operations are very similar to <a href="#">GRAPHIC GET POS</a> and <a href="#">GRAPHIC SET POS</a>, except that the position is reported in text rows and columns, rather than <a href="#">Page Units</a>. The current graphic position is translated to a row and column number, based upon the standard character size in a fixed width <a href="#">font</a>, or the average character size for a variable width font.</p> |

*RowValue*& specifies the horizontal screen row (starting at 1) at which to position the cursor. *ColValue*& specifies the vertical screen column (starting at 1) at which to position the cursor. Since row and column numbers start at one (1), the upper left corner of the window is considered to be cell 1,1.

The first form of GRAPHIC CELL moves the print position to the desired row and column. If a value given is zero (0), that parameter is ignored and that position is not changed.

The second form of GRAPHIC CELL retrieves the current print position, and assigns the values to the variables specified by *RowVar*& and *ColVar*&. Every point which falls within a text character cell is reported as that Row/Column position. If the graphic position is not at the upper left corner of the text character, you may get imprecise or unexpected results. This can occur if you perform a graphic operation other than [GRAPHIC PRINT](#) which leaves the "Last Point Referenced" at a mid-cell position.

The remaining forms allow you to retrieve just a single value, either row or column, and are supported in both statement and function form.

**See also** [GRAPHIC CELL SIZE](#), [GRAPHIC GET POS](#), [GRAPHIC SET FONT](#), [GRAPHIC SET POS](#), [GRAPHIC SET SCROLLTEXT](#), [GRAPHIC SET WORDWRAP](#), [GRAPHIC SET WRAP](#), [GRAPHIC SPLIT](#)

## GRAPHIC CHR SIZE statement

# GRAPHIC CHR SIZE statement

IMPROVED

**Purpose** Retrieve the character size on the Graphic [Target](#).

**Syntax** *GRAPHIC CHR SIZE To WidthVar!, HeightVar!*

*Function Form:*

*WidthVar!* = GRAPHIC(Chr.Size.X)

*HeightVar!* = GRAPHIC(Chr.Size.Y)

**Remarks** GRAPHIC CHR SIZE retrieves the size of one character, for the current [font](#), on the attached graphic target. The returned character size is specified in [Page Units](#). The height value is the actual size of the displayed character, without including external leading (if any) for this particular font.

If the font is a fixed-width font, like Courier New or Lucida Console, the sizes returned are as exact as possible, given the fractional rounding approximations necessary for some [scaled](#) units. If the font is proportional, like Arial or Times New Roman, the width will be the average size for the entire font.

External leading is the vertical distance from the bottom of one character to the top of the character below it. This value is specified by the font in use. It may vary from zero to a larger value, depending upon the font and point size. To retrieve the total row height including external leading, use [GRAPHIC CELL SIZE](#) instead.

**See also** [GRAPHIC ATTACH](#), [GRAPHIC CELL](#), [GRAPHIC CELL SIZE](#), [GRAPHIC SET FONT](#), [GRAPHIC PRINT](#), [GRAPHIC TEXT SIZE](#)

## GRAPHIC CLEAR statement

# GRAPHIC CLEAR statement

**Purpose** Clear the entire selected [graphic target](#), optionally using a specified [color](#) and fill style.

**Syntax** *GRAPHIC CLEAR [rgbColor& [, fillstyle&]]*

**Remarks** The graphic target must first be selected with [GRAPHIC ATTACH](#). The last point referenced (POS) is set to the upper left corner of the graphic window (0,0).

|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>rgbColor&amp;</i>  | Optional <a href="#">RGB</a> value representing the fill color. If <i>rgbColor&amp;</i> is omitted (or -1), the graphic target is cleared to the default background color for the selected graphic target.                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <i>fillstyle&amp;</i> | Optional fill style (pattern) to be used. If <i>fillstyle&amp;</i> is omitted, the default fill style is solid (0). If a hatch pattern is chosen (1 to 6), the foreground color is specified by the <i>rgbColor&amp;</i> , while the background is specified by the default background color for the selected graphic window. The optional <i>fillstyle&amp;</i> may be: <ul style="list-style-type: none"> <li>0 Solid (default)</li> <li>1 Horizontal Lines</li> <li>2 Vertical Lines</li> <li>3 Upward Diagonal Lines</li> <li>4 Downward Diagonal Lines</li> <li>5 Crossed Lines</li> <li>6 Diagonal Crossed Lines</li> </ul> |
| <b>See also</b>       | <a href="#">Built In RGB Color Equates</a> , <a href="#">GRAPHIC ATTACH</a> , <a href="#">GRAPHIC COLOR</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

## GRAPHIC COLOR statement

# GRAPHIC COLOR statement IMPROVED

|                 |                                                                                                                                                                                                                                                                                                        |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Sets the foreground and background color.                                                                                                                                                                                                                                                              |
| <b>Syntax</b>   | <code>GRAPHIC COLOR foreground&amp; [, background&amp;]</code>                                                                                                                                                                                                                                         |
| <b>Remarks</b>  | If either parameter is -1, the default foreground/background color is used. If the background parameter is -2, the background is not painted, allowing the content behind to become visible. If either parameter is -3, the existing color is not changed. Otherwise, the specified RGB color is used. |
| <b>See also</b> | <a href="#">Built In RGB Color Equates</a> , <a href="#">GRAPHIC ATTACH</a> , <a href="#">GRAPHIC PRINT</a> , <a href="#">GRAPHIC SET FONT</a>                                                                                                                                                         |
| <b>Example</b>  | <pre>' Set red foreground and blue background color. GRAPHIC COLOR %RED, RGB(0,0,191)</pre>                                                                                                                                                                                                            |

## GRAPHIC COPY statement

# GRAPHIC COPY statement

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Copy a<br>to the selected <a href="#">graphic target</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Syntax</b>  | <code>GRAPHIC COPY hbmpSource???, id&amp; [, style&amp;]</code><br><code>GRAPHIC COPY hbmpSource???, id&amp; TO (x!, y!) [, style&amp;]</code><br><code>GRAPHIC COPY hbmpSource???, id&amp;, (x1!, y1!)-(x2!, y2!) TO (x!, y!) [, style%]</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Remarks</b> | You can copy a complete bitmap, or a portion of it, to the selected graphic target. The expression <i>hbmpSource???</i> specifies the handle of the source <a href="#">GRAPHIC BITMAP</a> , <a href="#">GRAPHIC WINDOW</a> , or <a href="#">dialog</a> containing a <a href="#">GRAPHIC CONTROL</a> . The expression <i>id&amp;</i> is the unique control <a href="#">identifier</a> in the range 1 to 65535, as assigned with the CONTROL ADD GRAPHIC statement. <i>id&amp;</i> must be 0 for a GRAPHIC WINDOW or a GRAPHIC BITMAP.<br>The destination of the copy operation is the window selected by <a href="#">GRAPHIC ATTACH</a> . You must take care that your parameters are valid for the specified bitmap, or the results of the operation are undefined.<br><br>The first form of the GRAPHIC COPY statement copies the complete bitmap, positioning it at (0,0), which is the upper left corner of the destination.<br><br>The second form of GRAPHIC COPY also copies the complete bitmap, but positions it at the point specified by the parameter ( <i>x!</i> , <i>y!</i> ).<br><br>The third form copies a portion of the bitmap, specified by <i>x1,y1</i> as the upper left corner |

and x2,y2 as the lower right corner. It is positioned at the point specified by the parameter (x,y). You must use care that your parameters are valid for the specified bitmaps, or results of the operation are undefined.

If the style parameter is included, it is one of the values in the following table. If not included, a default of %mix\_CopySrc is presumed. There are 8 mix modes available to use for mixing drawing colors with the colors which already exist at the at the drawing location. The mix mode

are predefined in PowerBASIC.

|                  |                                                                                              |
|------------------|----------------------------------------------------------------------------------------------|
| %mix_Blackness   | Pixel is always 0 (black).                                                                   |
| %mix_NotMergeSrc | Pixel is the inverse of the MergeSrc color.                                                  |
| %mix_MaskNotSrc  | Pixel is a combination of the colors common to both the pixel and the inverse of the source. |
| %mix_NotCopySrc  | Pixel is the inverse of the pen color.                                                       |
| %mix_MaskSrcNot  | Pixel is a combination of the colors common to both the source and the inverse of the pixel. |
| %mix_Not         | Pixel is the inverse of the pixel color.                                                     |
| %mix_XorSrc      | Pixel is a combination of the colors in the source and in the pixel, but not in both.        |
| %mix_NotMaskSrc  | Pixel is the inverse of the MaskSrc color.                                                   |
| %mix_MaskSrc     | Pixel is a combination of the colors common to both the source and the pixel.                |
| %mix_NotXorSrc   | Pixel is the inverse of the XorSrc color.                                                    |
| %mix_Nop         | Pixel remains unchanged.                                                                     |
| %mix_MergeNotSrc | Pixel is a combination of the source color and the inverse of the pixel color.               |
| %mix_CopySrc     | Pixel is the source color (default).                                                         |
| %mix_MergeSrcNot | Pixel is a combination of the source color and the inverse of the pixel color.               |
| %mix_MergeSrc    | Pixel is a combination of the source color and the pixel color.                              |
| %mix_Whiteness   | Pixel is always 1 (white).                                                                   |

**See also** [GRAPHIC GET STRETCHMODE](#), [GRAPHIC RENDER](#), [GRAPHIC SET STRETCHMODE](#), [GRAPHIC STRETCH](#)

## GRAPHIC DETACH statement

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## GRAPHIC DETACH statement

**Purpose** Detaches a graphic [target](#) attached to the [graphic stream](#).

**Syntax** GRAPHIC DETACH

**Remarks** Though detached from the graphic stream, the graphic target is not deleted, nor is it altered in any way. Until another graphic target is attached, any statements executed are ignored. If no graphic is attached, this statement performs no operation.

See also [GRAPHIC ATTACH](#), [GRAPHIC BITMAP LOAD](#), [GRAPHIC BITMAP NEW](#), [GRAPHIC WINDOW](#)

## GRAPHIC ELLIPSE statement

# GRAPHIC ELLIPSE statement

|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>        | Draw an ellipse or a circle in the selected <a href="#">graphic target</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Syntax</b>         | <code>GRAPHIC ELLIPSE (x1!, y1!) - (x2!, y2!) [, [rgbColor&amp;] [, [fillcolor&amp;] [, [fillstyle&amp;]]]</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Remarks</b>        | <p>Coordinates are specified in <a href="#">Page Units</a>. Line width can be set using <a href="#">GRAPHIC WIDTH</a>. If line width is set to 1 (the default), the line style can be set with <a href="#">GRAPHIC STYLE</a>. Because of the nature of an ellipse, which has no obvious beginning or end, GRAPHIC ELLIPSE neither uses, nor updates, the last point referenced (POS).</p> <p>The coordinate pair define an invisible bounding rectangle which would enclose the ellipse to be drawn. It tells both the size and the proportions of the ellipse. Windows graphic conventions consider the bottom and right coordinates of it to be exclusive. The pixels at the bottom and right edges are ignored, unless Overlap Mode is enabled. See <a href="#">GRAPHIC SET OVERLAP</a> for details.</p> |
| <i>x1!, y1!</i>       | The upper left corner of the bounding rectangle.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <i>x2!, y2!</i>       | The lower right corner of the bounding rectangle.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <i>rgbColor&amp;</i>  | Optional <a href="#">RGB</a> color of the ellipse edge. If omitted (or -1), the edge <a href="#">color</a> defaults to the current foreground color for the selected graphic window.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <i>fillcolor&amp;</i> | Optional RGB color of the ellipse interior. If <i>fillcolor&amp;</i> is omitted (or -2), the interior of the ellipse is not filled, allowing the background to show through. If <i>fillcolor&amp;</i> is -1, the interior is painted with the same color as the edge. Otherwise, <i>fillcolor&amp;</i> specifies the RGB color to be used.                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <i>fillstyle&amp;</i> | Optional fill style (pattern) to be used. If <i>fillstyle&amp;</i> is omitted, the default fill style is solid (0). If a hatch pattern is chosen (1 to 6), the foreground color is specified by the <i>fillcolor&amp;</i> , while the background is specified by the default background color for the selected graphic window. The optional <i>fillstyle&amp;</i> may be: <ul style="list-style-type: none"> <li>0 Solid (default)</li> <li>1 Horizontal Lines</li> <li>2 Vertical Lines</li> <li>3 Upward Diagonal Lines</li> <li>4 Downward Diagonal Lines</li> <li>5 Crossed Lines</li> <li>6 Diagonal Crossed Lines</li> </ul>                                                                                                                                                                          |
| <b>See also</b>       | <a href="#">Built In RGB Color Equates</a> , <a href="#">GRAPHIC ARC</a> , <a href="#">GRAPHIC ATTACH</a> , <a href="#">GRAPHIC COLOR</a> , <a href="#">GRAPHIC LINE</a> , <a href="#">GRAPHIC PIE</a> , <a href="#">GRAPHIC SET OVERLAP</a> , <a href="#">GRAPHIC STYLE</a> , <a href="#">GRAPHIC WIDTH</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Example</b>        | <pre>' Draw a circle, using default colors. GRAPHIC ELLIPSE (10, 10) - (100, 100)  ' Draw a blue ellipse filled with a light-gray, ' diagonal cross pattern. GRAPHIC ELLIPSE (15, 25) - (95, 50), %BLUE, RGB(191,191,191), 6</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

## GRAPHIC GET BITS statement

# GRAPHIC GET BITS statement

**Purpose** Retrieve a copy of a bitmap , storing it as a device-independent bitmap in a [dynamic string](#) variable.

**Syntax** GRAPHIC GET BITS TO *bitvar\$*

**Remarks** This statement retrieves a copy of the entire bitmap for the selected [graphic target](#), assigning it to the dynamic string [variable](#) specified by *bitvar\$*. This allows you to make many modifications to the bitmap very quickly, particularly operations which may not be directly supported by GRAPHIC code. For example, you might change all red pixels in a bitmap to blue. Once your operations are complete, the bitmap is replaced using [GRAPHIC SET BITS](#).

The *bitvar\$* string will contain a series of four-byte values, each of which represents a [long integer](#). You can convert the four-byte string sections to numeric values with the [CVL](#) function, and convert a numeric value to a four-byte string with [MKL\\$](#). The first four-byte value specifies the width of the bitmap, in pixels, and the second specifies the height. Following that will be one four-byte value for each pixel in the bitmap, which represents the [color](#) of that pixel. So, a 20 by 20 bitmap would have 400 pixels and require 1600 bytes (400 \* 4), plus 4 bytes for the width and 4 bytes for the height, or a total of 1608 bytes.

The first four-byte pixel value in the string represents the top-left corner of the image, the second represents the second pixel of the first row, and so on. After the last pixel of the first row will be the first pixel of the second row, etc.

If execution speed is most important, it's likely that the string can be manipulated most efficiently with pointer variables.

Some Windows API functions, namely those which reference Device-Independent Bitmaps (DIB), require that colors be specified in the reverse of normal [RGB](#) sequence (Blue-Green-Red instead of Red-Green-Blue). To maximize performance, GRAPHIC GET BITS uses BGR format as well. You can use the [BGR\(\)](#) function to translate an RGB value to its BGR equivalent.

**See also** [Built In RGB Color Equates](#), [BGR](#), [CVL](#), [GRAPHIC SET BITS](#), [MKL\\$](#), [RGB](#)

**Example**

```
' Change all red pixels to blue
LOCAL PixelPtr AS LONG PTR
GRAPHIC GET BITS TO bmp$
xsize& = CVL(bmp$,1)
ysize& = CVL(bmp$,5)
PixelPtr = STRPTR(bmp$) + 8
FOR i& = 1 TO xsize& * ysize&
 IF @PixelPtr = BGR(%red) THEN @PixelPtr = BGR(%blue)
 INCR PixelPtr
NEXT
GRAPHIC SET BITS bmp$
```

## GRAPHIC GET CANVAS statement

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## GRAPHIC GET CANVAS statement

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Retrieves the writable size of the attached graphic <a href="#">target</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Syntax</b>   | <code>GRAPHIC GET CANVAS TO <i>WidthVar!</i>, <i>HeightVar!</i></code><br><i>Function Form:</i><br><code><i>WidthVar!</i> = GRAPHIC(CANVAS.X)</code><br><code><i>HeightVar!</i> = GRAPHIC(CANVAS.Y)</code>                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Remarks</b>  | GRAPHIC GET CANVAS retrieves the size of the drawing buffer for the attached graphic window, control, or bitmap. The size is specified in <a href="#">Page Units</a> , so it could return scaled values if they were applied with <a href="#">GRAPHIC SCALE</a> . If the graphic window or control is FIXED (the default), the size returned is equivalent to the <a href="#">CLIENT</a> size (other than the scaling factor). The CANVAS size does not include a <a href="#">caption</a> , frame, scrollbars, etc. If no graphic target has been attached with <a href="#">GRAPHIC ATTACH</a> , the values 0,0 are returned. |
| <b>See also</b> | <a href="#">GRAPHIC GET CLIENT</a> , <a href="#">GRAPHIC GET CLIP</a> , <a href="#">GRAPHIC GET SIZE</a> , <a href="#">GRAPHIC GET SCALE</a> , <a href="#">GRAPHIC SCALE</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

## GRAPHIC GET CAPTION statement

### Keyword Template

|                 |
|-----------------|
| <b>Purpose</b>  |
| <b>Syntax</b>   |
| <b>Remarks</b>  |
| <b>See also</b> |
| <b>Example</b>  |

## GRAPHIC GET CAPTION statement New!

|                 |                                                                                                                                                                                                                                                                                                                              |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Retrieves the caption from a <a href="#">Graphic Window</a> .                                                                                                                                                                                                                                                                |
| <b>Syntax</b>   | <code>GRAPHIC GET CAPTION To <i>CaptionVar\$</i></code><br><i>Function form:</i><br><code><i>CaptionVar\$</i> = GRAPHIC\$(CAPTION)</code>                                                                                                                                                                                    |
| <b>Remarks</b>  | GRAPHIC GET CAPTION retrieves the text (if any) which is currently displayed as the caption of the selected Graphic <a href="#">Target</a> . This area is also called the "title bar". A Graphic Window is the only form of Graphic Target which may have a caption, so other forms will return a null (zero-length) string. |
| <b>See also</b> | <a href="#">GRAPHIC SET CAPTION</a> , <a href="#">GRAPHIC WINDOW</a>                                                                                                                                                                                                                                                         |

## GRAPHIC GET CLIENT statement

## GRAPHIC GET CLIENT statement IMPROVED

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Retrieve the client size of the selected <a href="#">graphic target</a> .                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Syntax</b>  | <code>GRAPHIC GET CLIENT To <i>WidthVar!</i>, <i>HeightVar!</i></code><br><i>Function form:</i><br><code><i>WidthVar!</i> = GRAPHIC(Client.X)</code><br><code><i>HeightVar!</i> = GRAPHIC(Client.Y)</code>                                                                                                                                                                                                                                                               |
| <b>Remarks</b> | GRAPHIC GET CLIENT retrieves the physical size of the client area (visible part) of the attached <a href="#">graphic window</a> or <a href="#">control</a> . The size is specified in <a href="#">Pixels</a> or <a href="#">Dialog Units</a> , depending upon how it was created. The sizes returned are not altered or affected by <a href="#">GRAPHIC SCALE</a> , <a href="#">VIRTUAL</a> , or <a href="#">AUTOSIZE</a> operations, as it returns the physical size of |

the viewable area in the terms used to create it. The client area does not include a [caption](#), frame, scrollbars, etc. When GRAPHIC GET CLIENT is used with a , it returns 0,0. You would normally use [GRAPHIC GET CANVAS](#) with a Bitmap, or to obtain the size of the area which can be drawn. If no graphic target has been attached with [GRAPHIC ATTACH](#), the values 0,0 are returned.

**See also** [GRAPHIC ATTACH](#), [GRAPHIC GET CANVAS](#), [GRAPHIC GET CLIP](#), [GRAPHIC GET SIZE](#), [GRAPHIC SET CLIENT](#)

## GRAPHIC GET CLIP statement

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## GRAPHIC GET CLIP statement New!

**Purpose** Retrieves the size of the [clip area](#).

**Syntax** `GRAPHIC GET CLIP TO WidthVar!, HeightVar!`

*Function Form:*

`WidthVar! = GRAPHIC(Clip.X)`

`HeightVar! = GRAPHIC(Clip.Y)`

**Remarks** The clip area of a graphic [target](#) is that space where

operations can be displayed. That is, the clip area is that portion of the [client area](#) which is not protected (clipped) by [GRAPHIC SET CLIP](#).

GRAPHIC GET CLIP retrieves the size of the clip area, and assigns these values to the variables specified by *WidthVar!* and *HeightVar!*. The size is specified in [PAGE UNITS](#). If no graphic target is selected, the values 0,0 are returned.

**See also** [GRAPHIC GET CANVAS](#), [GRAPHIC GET CLIENT](#), [GRAPHIC SET CLIP](#)

## GRAPHIC GET DC statement

# GRAPHIC GET DC statement

**Purpose** Retrieve the handle of the DC (device context) for the selected [graphic target](#).

**Syntax** `GRAPHIC GET DC TO hDC???`

*Function Form:*

`DCVar??? = GRAPHIC(DC)`

**Remarks** The DC handle may be used with various Windows API functions to perform specialized graphic operations in the graphic target. If no graphic window is currently selected, zero is returned.

**See also** [GRAPHIC ATTACH](#)

## GRAPHIC GET LINES statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## GRAPHIC GET LINES statement IMPROVED

**Purpose** Retrieves the number of [text](#) lines which will fit on the graphic [target](#).

**Syntax** GRAPHIC GET LINES TO *linecount&*

*Function Form:*

*linecount&* = GRAPHIC(LINES)

**Remarks** GRAPHIC GET LINES retrieves the number of lines of text which will fit on the graphic target, given the current selected [font](#). This value is assigned to *linecount&*.

**See also** [GRAPHIC ATTACH](#), [GRAPHIC CELL](#), [GRAPHIC CHR SIZE](#), [GRAPHIC PRINT](#), [GRAPHIC SET FONT](#), [GRAPHIC TEXT SIZE](#)

## GRAPHIC GET LOC statement

# GRAPHIC GET LOC statement IMPROVED

**Purpose** Retrieves the location of the [Graphic Window](#) on the screen.

**Syntax** GRAPHIC GET LOC TO *x&*, *y&*

*Function Form:*

*x&* = GRAPHIC(LOC.X)

*y&* = GRAPHIC(LOC.Y)

**Remarks** This statement retrieves the location of the selected Graphic Window. If no graphic object is selected, or it is not a Graphic Window, 0,0 is returned. The location is specified in pixels, relative to the upper left corner of the screen.

**See also** [GRAPHIC ATTACH](#), [GRAPHIC GET PPI](#), [GRAPHIC SET LOC](#)

## GRAPHIC GET MIX statement

# GRAPHIC GET MIX statement IMPROVED

**Purpose** Retrieve the color mix mode for the selected [graphic target](#).

**Syntax** GRAPHIC GET MIX TO *mixmode&*

*Function Form:*

*mixmode&* = GRAPHIC(MIX)

**Remarks** There are 16 mix modes available to use for mixing the drawing color with the color that already exists at the drawing location.

%mix\_Blackness Pixel is always 0 (black).

%mix\_NotMergeSrc Pixel is the inverse of the MergeSrc color.

%mix\_MaskNotSrc Pixel is a combination of the colors common to both the pixel and

|                  |                                                                                              |
|------------------|----------------------------------------------------------------------------------------------|
|                  | the inverse of the source.                                                                   |
| %mix_NotCopySrc  | Pixel is the inverse of the pen color.                                                       |
| %mix_MaskSrcNot  | Pixel is a combination of the colors common to both the source and the inverse of the pixel. |
| %mix_Not         | Pixel is the inverse of the pixel color.                                                     |
| %mix_XorSrc      | Pixel is a combination of the colors in the source and in the pixel, but not in both.        |
| %mix_NotMaskSrc  | Pixel is the inverse of the MaskSrc color.                                                   |
| %mix_MaskSrc     | Pixel is a combination of the colors common to both the source and the pixel.                |
| %mix_NotXorSrc   | Pixel is the inverse of the XorSrc color.                                                    |
| %mix_Nop         | Pixel remains unchanged.                                                                     |
| %mix_MergeNotSrc | Pixel is a combination of the source color and the inverse of the pixel color.               |
| %mix_CopySrc     | Pixel is the source color (default).                                                         |
| %mix_MergeSrcNot | Pixel is a combination of the source color and the inverse of the pixel color.               |
| %mix_MergeSrc    | Pixel is a combination of the source color and the pixel color.                              |
| %mix_Whiteness   | Pixel is always 1 (white).                                                                   |

See also [GRAPHIC SET MIX](#)

## GRAPHIC GET OVERLAP statement

# GRAPHIC GET OVERLAP statement New!

**Purpose** Retrieves the status of Graphic [Overlap Mode](#).

**Syntax** `GRAPHIC GET OVERLAP To OverlapVar&`

Function Form:

`OverlapVar& = GRAPHIC(OVERLAP)`

**Remarks** GRAPHIC GET OVERLAP retrieves the status of overlap mode and assigns it to the variable specified by *OverlapVar&*. If Overlap Mode is enabled, the value [true](#) (non-zero) is assigned. If it's disabled, the value [false](#) (zero) is assigned instead. The value returned reflects the status of the graphic [target](#) which is currently attached to the graphic [stream](#).

With Overlap Mode, you control how PowerBASIC treats graphic operations which involve a RECT structure in their definition. Windows graphic conventions consider the bottom and right coordinates of a RECT to be exclusive. In other words, the [pixels](#) at the bottom and right edges lie immediately outside the rectangle. They are not drawn, but are ignored. For example:

```
GRAPHIC BOX (0,0) - (50,50)
```

In this case, a box is drawn from 0,0 to 49,49. The final pixels at the bottom and right edge are simply not drawn. However, if Overlap Mode is enabled with [GRAPHIC SET OVERLAP](#), the box is drawn from 0,0 to 50,50.

The Overlap Mode affects drawing operations involving [GRAPHIC SCALE](#), [GRAPHIC BOX](#), [GRAPHIC ELLIPSE](#), [GRAPHIC LINE](#), [GRAPHIC POLYLINE](#), etc.

See also [GRAPHIC SET OVERLAP](#)

## GRAPHIC GET PIXEL statement

# GRAPHIC GET PIXEL statement IMPROVED

**Purpose** Retrieve the color of the [pixel](#) at the specified point in the selected [graphic target](#).

**Syntax** `GRAPHIC GET PIXEL [STEP] (x!, y!) To PixelVar&`

*Function Form:*

`PixelVar& = GRAPHIC(PIXEL [STEP], x!, y!)`

**Remarks** The coordinate points *x!*, *y!* are specified in [Page Units](#).

**See also** [GRAPHIC ATTACH](#), [GRAPHIC COLOR](#), [GRAPHIC SCALE](#), [GRAPHIC SET PIXEL](#)

## GRAPHIC GET POS statement

# GRAPHIC GET POS statement

IMPROVED

**Purpose** Retrieve the POS (last point referenced) by a statement.

**Syntax** `GRAPHIC GET POS TO XVar!, YVar!`

*Function Form:*

`XVar! = GRAPHIC(POS.X)`

`YVar! = GRAPHIC(POS.Y)`

**Remarks** The coordinate points *XVar!*, *YVar!* are specified in the same terms ([pixels](#) or [dialog units](#)) as the [parent](#) dialog (or world coordinates, if those were chosen with [GRAPHIC SCALE](#)).

**See also** [GRAPHIC ATTACH](#), [GRAPHIC CELL](#), [GRAPHIC SCALE](#), [GRAPHIC SET POS](#)

## GRAPHIC GET PPI statement

# GRAPHIC GET PPI statement

IMPROVED

**Purpose** Retrieve the resolution of the display device, in points per inch.

**Syntax** `GRAPHIC GET PPI TO XVar&, YVar&`

*Function Form:*

`XVar& = GRAPHIC(PPI.X)`

`YVar& = GRAPHIC(PPI.Y)`

**Remarks** The resolution is always specified in [pixels](#). This statement is particularly useful in drawing items such as rulers and graphs to a representative physical size". There are 25.4 millimeters per inch, so just divide by 25.4 to convert from pixels per inch to pixels per millimeter.

"Representative physical size" means that the actual image may be close to a particular physical size, but is subject to factors including Windows default PPI setting, the driver's DPI to PPI ratio and even how the monitor has been adjusted. By using the GRAPHIC GET PPI, results, you can construct a representative graphic image that can be saved and later output at the intended scale by more precise means, for example a higher resolution Windows printer.

**See also** [GRAPHIC ATTACH](#), [GRAPHIC SCALE](#)

## GRAPHIC GET SCALE statement

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

## Example

## GRAPHIC GET SCALE statement

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Retrieve the current <a href="#">coordinate</a> limits for the <a href="#">graphic target</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Syntax</b>   | GRAPHIC GET SCALE TO <i>x1!</i> , <i>y1!</i> , <i>x2!</i> , <i>y2!</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Remarks</b>  | <p>GRAPHIC SCALE allows you to define your own world coordinate system for subsequent statements. World coordinates may be values, with the only requirement that <i>x1!</i> not equal <i>x2!</i>, and <i>y1!</i> not equal <i>y2!</i>.</p> <p>GRAPHIC GET SCALE retrieves the coordinate limits, which may be either custom world coordinates (if a <a href="#">GRAPHIC SCALE</a> has been executed), or else default <a href="#">pixel</a> coordinates. This allows you to save and restore a previous set of coordinates. This statement will automatically adjust to allow <a href="#">Dialog Unit</a> scale factors to be retrieved.</p> |
| <b>See also</b> | <a href="#">GRAPHIC SCALE</a> , <a href="#">GRAPHIC SCALE PIXELS</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

## GRAPHIC GET SCROLLTEXT statement

### Keyword Template

|                 |
|-----------------|
| <b>Purpose</b>  |
| <b>Syntax</b>   |
| <b>Remarks</b>  |
| <b>See also</b> |
| <b>Example</b>  |

## GRAPHIC GET SCROLLTEXT statement New!

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Retrieves the status of Graphic <a href="#">ScrollText Mode</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Syntax</b>   | <p>GRAPHIC GET SCROLLTEXT To <i>ScrollVar&amp;</i></p> <p><i>Function Form:</i></p> <p><i>ScrollVar&amp;</i> = GRAPHIC(SCROLLTEXT)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Remarks</b>  | <p>GRAPHIC GET SCROLLTEXT retrieves the status of ScrollText mode and assigns it to the variable specified by <i>ScrollVar&amp;</i>. If ScrollText Mode is enabled, the value <a href="#">true</a> (non-zero) is assigned. If it's disabled, the value <a href="#">false</a> (zero) is assigned instead. The value returned reflects the status of the graphic <a href="#">target</a> which is currently attached to the graphic <a href="#">stream</a>.</p> <p>With ScrollText Mode, you can control how PowerBASIC prints <a href="#">text</a> on a graphic target when it reaches the end of a page. Since a graphic target operates on a full page basis, the default is to ignore text which is printed past the end of the page. This can be modified under program control by using <a href="#">GRAPHIC SET SCROLLTEXT</a>.</p> <p>When ScrollText Mode is enabled, scrolling of a page is triggered only by <a href="#">GRAPHIC PRINT</a>. If the <a href="#">POS</a> (last point referenced) is located on the bottom row of the graphic target, and a GRAPHIC PRINT statement moves the POS off of the page, the entire contents of the graphic target is scrolled one row, and a new blank row is opened at the bottom.</p> |
| <b>See also</b> | <a href="#">GRAPHIC CELL</a> , <a href="#">GRAPHIC SET SCROLLTEXT</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

## GRAPHIC GET SIZE statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## GRAPHIC GET SIZE statement **New!**

**Purpose** Retrieves the overall size of the selected graphic [target](#).

**Syntax** GRAPHIC GET SIZE TO *WidthVar&*, *HeightVar&*

*Function Form:*

*WidthVar&* = GRAPHIC(SIZE.X)

*HeightVar&* = GRAPHIC(SIZE.Y)

**Remarks** GRAPHIC GET SIZE retrieves overall physical size of the selected [graphic window](#) or [control](#). The size is specified in [Pixels](#) or [Dialog Units](#), depending upon how it was created. The size always includes any [caption](#), frame, scrollbars, etc. If no graphic target is attached, the values 0,0 are returned.

**See also** [GRAPHIC GET CANVAS](#), [GRAPHIC GET CLIENT](#), [GRAPHIC GET CLIP](#), [GRAPHIC GET LINES](#), [GRAPHIC SET SIZE](#)

## GRAPHIC GET STRETCHMODE statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## GRAPHIC GET STRETCHMODE statement **New!**

**Purpose** Retrieves the default bitmap stretching mode for the attached [DC](#).

**Syntax** GRAPHIC GET STRETCHMODE TO *ModeVar&*

*Function Form:*

*ModeVar&* = GRAPHIC(STRETCHMODE)

**Remarks** There are several operations in PowerBASIC which involve stretching or condensing images on bitmaps, most notably [GRAPHIC STRETCH](#). As individual pixels must be added or removed, there is a good chance that the quality of the image will be degraded. However, if you describe the nature of the image by defining a StretchMode, you can substantially enhance the appearance.

The default StretchMode is maintained individually for each DC. You can retrieve the default mode with this statement, or set it with GRAPHIC GET STRETCHMODE. Of course, you can also override the default StretchMode when you execute one of the

affected statements.

The 4 stretch mode equates are predefined in PowerBASIC.

| Equates       | Value | Description                                                                                                                                                                                                                                 |
|---------------|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| %BLACKONWHITE | 1     | This is the default Windows stretch mode, and is most appropriate for monochrome bitmaps, or those with blocks of color. Performs a boolean OR of eliminated and existing pixels. It preserves black pixels at the expense of white pixels. |
| %WHITEONBLACK | 2     | Performs a boolean OR of eliminated and existing pixels. It preserves white pixels at the expense of black pixels.                                                                                                                          |
| %COLORONCOLOR | 3     | Deletes eliminated lines of pixels without trying to preserve their information.                                                                                                                                                            |
| %HALFTONE     | 4     | This provides the highest quality for complex color bitmaps. The average color of the destination pixel block is kept approximately the same as the source pixel block.                                                                     |

See also [GRAPHIC BITMAP LOAD](#), [GRAPHIC COPY](#), [GRAPHIC RENDER](#), [GRAPHIC SET STRETCHMODE](#), [GRAPHIC STRETCH](#)

## GRAPHIC GET VIEW statement

### Keyword Template

Purpose

Syntax

Remarks

See also

Example

## GRAPHIC GET VIEW statement New!

**Purpose** Retrieves the position of the [virtual](#) graphic viewport.

**Syntax** `GRAPHIC GET VIEW To WidthVar!, HeightVar!`

*Function Form:*

`WidthVar! = GRAPHIC(View.X)`

`HeightVar! = GRAPHIC(View.Y)`

**Remarks** Retrieves the [position](#) of the viewport on a virtual graphic [target](#). The size is specified in [Page Units](#). If no graphic target has been selected, or no virtual window has been created, the values 0,0 are returned.

See also [GRAPHIC SET VIEW](#), [GRAPHIC SET VIRTUAL](#)

## GRAPHIC GET WORDWRAP statement

### Keyword Template

Purpose

Syntax  
Remarks  
See also  
Example

## GRAPHIC GET WORDWRAP statement New!

**Purpose** Retrieves the status of Graphic [WordWrap](#) Mode.

**Syntax** GRAPHIC GET WORDWRAP TO *WrapVar&*  
*Function Form:*  
*WrapVar&* = GRAPHIC(WORDWRAP)

**Remarks** GRAPHIC GET WORDWRAP retrieves the status of wordwrap mode and assigns it to the [variable](#) specified by *WrapVar&*. If WordWrap Mode is enabled, the value [true](#) (non-zero) is assigned. If it's disabled, the value [false](#) (zero) is assigned instead. The value returned reflects the status of the graphic [target](#) which is currently attached to the graphic [stream](#).

With WordWrap Mode, you can control how PowerBASIC [prints](#) text on a graphic target when it reaches the end of a line. Since a graphic target operates on a full page basis, the default is to ignore text which is printed past the end of the line. This can be modified under program control by using [GRAPHIC SET WORDWRAP](#).

When WordWrap mode is enabled, it affects only [GRAPHIC PRINT](#) operations. If GRAPHIC PRINT attempts to display a word beyond the end of a row, the entire word is automatically wrapped to the first column of the next row.

**See also** [GRAPHIC CELL](#), [GRAPHIC GET WRAP](#), [GRAPHIC SET WORDWRAP](#), [GRAPHIC SET WRAP](#), [GRAPHIC SPLIT](#)

## GRAPHIC GET WRAP statement

### Keyword Template

Purpose  
Syntax  
Remarks  
See also  
Example

## GRAPHIC GET WRAP statement New!

**Purpose** Retrieves the status of Graphic [Wrap Mode](#).

**Syntax** GRAPHIC GET WRAP TO *WrapVar&*  
*Function Form:*  
*WrapVar&* = GRAPHIC(WRAP)

**Remarks** GRAPHIC GET WRAP retrieves the status of wrap mode and assigns it to the [variable](#) specified by *WrapVar&*. If Wrap Mode is enabled, the value [true](#) (non-zero) is assigned. If it's disabled, the value [false](#) (zero) is assigned instead. The value returned reflects the status of the graphic [target](#) which is currently attached to the graphic [stream](#).

With Wrap Mode, you can control how PowerBASIC [prints](#) text on a graphic target when it reaches the end of a line. Since a graphic target operates on a full page basis, the default is to ignore text which is printed past the end of the line. This can be modified

under program control by using [GRAPHIC SET WRAP](#).

When Wrap Mode is enabled, it affects only [GRAPHIC PRINT](#) operations. If GRAPHIC PRINT attempts to display a character beyond the end of a row, it is automatically wrapped to the first column of the next row.

**See also** [GRAPHIC CELL](#), [GRAPHIC GET WORDWRAP](#), [GRAPHIC SET WORDWRAP](#), [GRAPHIC SET WRAP](#), [GRAPHIC SPLIT](#)

## GRAPHIC IMAGELIST statement

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## GRAPHIC IMAGELIST statement

**Purpose**

Displays an image from an [IMAGELIST](#)

**Syntax**

`GRAPHIC IMAGELIST (x!,y!), hLst, index&, overlay&, style&`

**Remarks**

One of the images stored in an IMAGELIST is displayed on the selected [graphic control](#), or [window](#). The parameters *x!,y!* define the upper left corner of the position of the image. *hLst* is the [handle](#) of the IMAGELIST and *index&* is the selector of the image to be displayed (1=first, 2=second, etc.). If *overlay&* is non-zero, it specifies an overlay image to be added to the displayed image from the image list. The parameter *style&* may be one of the following style bits:

|                               |                                                                                                                                                                                                                      |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>%ILD_NORMAL</code>      | Draws the image using the background color of the image list. If the background color is the default value <code>%CLR_NONE</code> (defined in the <code>Commctrl.inc</code> file), the image is drawn transparently. |
| <code>%ILD_TRANSPARENT</code> | Draws the image transparently if there is a mask.                                                                                                                                                                    |
| <code>%ILD_MASK</code>        | Draws the mask.                                                                                                                                                                                                      |
| <code>%ILD_BLEND25</code>     | If there is a mask, the image is drawn blending 25% with the system highlight color.                                                                                                                                 |
| <code>%ILD_BLEND50</code>     | If there is a mask, the image is drawn blending 50% with the system highlight color.                                                                                                                                 |

**See also**

[GRAPHIC ATTACH](#), [GRAPHIC COPY](#), [GRAPHIC RENDER](#), [GRAPHIC STRETCH](#), [IMAGELIST](#)

## GRAPHIC INKEY\$ statement

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

See also

Example

## GRAPHIC INKEY\$ statement IMPROVED

**Purpose** Reads a keyboard character if one is ready.

**Syntax** GRAPHIC INKEY\$ TO *InkeyVar\$*

Function Form:

*InkeyVar\$* = GRAPHIC\$(INKEY\$)

**Remarks** GRAPHIC INKEY\$ returns a  
of 0, 1, or 2 characters that reflects the status of the keyboard buffer for the selected graphic target. A null string (LEN=0) means that the buffer is empty - no key pressed. A string length of one means that an [ASCII](#) key was pressed and the string contains the ASCII character. An ASCII value between 1 and 31 indicate a control code.  
A string length of two means that an extended key was pressed. In this case, the first character in the string has an ASCII value of zero, and the second is the extended keyboard code.

**See also** [GRAPHIC INPUT](#), [GRAPHIC INPUT FLUSH](#), [GRAPHIC INSTAT](#), [GRAPHIC LINE INPUT](#), [GRAPHIC WAITKEY\\$](#)

## GRAPHIC INPUT statement

### Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## GRAPHIC INPUT statement

**Purpose** Reads data from the keyboard from within a [graphic window](#) or [graphic control](#).

**Syntax** GRAPHIC INPUT [*prompt*,] *varlist*

*prompt* An optional quoted [string literal](#) or [string equate](#) which is displayed to the user as a prompt.

*varlist* A comma delimited sequence of one or more or [variables](#).

**Remarks** GRAPHIC INPUT displays the prompt on the graphic window or graphic control, waits for the user to enter data from the keyboard, and assigns the data to the variables in *varlist*. Data entered from the keyboard must match the type of the variables -- that is, non-numeric characters are unacceptable for numeric variables.

If a single GRAPHIC INPUT statement prompts for more than one variable, the user must enter the proper number of values on a single line, separated by commas. If not enough comma-delimited values are entered, remaining variables are set to zero or nul.

**See also** [GRAPHIC INKEY\\$](#), [GRAPHIC INPUT FLUSH](#), [GRAPHIC INSTAT](#), [GRAPHIC LINE INPUT](#), [GRAPHIC WAITKEY\\$](#)

## GRAPHIC INPUT FLUSH statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## GRAPHIC INPUT FLUSH statement

**Purpose** Remove all buffered keyboard data.

**Syntax** `GRAPHIC INPUT FLUSH`

**See also** [GRAPHIC INKEY\\$](#), [GRAPHIC INPUT](#), [GRAPHIC INSTAT](#), [GRAPHIC LINE INPUT](#), [GRAPHIC WAITKEY\\$](#)

## GRAPHIC INSTAT statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## GRAPHIC INSTAT statement IMPROVED

**Purpose** Determines whether a keyboard character is ready.

**Syntax** `GRAPHIC INSTAT TO NumericVar`

*Function Form:*

`InstatVar& = GRAPHIC(INSTAT)`

**Remarks** The

variable receives the keyboard buffer status for the selected [graphic target](#). The value assigned is [TRUE](#) (non-zero) if a keyboard character is ready to be retrieved, or [FALSE](#) (zero) if not.

GRAPHIC INSTAT does not remove the character from the buffer, so repeated execution will continue to return TRUE until the character is read with [GRAPHIC INKEY\\$](#), [GRAPHIC INPUT](#), etc.

**See also** [GRAPHIC INKEY\\$](#), [GRAPHIC INPUT](#), [GRAPHIC INPUT FLUSH](#), [GRAPHIC LINE INPUT](#), [GRAPHIC WAITKEY\\$](#)

## GRAPHIC LINE INPUT statement

# Keyword Template

Purpose  
Syntax  
Remarks  
See also  
Example

## GRAPHIC LINE INPUT statement

**Purpose** Read an entire line from the keyboard from within a [Graphic Window](#) or a [Graphic Control](#).

**Syntax** `GRAPHIC LINE INPUT ["prompt"] string_variable`

**Remarks** GRAPHIC LINE INPUT displays the optional prompt on the Graphic Window or Control and waits for user input. Keystrokes are accepted until you press ENTER, at which time the entire typed string is assigned to the *string\_variable*. Input is limited to 255 characters.

**See also** [GRAPHIC INKEY\\$](#), [GRAPHIC INPUT](#), [GRAPHIC INPUT FLUSH](#), [GRAPHIC INSTAT](#), [GRAPHIC WAITKEY\\$](#)

## GRAPHIC LINE statement

## GRAPHIC LINE statement

**Purpose** Draw a line on the selected [graphic target](#)

**Syntax** `GRAPHIC LINE [STEP] [(x1!, y1!)] - [STEP] (x2!, y2!)[, rgbColor&]`

**Remarks** The line is drawn from the first point, up to, but not including the second point. Coordinate points are specified in [Page Units](#). Line width can be set using [GRAPHIC WIDTH](#). If line width is set to 1 (the default), the line style can be set with [GRAPHIC STYLE](#).

Windows graphic conventions consider the final x2 and y2 coordinates to be exclusive. Therefore, by default, the final pixel is not drawn unless Overlap Mode is enabled. See [GRAPHIC SET OVERLAP](#) for details.

*x1!, y1!* Optional values which define the starting point of the line. If this optional first point is omitted, the line begins at the last point referenced (POS) in a preceding statement. If the first STEP option is included, the *x1!* and *y1!* starting coordinates are relative to the last point referenced (POS).

*x2!, y2!* The ending point of the line. If the second STEP option is included, the *x2!* and *y2!* ending coordinates are relative to the starting coordinates.

*rgbColor&* Optional [RGB](#) color value for the line. If *rgbColor&* is omitted (or -1), the line [color](#) defaults to the current foreground color.

**See also** [GRAPHIC ARC](#), [GRAPHIC ATTACH](#), [GRAPHIC BOX](#), [GRAPHIC COLOR](#), [GRAPHIC ELLIPSE](#), [GRAPHIC PIE](#), [GRAPHIC SET OVERLAP](#), [GRAPHIC STYLE](#), [GRAPHIC WIDTH](#)

**Example**

```
' Draw a triangle. Note that, since LINE draws up to,
' but not including the second point, one extra point
' must be added when STEP is used.
GRAPHIC LINE (10, 10) - (10, 100) ' left side
GRAPHIC LINE STEP - (101, 100) ' base line
GRAPHIC LINE STEP - (10, 10) ' back to top
```

**GRAPHIC PAINT statement****GRAPHIC PAINT statement**

|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>        | Fill an area with a solid <a href="#">color</a> or a hatch pattern.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Syntax</b>         | <code>GRAPHIC PAINT [BORDER   REPLACE] [STEP] (x!, y!) [, [rgbFill&amp;] [, [rgbBorder&amp;] [, [fillstyle&amp;]]]</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Remarks</b>        | The coordinate points are specified in <a href="#">Page Units</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <i>x!, y!</i>         | The point where filling begins. If the STEP option is included, the x and y coordinates are relative to the last point referenced (POS) in the selected graphic target.                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <i>rgbFill&amp;</i>   | Optional <a href="#">RGB</a> color value for the fill area. If <i>rgbFill&amp;</i> is omitted (or -1), the default foreground <a href="#">color</a> is used.                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <i>rgbBorder&amp;</i> | Optional RGB base color of the fill area. If the REPLACE option is chosen, filling continues outward in all directions until a color other than <i>rgbBorder&amp;</i> is found. If the BORDER option (or no option) is included, filling continues outward until the <i>rgbBorder&amp;</i> color is found. If <i>rgbBorder&amp;</i> is not specified, it is assumed to be the same as the <i>rgbFill&amp;</i> parameter.                                                                                                                                                                                                     |
| <i>fillstyle&amp;</i> | Optional fill style (pattern) to use. If <i>fillstyle&amp;</i> is omitted, the default fill style is solid (0). If a hatch pattern is chosen (1 to 6), the foreground color is specified by the <i>rgbFill&amp;</i> , while the background is specified by the default background color for the selected graphic target. The optional <i>fillstyle&amp;</i> may be: <ul style="list-style-type: none"> <li>0 Solid (default)</li> <li>1 Horizontal Lines</li> <li>2 Vertical Lines</li> <li>3 Upward Diagonal Lines</li> <li>4 Downward Diagonal Lines</li> <li>5 Crossed Lines</li> <li>6 Diagonal Crossed Lines</li> </ul> |
| <b>See also</b>       | <a href="#">Built In RGB Color Equates</a> , <a href="#">GRAPHIC ARC</a> , <a href="#">GRAPHIC ATTACH</a> , <a href="#">GRAPHIC BOX</a> , <a href="#">GRAPHIC COLOR</a> , <a href="#">GRAPHIC ELLIPSE</a> , <a href="#">GRAPHIC LINE</a> , <a href="#">GRAPHIC PIE</a>                                                                                                                                                                                                                                                                                                                                                       |

**Example**

```

FUNCTION PBMAIN
 LOCAL hWin AS DWORD

 GRAPHIC WINDOW "Paint", 0, 0, 200, 200 TO hWin
 GRAPHIC ATTACH hWin, 0

 ' Draw a circle with blue foreground color
 ' and a box below it with red foreground color.
 GRAPHIC ELLIPSE (10, 10) - (70, 70), %BLUE
 GRAPHIC BOX (10, 80) - (70, 120), 0, %RED

 ' Fill the area inside the circle's blue borders
 ' with a green diagonal pattern.
 GRAPHIC PAINT BORDER (40, 40), %GREEN, %BLUE, 6

 'Retrieve the color at point 5,5 (outside the circle).
 GRAPHIC GET PIXEL (5, 5) TO lRes&

 ' Fill the area outside the circle by replacing the color
 ' at point 5,5 and outwards with a solid yellow color.
 GRAPHIC PAINT REPLACE (5, 5), RGB(255, 255, 223), lRes&, 0

 SLEEP 10000
END FUNCTION

```

## GRAPHIC PIE statement

# GRAPHIC PIE statement

|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>        | Draw a pie section on the selected <a href="#">graphic target</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Syntax</b>         | <code>GRAPHIC PIE (x1!, y1!) - (x2!, y2!), arcStart!, arcEnd! [, [rgbColor&amp;] [, [fillcolor&amp;] [, [fillstyle&amp;]]]</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Remarks</b>        | <p>A pie section is an arc, with a line drawn from each end point to the center of the circle or ellipse. To specify a pie section, you would first define the full circle or ellipse of which it is a part, and then specify the points on the ellipse where the arc starts and stops.</p> <p>The full circle or ellipse is defined by its bounding rectangle, which is the smallest rectangle which can be drawn around the circle or ellipse. For example, if the circle is centered at position (400,400), with a radius of 100 pixels, the upper left corner (x1,y1) of the bounding rectangle is (300,300), and the lower right corner (x2,y2) is (500,500).</p> <p>The start point and end point of the arc are specified by their angle, which must be given in radians. A complete circle or ellipse is 2*pi radians. On a 12-hour clock-face, the values 0 and 2*pi both refer to the position of 3 o'clock, while the value 1*pi refers to the position of 9 o'clock. Other positions are specified by a radian value relative to these. In PowerBASIC, arcs are always drawn counter-clockwise from the starting point to the ending point.</p> <p>Prior to any graphical operations, the graphic target must first be selected with <a href="#">GRAPHIC ATTACH</a>. The Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog (or world coordinates, if those were chosen with <a href="#">GRAPHIC SCALE</a>). Line width can be set using <a href="#">GRAPHIC WIDTH</a>. If line width is set to 1 (the default), the line style can be set with <a href="#">GRAPHIC STYLE</a>. Because of the nature of a pie section, GRAPHIC PIE neither uses, nor updates, graphic POS (last point referenced).</p> |
| <i>x1!, y1!</i>       | The upper left corner of the bounding rectangle of the full circle or ellipse.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <i>x2!, y2!</i>       | The lower right corner of the bounding rectangle of the full circle or ellipse.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <i>ArcStart!</i>      | The starting angle of the arc, in radians, from 0 to 2*pi.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <i>ArcEnd!</i>        | The ending angle of the arc, in radians, from 0 to 2*pi radians. Note that arcs are always drawn counter-clockwise from <i>arcStart!</i> to <i>arcEnd!</i> . Compared with a 12-hour clock-face, 0 or 2*pi radians is at 3 o'clock, and 1*pi radians is at 9 o'clock.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <i>rgbColor&amp;</i>  | Optional <a href="#">RGB</a> color of the pie section edge. If omitted (or -1), the edge <a href="#">color</a> defaults to the current foreground color.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <i>fillcolor&amp;</i> | Optional RGB color of the pie section interior. If <i>fillcolor&amp;</i> is omitted (or -2), the interior of the pie section is not filled, allowing the background to show through. If <i>fillcolor&amp;</i> is -1, the interior is painted with the same color as the edge. Otherwise, <i>fillcolor&amp;</i> specifies the RGB color to be used.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <i>fillstyle&amp;</i> | Optional fill style (pattern) to be used. If <i>fillstyle&amp;</i> is omitted, the default fill style is solid (0). If a hatch pattern is chosen (1 to 6), the foreground color is specified by the <i>fillcolor&amp;</i> , while the background is specified by the default background color. The optional <i>fillstyle&amp;</i> may be:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                       | <ul style="list-style-type: none"> <li>0 Solid (default)</li> <li>1 Horizontal Lines</li> <li>2 Vertical Lines</li> <li>3 Upward Diagonal Lines</li> <li>4 Downward Diagonal Lines</li> <li>5 Crossed Lines</li> <li>6 Diagonal Crossed Lines</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>See also</b>       | <a href="#">Built In RGB Color Equates</a> , <a href="#">GRAPHIC ARC</a> , <a href="#">GRAPHIC ATTACH</a> , <a href="#">GRAPHIC BOX</a> , <a href="#">GRAPHIC COLOR</a> , <a href="#">GRAPHIC ELLIPSE</a> , <a href="#">GRAPHIC LINE</a> , <a href="#">GRAPHIC SET OVERLAP</a> , <a href="#">GRAPHIC STYLE</a> , <a href="#">GRAPHIC WIDTH</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Example</b>        | <code>FUNCTION PBMAIN</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

```

LOCAL hWin AS DWORD

GRAPHIC WINDOW "Pie", 0, 0, 200, 200 TO hWin
GRAPHIC ATTACH hWin, 0

' A full circle is 2Pi radians (100%).
' To show a 25% Pie, use the formula 0.25 * 2Pi.
' The following divides a full circle into four 25% parts, each
' with its own colors, each slightly separated from the others.
' Note: 0 is at 3 O'clock, then it builds counter-clockwise.

LOCAL Pi2 AS DOUBLE
Pi2 = 8 * ATN(1) ' 2 * Pi can be useful here

GRAPHIC PIE (10, 9)-(110, 109), 0, Pi2 * 0.25, %BLUE, %
LTGRAY, 3
GRAPHIC PIE (9, 9)-(109, 109), Pi2 * 0.25, Pi2 * 0.50, %RED, %
LTGRAY, 4
GRAPHIC PIE (9, 10)-(109, 110), Pi2 * 0.5, Pi2 * 0.75, RGB(0,127,0), %
LTGRAY, 3
GRAPHIC PIE (10, 10)-(110, 110), Pi2 * 0.75, 0, %GRAY, %LTGRAY,
4

SLEEP 10000
END FUNCTION

```

## GRAPHIC POLYGON statement

# GRAPHIC POLYGON statement

**Purpose** Draw a polygon in the selected [graphic target](#).

**Syntax** `GRAPHIC POLYGON points [, [rgbColor&] [, [fillcolor&] [, [fillstyle&] [, [fillmode&]]]]`

**Remarks** The Coordinates are specified in [Page Units](#). Line width can be set using [GRAPHIC WIDTH](#). If line width is set to 1 (the default), the line style can be set with [GRAPHIC STYLE](#). GRAPHIC POLYGON neither uses, nor updates, the last point referenced ([POS](#)).

*points* User-defined type that defines the number of vertices and the location of each. There must be at least two, and no more than 1024 vertices. The first member is a long integer point count, followed directly by the appropriate number of single precision floats to specify the actual coordinates. Floating point coordinates are required, because of the possibility of their use as world coordinates with SCALE. You can use a type with a scalar list, like this:

```

TYPE PolyPoints
 count as long
 x1 as single
 y1 as single
 x2 as single
 y2 as single
 x3 as single
 y3 as single
END TYPE

```

Or, you can create an array using point types, like this:

```

TYPE PolyPoint
 x as single
 y as single
END TYPE

```

```

TYPE PolyArray
 count as long
 xy(1 TO 3) as PolyPoint
END TYPE

```

- rgbColor&* Optional [RGB](#) color of the polygon edge. If omitted (or -1), the edge [color](#) defaults to the current foreground color.
- fillcolor&* Optional RGB color of the polygon interior. If *fillcolor&* is omitted (or -2), the interior of the ellipse is not filled, allowing the background to show through. If *fillcolor&* is -1, the interior is painted with the same color as the edge. Otherwise, *fillcolor&* specifies the RGB color to be used.
- fillstyle&* Optional fill style (pattern) to be used. If *fillstyle&* is omitted, the default fill style is solid (0). If a hatch pattern is chosen (1 to 6), the foreground color is specified by the *fillcolor&*, while the background is specified by the default background color. The optional *fillstyle&* may be:
- 0 Solid (default)
  - 1 Horizontal Lines
  - 2 Vertical Lines
  - 3 Upward Diagonal Lines
  - 4 Downward Diagonal Lines
  - 5 Crossed Lines
  - 6 Diagonal Crossed Lines
- fillmode&* If *fillmode&* is missing (or zero), the winding mode is selected. This fills any region with a non-zero winding value. If *fillmode&* is non-zero, the alternate mode is selected. This fills the area between odd-numbered and even-numbered polygon sides on each scan line. That is, it fills the area between the first side and the second side, between the third side and fourth side, etc.
- See also** [Built In RGB Color Equates](#), [GRAPHIC ARC](#), [GRAPHIC ATTACH](#), [GRAPHIC BOX](#), [GRAPHIC COLOR](#), [GRAPHIC ELLIPSE](#), [GRAPHIC LINE](#), [GRAPHIC POLYLINE](#), [GRAPHIC SET OVERLAP](#), [GRAPHIC STYLE](#), [GRAPHIC WIDTH](#)

## GRAPHIC POLYLINE statement

# GRAPHIC POLYLINE statement

- Purpose** Draw a series of connected line segments.
- Syntax** `GRAPHIC POLYLINE points [, rgbColor&]`
- Remarks** The Coordinates are specified in [Page Units](#). Line width can be set using [GRAPHIC WIDTH](#). If line width is set to 1 (the default), the line style can be set with [GRAPHIC STYLE](#). [GRAPHIC POLYLINE](#) neither uses, nor updates, the last point referenced ([POS](#)).  
Windows graphic conventions consider the final *x* and *y* coordinates to be exclusive. Therefore, by default, the final pixel is not drawn unless Overlap Mode is enabled. See [GRAPHIC SET OVERLAP](#) for details.
- points* User-defined type that defines the number of vertices and the location of each. There must be at least two, and no more than 1024 vertices. The first member is a long integer point count, followed directly by the appropriate number of single precision floats to specify the actual coordinates. Floating point coordinates are required, because of the possibility of their use as world coordinates with [SCALE](#). You can use a type with a scalar list, like this:
- ```

TYPE PolyPoints
  count as long
  x1 as single
  y1 as single
  x2 as single

```

```

y2 as single
x3 as single
y3 as single
END TYPE

```

Or, you can create an array using point types, like this:

```

TYPE PolyPoint
  x as single
  y as single
END TYPE

TYPE PolyArray
  count as long
  xy(1 TO 3) as PolyPoint
END TYPE

```

rgbColor& Optional [RGB](#) color of the polyline. If omitted (or -1), the [color](#) defaults to the current foreground color.

See also [Built In RGB Color Equates](#), [GRAPHIC ARC](#), [GRAPHIC ATTACH](#), [GRAPHIC BOX](#), [GRAPHIC COLOR](#), [GRAPHIC ELLIPSE](#), [GRAPHIC LINE](#), [GRAPHIC POLYGON](#), [GRAPHIC SET OVERLAP](#), [GRAPHIC STYLE](#), [GRAPHIC WIDTH](#)

GRAPHIC PRINT statement

GRAPHIC PRINT statement IMPROVED

| | | | | | | | | | | | | | |
|-----------------|---|-----|---|------|---|---|---|-----------------|--|-----------------|--|-----------------|--|
| Purpose | Output text to the selected graphic target . | | | | | | | | | | | | |
| Syntax | GRAPHIC PRINT [EXPLIST] [POS(<i>n</i>)] [SPC(<i>n</i>)] [TAB(<i>n</i>)] [,] [;]... | | | | | | | | | | | | |
| Remarks | <p>Prior to any graphical operations are executed, you should be certain that a graphic target has been selected, either by default, or with GRAPHIC ATTACH. The text color and the text background color are set with GRAPHIC COLOR. Text which extends beyond the bounds of the graphic target is clipped. The size of the text to be printed can be determined in advance with GRAPHIC TEXT SIZE, and formatted to fit a particular field with GRAPHIC SPLIT. Drawing begins at the last point referenced by another procedure, or the point specified by GRAPHIC SET POS. The upper left corner of the text is positioned at the POS.</p> <p>GRAPHIC PRINT has the following parts, which may occur in any order and quantity, within a single statement:</p> <table> <tr> <td>EXP</td> <td>and/or expression(s) to be written to the graphic target. A semicolon</td> </tr> <tr> <td>RLIS</td> <td>can be used as separator between multiple expressions in the same</td> </tr> <tr> <td>T</td> <td>statement. Upon completion, the POS is moved to the left margin of the next line.</td> </tr> <tr> <td>POS(<i>n</i>)</td> <td>An optional function used to set the POS to the horizontal page unit (pixel, dialog unit, scaled unit, etc.) specified by the numeric argument. Multiple uses of the POS function is permitted in a single statement. The vertical position of the POS is never changed.</td> </tr> <tr> <td>SPC(<i>n</i>)</td> <td>An optional function used to insert <i>n</i> spaces into the printed output. Multiple use of SPC is permitted in a single statement. Values of <i>n</i> less than 1 are ignored.</td> </tr> <tr> <td>TAB(<i>n</i>)</td> <td>An optional function used to tab to the <i>n</i>th column before printing the next expression. Multiple use of TAB is permitted in a single statement. Since TAB references columns, rather than pixels, it can give unpredictable results when used with a variable width font. It is best used with a fixed</td> </tr> </table> | EXP | and/or expression(s) to be written to the graphic target. A semicolon | RLIS | can be used as separator between multiple expressions in the same | T | statement. Upon completion, the POS is moved to the left margin of the next line. | POS(<i>n</i>) | An optional function used to set the POS to the horizontal page unit (pixel, dialog unit, scaled unit, etc.) specified by the numeric argument. Multiple uses of the POS function is permitted in a single statement. The vertical position of the POS is never changed. | SPC(<i>n</i>) | An optional function used to insert <i>n</i> spaces into the printed output. Multiple use of SPC is permitted in a single statement. Values of <i>n</i> less than 1 are ignored. | TAB(<i>n</i>) | An optional function used to tab to the <i>n</i> th column before printing the next expression. Multiple use of TAB is permitted in a single statement. Since TAB references columns , rather than pixels, it can give unpredictable results when used with a variable width font . It is best used with a fixed |
| EXP | and/or expression(s) to be written to the graphic target. A semicolon | | | | | | | | | | | | |
| RLIS | can be used as separator between multiple expressions in the same | | | | | | | | | | | | |
| T | statement. Upon completion, the POS is moved to the left margin of the next line. | | | | | | | | | | | | |
| POS(<i>n</i>) | An optional function used to set the POS to the horizontal page unit (pixel, dialog unit, scaled unit, etc.) specified by the numeric argument. Multiple uses of the POS function is permitted in a single statement. The vertical position of the POS is never changed. | | | | | | | | | | | | |
| SPC(<i>n</i>) | An optional function used to insert <i>n</i> spaces into the printed output. Multiple use of SPC is permitted in a single statement. Values of <i>n</i> less than 1 are ignored. | | | | | | | | | | | | |
| TAB(<i>n</i>) | An optional function used to tab to the <i>n</i> th column before printing the next expression. Multiple use of TAB is permitted in a single statement. Since TAB references columns , rather than pixels, it can give unpredictable results when used with a variable width font . It is best used with a fixed | | | | | | | | | | | | |

width font.

;, Special characters that determine the position of the next text item printed. A semicolon (;) means the next text item is printed immediately; a comma (,) means the next text item is printed at the start of the next print zone. Print zones begin every 14 columns.

If the final argument is a semicolon or comma, the POS is maintained at the current location, rather than the default action of moving to the start of the next line. For example:

```
GRAPHIC PRINT "Hello";
GRAPHIC PRINT " world!";
```

...produces the contiguous result "Hello world!"

If you omit all arguments, GRAPHIC PRINT just moves the POS to the left margin of the next line. Any control codes, such as Carriage Return, Line-Feed, and Backspace are not interpreted. They will display as symbols in the currently selected font.

USING\$ is a separate function, which may be included in the ExprList. See the [USING\\$\(\)](#) function for more information.

It is not possible to print a [User-Defined Type](#) (UDT), a [Variant](#), an [object](#) variable, or an entire [array](#). Individual member values must be extracted with the appropriate function before they can be displayed.

See also

[GRAPHIC ATTACH](#), [GRAPHIC CELL](#), [GRAPHIC CHR SIZE](#), [GRAPHIC SET FONT](#), [GRAPHIC GET POS](#), [GRAPHIC SET POS](#), [GRAPHIC SET SCROLLTEXT](#), [GRAPHIC SET WORDWRAP](#), [GRAPHIC SET WRAP](#), [GRAPHIC SPLIT](#), [GRAPHIC TEXT SIZE](#), [USING\\$](#)

GRAPHIC REDRAW statement

GRAPHIC REDRAW statement

Purpose Update buffered graphical statements, drawing them to the selected [graphic target](#).

Syntax GRAPHIC REDRAW

Remarks This statement is only needed when [GRAPHIC ATTACH](#) with the REDRAW option have been chosen for faster, buffered draw operations. Otherwise, it performs no operation.

All PowerBASIC graphical displays are *persistent* -- they are automatically redrawn for you after resuming from being minimized or temporarily covered by other windows.

In intensive drawing operations, it is preferable to delay the display until a number of statements have been performed by using the REDRAW option with the GRAPHIC ATTACH statement and the GRAPHIC REDRAW statement. This can improve the overall performance dramatically.

See also

[GRAPHIC ATTACH](#)

Example

```
FUNCTION PBMAIN
  LOCAL hWin AS DWORD

  ' Draw a buffered, blue gradient fill
  GRAPHIC WINDOW "Gradient", 0, 0, 255, 255 TO hWin
  GRAPHIC ATTACH hWin, 0, REDRAW
  FOR y& = 0 TO 255
    GRAPHIC LINE (0, y&) - (255, y&), RGB(0, 0, y&)
  NEXT
  GRAPHIC REDRAW

  SLEEP 10000
```

END FUNCTION

GRAPHIC RENDER statement

GRAPHIC RENDER statement

IMPROVED

| | |
|-----------------|--|
| Purpose | Render an image on the selected graphic target . |
| Syntax | <code>GRAPHIC RENDER [BITMAP ICON] <i>ImgName</i>, (<i>x1!</i>, <i>y1!</i>)-(<i>x2!</i>, <i>y2!</i>)</code> |
| Remarks | <p>Renders an image (bitmap or icon), loaded from a resource or a disk file, on the selected graphic target. The optional director word identifies whether the source is a <code>.</code> or an <code>.</code>. If not specified, Bitmap is the default.</p> <p>The parameter <i>ImgName</i> tells the name of the image. If <i>ImgName</i> is a numeric resource ID, it can be given as a numeric expression or the string equivalent with a leading pound sign (e.g. "#10023"). Otherwise, the string resource ID or the file name is given as a string expression. If the string name contains a period, it's presumed to be the name of a disk file. Otherwise, an attempt is made to load it as a resource; if not found, it's presumed to be a disk file.</p> <p>The parameters <i>x1!</i>, <i>y1!</i> define the upper left corner of the target rectangle, while <i>x2!</i>, <i>y2!</i> define the lower right corner of that rectangle. If the target rectangle is larger or smaller than the original, the image is stretched or condensed to the requested size.</p> <p>The following code will retrieve the natural size of an image in a bitmap file, in pixels:</p> <pre>nFile& = FREEFILE OPEN "myimage.bmp" FOR BINARY AS nFile& GET #nFile&, 19, nWidth& GET #nFile&, 23, nHeight& CLOSE nFile&</pre> |
| See also | GRAPHIC COPY , GRAPHIC GET STRETCHMODE , GRAPHIC IMAGELIST , GRAPHIC SET STRETCHMODE , GRAPHIC STRETCH |

GRAPHIC SAVE statement

GRAPHIC SAVE statement

| | |
|-----------------|--|
| Purpose | Save an image to a bitmap (.BMP) file. |
| Syntax | <code>GRAPHIC SAVE <i>BmpName</i>\$</code> |
| Remarks | <p>The selected graphic target (a graphic control, or window, etc.) is saved to a disk file using the filename specified by <i>BmpName</i>\$. The bitmap is always saved in a single plane, 24-bit format, to allow for the maximum (true color) resolution.</p> |
| See also | CONTROL ADD GRAPHIC , GRAPHIC ATTACH , GRAPHIC BITMAP LOAD , GRAPHIC BITMAP NEW |

GRAPHIC SCALE statement

GRAPHIC SCALE statement

| | |
|----------------|---|
| Purpose | Define a custom coordinate system for the graphic target . |
| Syntax | <code>GRAPHIC SCALE (<i>x1!</i>, <i>y1!</i>) - (<i>x2!</i>, <i>y2!</i>)</code> <code>GRAPHIC SCALE PIXELS</code> |

| | |
|-----------------|--|
| Remarks | <p>The graphic target must first be chosen with GRAPHIC ATTACH. GRAPHIC SCALE lets you define your own world coordinate system for subsequent statements. The custom coordinates remain with the graphic target until GRAPHIC SCALE is repeated, or the target is deleted. World coordinates may be values, with the only requirement that $x1!$ not equal $x2!$, and $y1!$ not equal $y2!$. If either is equal, the statement is ignored.</p> <p>If $x2!$ is greater than $x1!$, coordinates grow larger as they move to the right. Otherwise, they grow larger as they move to the left.</p> <p>If $y2!$ is greater than $y1!$, coordinates grow larger as they move downward. Otherwise, they grow larger as they move upward.</p> <p>By default, the position $x2!/y2!$ translates to the first pixel which is outside of the client area, and therefore not drawn. However, if OVERLAP MODE is enabled by GRAPHIC SET OVERLAP, $x2!/y2!$ translates to the final pixel in the client area and is drawn.</p> <p>GRAPHIC SCALE PIXELS sets or resets the coordinate system to pixel coordinates. This can be particularly valuable when the original coordinates are in Dialog Units, since this provides increased resolution for other graphic functions.</p> |
| See also | GRAPHIC ATTACH , GRAPHIC CELL , GRAPHIC CELL SIZE , GRAPHIC GET SCALE , GRAPHIC SET OVERLAP |

GRAPHIC SET AUTOSIZE statement

Keyword Template

Purpose
Syntax
Remarks
See also
Example

GRAPHIC SET AUTOSIZE statement New!

| | |
|----------------|---|
| Purpose | Expands a graphic target into autosize mode. |
| Syntax | <code>GRAPHIC SET AUTOSIZE <i>nWidth</i>, <i>nHeight</i> [,USERSIZE]</code> |
| Remarks | <p>AUTOSIZE mode allows the attached graphic target (control or window) to display the contents of a virtual window, which may be larger or smaller. The entire contents of the virtual window are always displayed on the screen, so the image is stretched or condensed to fit properly. The physical size of the display area is not changed. If the graphic target is a</p> <p>, no operation is performed, as there is no display area.</p> <p>This statement may be used to change a target to AUTOSIZE mode, or to change the sizes and UserSize option of an existing AUTOSIZE target.</p> <p>When executed, a new virtual bitmap of the specified height and width is created. <i>nWidth</i> and <i>nHeight</i> are always specified in Pixels or Dialog Units, depending upon the original window creation. The new virtual bitmap is immediately filled with the original bitmap, but stretched or condensed to fit. This is done to avoid flashing effects which sometimes occur with a brief color change. Your program may now draw to the new bitmap in the normal fashion for a bitmap of the new size.</p> <p>If a clip area had been established to create margins, it is reset. If scaled coordinates had been established, they are also reset, as neither would be appropriate for the altered</p> |

size. You can enable these attributes again with [GRAPHIC SCALE](#) or [GRAPHIC SET CLIP](#), based upon the new size of the drawing area. You can retrieve the size of the virtual drawing area, at any time, with [GRAPHIC GET CANVAS](#).

AUTOSIZE mode is quite similar to VIRTUAL mode. Both create a virtual window which is the target of your drawing and text printing operations. The difference is the way in which they are displayed. VIRTUAL displays a viewport, smaller than the virtual window, which can be moved to various positions. This allows the user to view one selected section at a time. AUTOSIZE displays the entire virtual window, all of the time, by stretching or condensing it as needed.

If you add the USERSIZE option, an attached graphic window is displayed with a thick frame, which allows the user to "drag" the edges to a new size at any time. This option is not appropriate for a graphic control, and is ignored in that case.

See also

[GRAPHIC GET CANVAS](#), [GRAPHIC SCALE](#), [GRAPHIC SET CLIP](#), [GRAPHIC SET FIXED](#), [GRAPHIC SET VIRTUAL](#),

GRAPHIC SET BITS statement

GRAPHIC SET BITS statement

Purpose Replace a copy of a bitmap that was retrieved as a device-independent bitmap.

Syntax `GRAPHIC SET BITS bitexpr$`

Remarks This statement replaces a bitmap that was originally retrieved with the [GRAPHIC GET BITS](#) statement. The bitmap is assigned to the selected [graphic target](#) from the [string expression](#) specified by *bitexpr*\$. This allows you to make many modifications to the bitmap very quickly, particularly operations which may not be directly supported by PowerBASIC. For example, a typical use might be to change all red [pixels](#) in a bitmap to blue.

The *bitexpr*\$ [string](#) contains a series of four-[byte](#) values, each of which represents a [long integer](#). You can convert the four-byte string sections to numeric values with the [CVL](#) function, and convert a numeric value to a four-byte string with [MKL\\$](#). The first four-byte value specifies the width of the bitmap, in pixels, and the second specifies the height. Following that will be one four-byte value for each pixel in the bitmap, which represents the [color](#) of that pixel. So, a 20 by 20 bitmap would have 400 pixels and require 1600 bytes (400 * 4), plus 4 bytes for the width and 4 bytes for the height, or a total of 1608 bytes.

The first four-byte pixel value in the string represents the top-left corner of the image, the second represents the second pixel of the first row, and so on. After the last pixel of the first row will be the first pixel of the second row, etc.

If execution speed is most important, it's likely that the string can be manipulated most efficiently with pointer variables.

Some Windows API functions, namely those which reference Device-Independent Bitmaps (DIB), require that colors be specified in the reverse of normal [RGB](#) sequence (Blue-Green-Red instead of Red-Green-Blue). To maximize performance, GRAPHIC SET BITS uses [BGR](#) format as well. You can use the BGR function to translate an RGB value to its BGR equivalent.

See also

[Built In RGB Color Equates](#), [BGR](#), [CVL](#), [GRAPHIC GET BITS](#), [MKL\\$](#), [RGB](#)

Example

```
' Change all red pixels to blue
LOCAL PixelPtr AS LONG PTR
GRAPHIC GET BITS TO bmp$
xsize& = CVL(bmp$,1)
ysize& = CVL(bmp$,5)
PixelPtr = STRPTR(bmp$) + 8
FOR i& = 1 TO xsize& * ysize&
```

```

IF @PixelPtr = BGR(%red) THEN @PixelPtr = BGR(%blue)
INCR PixelPtr
NEXT
GRAPHIC SET BITS bmp$

```

GRAPHIC SET CAPTION statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC SET CAPTION statement **New!**

Purpose Change the caption on a [Graphic Window](#).

Syntax GRAPHIC SET CAPTION *CaptionExpr\$*

Remarks If the selected Graphic [Target](#) has a title bar, the caption is changed to the contents of the [string expression](#).

See also [GRAPHIC WINDOW](#)

GRAPHIC SET CLIENT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC SET CLIENT statement **New!**

Purpose Change the size of a [graphic control](#) or [graphic window](#) to a specific [client area](#) size.

Syntax GRAPHIC SET CLIENT *nWide&, nHigh&*

nWide&, nHigh& Integral numeric expressions which specify the desired size of the client area. Width and height are specified in [pixels](#) or [dialog units](#), depending upon the system used when created.

Remarks Client size may be smaller than overall size, depending on the type of borders used. The client area is the part inside the borders, which varies depending upon the style and exstyle at creation. Overall size includes the borders. A graphic [target](#) with a border will typically have a larger overall size than one without a border.

Beginning with this version of PowerBASIC, GRAPHIC CONTROLS may be resized with [CONTROL SET CLIENT](#), GRAPHIC SET CLIENT, [CONTROL SET SIZE](#), and [GRAPHIC SET SIZE](#).

The original bitmap is copied, pixel for pixel, to the newly resized graphic control or window. Any expanded area is filled with the current background color. Your program draws to it in the normal fashion for a bitmap of the new size.

If a [clip_area](#) had been established to create margins, it is reset. If [scaled](#) coordinates had been established, they are also reset, as neither would be appropriate for the altered size. You can enable these attributes again with [GRAPHIC SCALE](#) or [GRAPHIC SET CLIP](#), based upon the new size of the drawing area.

See also [CONTROL_GET_CLIENT](#), [CONTROL_GET_SIZE](#), [CONTROL_SET_CLIENT](#), [CONTROL_SET_SIZE](#), [GRAPHIC_GET_CANVAS](#), [GRAPHIC_GET_CLIENT](#), [GRAPHIC_GET_SIZE](#), [GRAPHIC_SET_CLIP](#), [GRAPHIC_SET_SIZE](#)

GRAPHIC SET CLIP statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC SET CLIP statement New!

Purpose Establishes margins around the outer edges of the graphic [target](#).

Syntax `GRAPHIC SET CLIP LeftMargin!, TopMargin!, RightMargin!, BottomMargin!`

Remarks This statement establishes margins on any or all sides of the graphic target. All subsequent operations are "clipped" on these boundaries, so that no additional text or graphics are displayed in these protected areas. However, the margins are not erased, so anything already written in these areas will remain unchanged.

Each of the 4 parameters is specified in the [PAGE UNITS](#) currently in effect. However, as this statement changes the target space available to you, the page units are immediately set to [pixels](#). The upper left corner of the clip area is now addressed as point (0,0), while the right and bottom limits are reduced by the size of the margins. If you would prefer to use Scaled Page Units for this revised clip area, you must execute a new [GRAPHIC SCALE](#).

GRAPHIC SET CLIP is particularly useful for displaying [text](#), where enclosing "white space" improves the appearance a good deal.

You can disable a clip area by executing GRAPHIC SET CLIP 0,0,0,0.

See also [GRAPHIC_GET_CLIP](#), [GRAPHIC_SCALE](#)

GRAPHIC SET FIXED statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC SET FIXED statement New!

Purpose Restores a graphic [target](#) to standard fixed mode.

Syntax GRAPHIC SET FIXED

Remarks The attached graphic target ([control](#) or [window](#)) is restored to the standard FIXED mode. The drawing area is set equal to the physical size of the display area, which is not changed.

When executed, it is assumed that the graphic subsystem is set to [AUTOSIZE](#) or [VIRTUAL](#) mode. If not, no operation is performed. A new bitmap of the [client area](#) size is created. The original bitmap is copied, [pixel](#) for pixel, at the existing size. Any expanded area is filled with the current background [color](#). Your program draws to it in the normal fashion for a bitmap of the new size.

If a [clip area](#) had been established to create margins, it is reset. If [scaled](#) coordinates had been established, they are also reset, as neither would be appropriate for the altered size. You can enable these attributes again with [GRAPHIC SCALE](#) or [GRAPHIC SET CLIP](#), based upon the new size of the drawing area. You can retrieve the size of the drawing area with [GRAPHIC GET CANVAS](#) or [GRAPHIC GET CLIENT](#).

See also [GRAPHIC GET CANVAS](#), [GRAPHIC GET CLIENT](#), [GRAPHIC SCALE](#), [GRAPHIC SET AUTOSIZE](#), [GRAPHIC SET VIRTUAL](#)

GRAPHIC SET FOCUS statement

GRAPHIC SET FOCUS statement

Purpose Bring the selected [graphic window](#) to the foreground and direct focus to it.

Syntax GRAPHIC SET FOCUS

Remarks A graphic window must first be chosen with [GRAPHIC ATTACH](#). The GRAPHIC SET FOCUS statement brings the graphic window to the foreground, directing focus to it. This is particularly useful when another window may overlap the graphic window.

See also [GRAPHIC ATTACH](#), [GRAPHIC WINDOW](#)

GRAPHIC SET FONT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC SET FONT statement IMPROVED

Purpose Select a font for use on the graphic [target](#).

| | |
|---------------------|---|
| Syntax | <code>GRAPHIC SET FONT <i>fonthdl&</i></code> |
| <i>fonthdl&</i> | The numeric handle returned by the FONT NEW statement. |
| Remarks | <p>The font specified by <i>fonthdl&</i> is selected to be used by all of the following GRAPHIC PRINT, GRAPHIC INPUT, and GRAPHIC LINE INPUT statements. This is the most efficient way to change fonts and their general appearance (size, style, etc.). If you specify a <i>fonthdl&</i> of zero, the font is changed back to the original default font chosen by PowerBASIC.</p> <p>You can predefine virtually any number of fonts and attributes by executing FONT NEW statements for each of them. That makes them ready for immediate use when selected by GRAPHIC SET FONT.</p> <p>If no specific font is selected, the default font is MS Sans Serif, 8 point, with no style attributes.</p> |
| Restrictions | GRAPHIC SET FONT replaces GRAPHIC FONT. Note that the GRAPHIC FONT statement is no longer supported, so update your code to use the new syntax. |
| See also | FONT NEW , GRAPHIC ATTACH , GRAPHIC CELL , GRAPHIC CELL SIZE , GRAPHIC CHR SIZE , GRAPHIC INPUT , GRAPHIC LINE INPUT , GRAPHIC PRINT , GRAPHIC TEXT SIZE |

GRAPHIC SET LOC statement

GRAPHIC SET LOC statement

| | |
|-----------------|---|
| Purpose | Change the location of the selected Graphic Window on the screen. |
| Syntax | <code>GRAPHIC SET LOC <i>x&</i>, <i>y&</i></code> |
| Remarks | This statement changes the location of the selected Graphic Window. If no graphic target is selected, or it is not a Graphic Window, no action is taken. The location is always given in pixels, relative to the upper left corner of the screen. |
| See also | GRAPHIC ATTACH , GRAPHIC GET LOC , GRAPHIC GET PPI |

GRAPHIC SET MIX statement

GRAPHIC SET MIX statement

| | | | | | | | | | | | | | | | | | | | |
|-------------------------------|---|-----------------------------|----------------------------|-------------------------------|---|------------------------------|--|------------------------------|--|------------------------------|--|-----------------------|--|--------------------------|---|------------------------------|--|---------------------------|---|
| Purpose | Set the color mix mode for the selected graphic target . | | | | | | | | | | | | | | | | | | |
| Syntax | <code>GRAPHIC SET MIX <i>mode&</i></code> | | | | | | | | | | | | | | | | | | |
| Remarks | <p>There are 16 mix modes available to use for mixing the drawing color with the color that already exists at the drawing location. The mix mode equates are predefined in PowerBASIC.</p> <table> <tr> <td><code>%mix_Blackness</code></td> <td>Pixel is always 0 (black).</td> </tr> <tr> <td><code>%mix_NotMergeSrc</code></td> <td>Pixel is the inverse of the MergeSrc color.</td> </tr> <tr> <td><code>%mix_MaskNotSrc</code></td> <td>Pixel is a combination of the colors common to both the pixel and the inverse of the source.</td> </tr> <tr> <td><code>%mix_NotCopySrc</code></td> <td>Pixel is the inverse of the pen color.</td> </tr> <tr> <td><code>%mix_MaskSrcNot</code></td> <td>Pixel is a combination of the colors common to both the source and the inverse of the pixel.</td> </tr> <tr> <td><code>%mix_Not</code></td> <td>Pixel is the inverse of the pixel color.</td> </tr> <tr> <td><code>%mix_XorSrc</code></td> <td>Pixel is a combination of the colors in the source and in the pixel, but not in both.</td> </tr> <tr> <td><code>%mix_NotMaskSrc</code></td> <td>Pixel is the inverse of the MaskSrc color.</td> </tr> <tr> <td><code>%mix_MaskSrc</code></td> <td>Pixel is a combination of the colors common to both the source and the pixel.</td> </tr> </table> | <code>%mix_Blackness</code> | Pixel is always 0 (black). | <code>%mix_NotMergeSrc</code> | Pixel is the inverse of the MergeSrc color. | <code>%mix_MaskNotSrc</code> | Pixel is a combination of the colors common to both the pixel and the inverse of the source. | <code>%mix_NotCopySrc</code> | Pixel is the inverse of the pen color. | <code>%mix_MaskSrcNot</code> | Pixel is a combination of the colors common to both the source and the inverse of the pixel. | <code>%mix_Not</code> | Pixel is the inverse of the pixel color. | <code>%mix_XorSrc</code> | Pixel is a combination of the colors in the source and in the pixel, but not in both. | <code>%mix_NotMaskSrc</code> | Pixel is the inverse of the MaskSrc color. | <code>%mix_MaskSrc</code> | Pixel is a combination of the colors common to both the source and the pixel. |
| <code>%mix_Blackness</code> | Pixel is always 0 (black). | | | | | | | | | | | | | | | | | | |
| <code>%mix_NotMergeSrc</code> | Pixel is the inverse of the MergeSrc color. | | | | | | | | | | | | | | | | | | |
| <code>%mix_MaskNotSrc</code> | Pixel is a combination of the colors common to both the pixel and the inverse of the source. | | | | | | | | | | | | | | | | | | |
| <code>%mix_NotCopySrc</code> | Pixel is the inverse of the pen color. | | | | | | | | | | | | | | | | | | |
| <code>%mix_MaskSrcNot</code> | Pixel is a combination of the colors common to both the source and the inverse of the pixel. | | | | | | | | | | | | | | | | | | |
| <code>%mix_Not</code> | Pixel is the inverse of the pixel color. | | | | | | | | | | | | | | | | | | |
| <code>%mix_XorSrc</code> | Pixel is a combination of the colors in the source and in the pixel, but not in both. | | | | | | | | | | | | | | | | | | |
| <code>%mix_NotMaskSrc</code> | Pixel is the inverse of the MaskSrc color. | | | | | | | | | | | | | | | | | | |
| <code>%mix_MaskSrc</code> | Pixel is a combination of the colors common to both the source and the pixel. | | | | | | | | | | | | | | | | | | |

| | |
|-------------------------------|--|
| <code>%mix_NotXorSrc</code> | Pixel is the inverse of the XorSrc color. |
| <code>%mix_Nop</code> | Pixel remains unchanged. |
| <code>%mix_MergeNotSrc</code> | Pixel is a combination of the source color and the inverse of the pixel color. |
| <code>%mix_CopySrc</code> | Pixel is the source color (default). |
| <code>%mix_MergeSrcNot</code> | Pixel is a combination of the source color and the inverse of the pixel color. |
| <code>%mix_MergeSrc</code> | Pixel is a combination of the source color and the pixel color. |
| <code>%mix_Whiteness</code> | Pixel is always 1 (white). |

See also [GRAPHIC ATTACH](#), [GRAPHIC GET MIX](#)

GRAPHIC SET OVERLAP statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC SET OVERLAP statement New!

Purpose Enables or disables Graphic Overlap Mode.

Syntax `GRAPHIC SET OVERLAP [NumrExpr&]`

Remarks GRAPHIC SET OVERLAP enables or disables overlap mode for the graphic [target](#) which is currently attached to the [graphic stream](#). It has no effect on any other graphic target. If *NumrExpr&* is [true](#) (non-zero), overlap mode is enabled. If [false](#) (zero), wrap mode is disabled. If *NumrExpr&* is missing, the default is to enable Overlap Mode.

With Overlap Mode, you control how PowerBASIC treats

operations which involve a RECT structure in their definition. Windows graphic conventions consider the bottom and right coordinates of a RECT to be exclusive. In other words, the [pixels](#) at the bottom and right edges lie immediately outside the rectangle. They are not drawn, but are ignored. For example:

```
GRAPHIC BOX (0,0) - (50,50)
```

In this case, a box is drawn from 0,0 to 49,49. The final pixels at the bottom and right edge are simply not drawn. However, if Overlap Mode is enabled with GRAPHIC SET OVERLAP, the box is drawn from 0,0 to 50,50.

The Overlap Mode affects drawing operations involving [GRAPHIC SCALE](#), [GRAPHIC BOX](#), [GRAPHIC ELLIPSE](#), [GRAPHIC LINE](#), [GRAPHIC POLYLINE](#), etc.

See also [GRAPHIC GET OVERLAP](#)

GRAPHIC SET PIXEL statement

GRAPHIC SET PIXEL statement

Purpose Draw a single [pixel](#).

Syntax `GRAPHIC SET PIXEL [STEP] (x!, y!) [, rgbColor&]`

| | |
|-----------------|--|
| Remarks | The coordinate point is specified in Page Units . If the STEP option is included, the <i>x!</i> and <i>y!</i> coordinates are relative to the last point referenced (POS). |
| See also | Built In RGB Color Equates , GRAPHIC COLOR , GRAPHIC GET PIXEL , GRAPHIC SET BITS |

GRAPHIC SET POS statement

GRAPHIC SET POS statement

| | |
|-----------------|--|
| Purpose | Set the last point referenced (POS) for the selected graphic target . |
| Syntax | <code>GRAPHIC SET POS [STEP] (<i>x!</i>, <i>y!</i>)</code> |
| Remarks | The coordinate point is specified in Page Units . If the STEP option is included, the <i>x!</i> and <i>y!</i> coordinates are relative to the last point referenced (POS). |
| See also | GRAPHIC ATTACH , GRAPHIC CELL , GRAPHIC GET POS , GRAPHIC SCALE |

GRAPHIC SET SCROLLTEXT statement

Keyword Template

| |
|-----------------|
| Purpose |
| Syntax |
| Remarks |
| See also |
| Example |

GRAPHIC SET SCROLLTEXT statement New!

| | |
|-----------------|---|
| Purpose | Enables or disables Graphic ScrollText Mode. |
| Syntax | <code>GRAPHIC SET SCROLLTEXT [<i>NumrExpr&</i>]</code> |
| Remarks | <p>GRAPHIC SET SCROLLTEXT enables or disables scroll mode for the graphic target which is currently attached to the graphic stream. It has no effect on any other graphic target.</p> <p>If <i>NumrExpr&</i> is true (non-zero), ScrollText mode is enabled. If false (zero), the mode is disabled. If <i>NumrExpr&</i> is missing, the default is to enable ScrollText Mode.</p> <p>With ScrollText Mode, you can control how PowerBASIC prints text on a graphic target when it reaches the end of a page. Since a graphic target operates on a full page basis, the default is to ignore text which is printed past the end of the page.</p> <p>When ScrollText Mode is enabled, scrolling of a page is triggered only by GRAPHIC PRINT. If the POS (last point referenced) is located on the bottom row of the graphic target, and a GRAPHIC PRINT statement moves the POS off of the page, the entire contents of the graphic target is scrolled one row, and a new blank row is opened at the bottom.</p> |
| See also | GRAPHIC GET SCROLLTEXT , GRAPHIC SET AUTOSIZE , GRAPHIC SET VIRTUAL , GRAPHIC SET WORDWRAP , GRAPHIC SET WRAP |

GRAPHIC SET SIZE statement

Keyword Template

Purpose
Syntax
Remarks
See also
Example

GRAPHIC SET SIZE statement **New!**

Purpose Change the overall size of a graphic [control](#) or graphic [window](#).

Syntax `GRAPHIC SET SIZE nWide&, nHigh&`

Remarks Overall size may be larger than [client](#) size, depending on the type of borders used. The client area is the part inside the borders, while overall size includes the borders. A graphic [target](#) with a border will typically have a larger overall size than one without a border.

Beginning with this version of PowerBASIC, GRAPHIC CONTROLS may be resized with [CONTROL SET CLIENT](#), [GRAPHIC SET CLIENT](#), [CONTROL SET SIZE](#), and [GRAPHIC SET SIZE](#).

The original bitmap is copied, pixel for pixel, to the newly resized control. Any expanded area is filled with the current background [color](#). Your program draws to it in the normal fashion for a bitmap of the new size.

If a [clip](#) area had been established to create margins, it is reset. If [scaled](#) coordinates had been established, they are also reset, as neither would be appropriate for the altered size. You can enable these attributes again with [GRAPHIC SCALE](#) or [GRAPHIC SET CLIP](#), based upon the new size of the drawing area.

nWide&, nHigh& Integral numeric expressions which specify the desired size of the overall area. Width and height are specified in [pixels](#) or [dialog units](#), depending upon the system used at creation.

See also [CONTROL SET CLIENT](#), [CONTROL SET SIZE](#), [GRAPHIC GET SIZE](#), [GRAPHIC SET CLIENT](#),

GRAPHIC SET STRETCHMODE statement

Keyword Template

Purpose
Syntax
Remarks
See also
Example

GRAPHIC SET STRETCHMODE statement **New!**

Purpose Sets the default bitmap stretching mode for the current [DC](#).

Syntax `GRAPHIC SET STRETCHMODE ModeExpr`

Remarks There are several operations in PowerBASIC which involve stretching or condensing images on bitmaps, most notably [GRAPHIC STRETCH](#). As individual [pixels](#) must be added or removed, there is a good chance that the quality of the image will be degraded. However, if you describe the nature of the image by defining a StretchMode, you can

substantially enhance the appearance.

The default StretchMode is maintained individually for each DC. You can set the default mode with this statement, or retrieve it with [GRAPHIC GET STRETCHMODE](#). Of course, you can also override the default StretchMode when you execute one of the affected statements.

The 4 stretch mode equates are predefined in PowerBASIC.

| Equate | Value | Description |
|---------------|-------|---|
| %BLACKONWHITE | 1 | This is the default Windows stretch mode, and is most appropriate for monochrome bitmaps, or those with blocks of color. Performs a boolean OR of eliminated and existing pixels. It preserves black pixels at the expense of white pixels. |
| %WHITEONBLACK | 2 | Performs a boolean OR of eliminated and existing pixels. It preserves white pixels at the expense of black pixels. |
| %COLORONCOLOR | 3 | Deletes eliminated lines of pixels without trying to preserve their information. |
| %HALFTONE | 4 | This provides the highest quality for complex color bitmaps. The average color of the destination pixel block is kept approximately the same as the source pixel block. |

See also [GRAPHIC BITMAP LOAD](#), [GRAPHIC COPY](#), [GRAPHIC GET STRETCHMODE](#), [GRAPHIC RENDER](#), [GRAPHIC STRETCH](#)

GRAPHIC SET VIEW statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC SET VIEW statement New!

Purpose Changes the position of the viewport on a [virtual](#) graphic [target](#).

Syntax `GRAPHIC SET VIEW XPos, YPos`

Remarks Moves the position of the viewport to the new position on a virtual graphic target. The position is specified in [Page Units](#). If no graphic target has been attached, or no virtual window has been created, then no operation is performed.

See also [GRAPHIC GET VIEW](#), [GRAPHIC SET AUTOSIZE](#), [GRAPHIC SET VIRTUAL](#)

GRAPHIC SET VIRTUAL statement

Keyword Template

Purpose
Syntax
Remarks
See also
Example

GRAPHIC SET VIRTUAL statement New!

Purpose Expands a graphic [target](#) into virtual mode.

Syntax `GRAPHIC SET VIRTUAL nWidth&, nHeight& [,USERSIZE]`

Remarks VIRTUAL mode allows the attached graphic target ([control](#) or [window](#)) to display the contents of a larger virtual window. The physical size of the display area is not changed. Instead, the display area acts as a smaller [viewport](#), which can be moved around the larger virtual window to view one section at a time. The physical size of the display area is not changed. If the graphic target is a

, no operation is performed, as there would be no display area.

This statement may be used to change a target to VIRTUAL mode, or to change the sizes and UserSize option of an existing VIRTUAL target.

When executed, a new virtual bitmap of the specified height and width is created.

nWidth& and *nHeight&* are always specified in [Pixels](#) or [Dialog Units](#), depending upon the original window creation. The original bitmap is copied, pixel for pixel, at the existing size. Any expanded area is filled with the current background [color](#). Your program draws to it in the normal fashion for a bitmap of the new size. Scroll bars are added so the user can move the viewport to the desired section. The size of the viewport is not changed.

The graphic viewport is initially placed at the upper-left corner of the virtual window. If a [clip area](#) had been established to create margins, it is reset. If [scaled](#) coordinates had been established, they are also reset, as neither would be appropriate for the altered size.

You can enable these attributes again with [GRAPHIC SCALE](#) or [GRAPHIC SET CLIP](#), based upon the new size of the drawing area. You can retrieve the size of the virtual drawing area, at any time, with [GRAPHIC GET CANVAS](#).

The graphic viewport can be moved by clicking the scrollbars, or by moving the mouse wheel to alter the vertical position. Depressing the control key, along with the mouse wheel, alters the horizontal position. In addition, the cursor movement keys (Left, Right, Up, Down, PageUp, PageDown, Home, End) may also be used for this purpose.

VIRTUAL mode is quite similar to AUTOSIZE mode. Both create a virtual window which is the target of your drawing and text printing operations. The difference is the way in which they are displayed.

VIRTUAL displays a viewport, smaller than the virtual window, which can be moved to various positions. This allows the user to view one selected section at a time.

AUTOSIZE displays the entire virtual window, all of the time, by stretching or condensing it as needed.

If you add the USERSIZE option, an attached graphic window is displayed with a thick frame, which allows the user to "drag" the edges to a new size at any time. This option is not appropriate for a graphic control, and is ignored in that case.

Generally speaking, it is not advisable to enable [ScrollText](#) mode on a virtual graphic window, as the display may be confusing to the user.

See also [GRAPHIC GET CANVAS](#), [GRAPHIC GET VIEW](#), [GRAPHIC SET AUTOSIZE](#), [GRAPHIC SET FIXED](#), [GRAPHIC SET VIEW](#)

GRAPHIC SET WORDWRAP statement

GRAPHIC SET WORDWRAP statement **New!**

| | |
|-----------------|--|
| Purpose | Enables or disables Graphic WordWrap Mode. |
| Syntax | <code>GRAPHIC SET WORDWRAP [<i>NumrExpr</i>&]</code> |
| Remarks | <p>GRAPHIC SET WORDWRAP enables or disables WordWrap mode for the graphic target which is currently attached to the graphic stream. It has no effect on any other graphic target. If <i>NumrExpr</i>& is true (non-zero), WordWrap mode is enabled. If false (zero), wrap mode is disabled. If <i>NumrExpr</i>& is missing, the default is to enable WordWrap Mode.</p> <p>With WordWrap Mode, you can control how PowerBASIC prints text on a graphic target when it reaches the end of a line. Since a graphic target operates on a full page basis, the default is to ignore text which is printed past the end of the line.</p> <p>When WordWrap mode is enabled, it affects only GRAPHIC PRINT operations. If GRAPHIC PRINT attempts to display a word beyond the end of a row, the entire word is automatically wrapped to the first column of the next row.</p> |
| See also | GRAPHIC CELL , GRAPHIC GET WORDWRAP , GRAPHIC SET WORDWRAP , GRAPHIC SET WRAP , GRAPHIC SPLIT |

GRAPHIC SET WRAP statement

GRAPHIC SET WRAP statement **New!**

| | |
|-----------------|--|
| Purpose | Enables or disables Graphic Wrap Mode. |
| Syntax | <code>GRAPHIC SET WRAP [<i>NumrExpr</i>&]</code> |
| Remarks | <p>GRAPHIC SET WRAP enables or disables wrap mode for the graphic target which is currently attached to the graphic stream. It has no effect on any other graphic target. If <i>NumrExpr</i>& is true (non-zero), wrap mode is enabled. If false (zero), wrap mode is disabled. If <i>NumrExpr</i>& is missing, the default is to enable Wrap Mode.</p> <p>With Wrap Mode, you can control how PowerBASIC prints text on a graphic target when it reaches the end of a line. Since a graphic target operates on a full page basis, the default is to ignore text which is printed past the end of the line.</p> <p>When Wrap Mode is enabled, it affects only GRAPHIC PRINT operations. If GRAPHIC PRINT attempts to display a character beyond the end of a row, it is automatically wrapped to the first column of the next row.</p> |
| See also | GRAPHIC CELL , GRAPHIC GET WRAP , GRAPHIC PRINT , GRAPHIC SET SCROLLTEXT , GRAPHIC SET WORDWRAP , GRAPHIC SPLIT |

GRAPHIC SPLIT statement

Keyword Template

| |
|-----------------|
| Purpose |
| Syntax |
| Remarks |
| See also |
| Example |

GRAPHIC SPLIT statement **New!**

| | |
|-----------------|--|
| Purpose | Splits a string into two parts for display on a graphic target . |
| Syntax | <code>GRAPHIC SPLIT [WORD] <i>MainStr</i>, <i>Part1Len</i> TO <i>Part1Var</i>, <i>Part2Var</i></code> |
| Remarks | <p>Generally speaking, GRAPHIC SPLIT allows you to determine how much text will fit on a line (or a line section), so you don't overrun the end. This is critical with variable-width fonts. Since these text characters have different widths, you cannot rely on a simple character count.</p> <p>GRAPHIC SPLIT separates the <i>MainStr</i> string expression into two parts, which are then assigned to the two variables specified by <i>Part1Var</i> and <i>Part2Var</i>. The numeric expression <i>Part1Len</i> specifies the maximum width of the print field, using page units (pixels, dialog units, scaled units). After completion of GRAPHIC SPLIT, the <i>Part1Var</i> will contain those characters which can be safely displayed in the print field. The <i>Part2Var</i> will contain the remaining characters, which might be displayed on following lines.</p> <p>Since this operation creates a "line break" not contemplated in the original text, you may have to modify the results in order to obtain the best appearance. For example, it's usually best to remove any leading spaces from <i>Part2Var</i> before printing it.</p> <p>If the WORD option is included, PowerBASIC guarantees that <i>Part1Var</i> will not end on a partial word. This may require that <i>Part1Len</i> is adjusted to a smaller value. In that case, <i>Part2Var</i> would be assigned these characters to compensate.</p> |
| See also | GRAPHIC CELL , GRAPHIC PRINT , GRAPHIC SET SCROLLTEXT , GRAPHIC SET WORDWRAP , GRAPHIC SET WRAP , SPLIT |

GRAPHIC STRETCH statement

GRAPHIC STRETCH statement **IMPROVED**

| | | | | | | | |
|------------------|---|----------------|----------------------------|------------------|---|-----------------|---|
| Purpose | Copy and resize a bitmap to the selected graphic target . | | | | | | |
| Syntax | <code>GRAPHIC STRETCH <i>hBmp</i>, <i>ID</i>, (<i>x1</i>,<i>y1</i>)-(<i>x2</i>,<i>y2</i>) TO (<i>x3</i>,<i>y3</i>)-(<i>x4</i>,<i>y4</i>) [, <i>Mix</i>, <i>Stretch</i>]</code> <code>GRAPHIC STRETCH PAGE <i>hBmp</i>, <i>ID</i> [, <i>Mix</i>, <i>Stretch</i>]</code> | | | | | | |
| Remarks | <p>You can copy a complete bitmap, or a portion of it, to the selected graphic target, while resizing it to a larger or smaller size. The handle variable <i>hBmp</i> specifies the handle of the source bitmap, control, or window. The parameter <i>ID</i> is the control identifier (1 to 65535) assigned with the CONTROL_ADD GRAPHIC. <i>ID</i> must be zero (0) for a GRAPHIC WINDOW or a</p> <p>. The destination of the stretch operation is always the attached graphic target. The bitmap is automatically resized to fit the destination parameters. You must use care that your parameters are valid for the specified bitmap, or the result of the operation is undefined.</p> <p>The second form, GRAPHIC STRETCH PAGE, is a shortcut for copying a complete bitmap to the clip or client area of the selected graphic target. The image is automatically stretched or condensed to fit the target appropriately.</p> | | | | | | |
| Mix | <p>If the <i>Mix</i> parameter is included, it is one of the values in the following table. If not included, or the value zero (0), a default of %mix_CopySrc is presumed. There are 16 mix modes available to use for mixing drawing colors with the colors which already exist at the drawing location. The mix mode equates are predefined in PowerBASIC.</p> <table> <tr> <td>%mix_Blackness</td> <td>Pixel is always 0 (black).</td> </tr> <tr> <td>%mix_NotMergeSrc</td> <td>Pixel is the inverse of the MergeSrc color.</td> </tr> <tr> <td>%mix_MaskNotSrc</td> <td>Pixel is a combination of the colors common to both the pixel and</td> </tr> </table> | %mix_Blackness | Pixel is always 0 (black). | %mix_NotMergeSrc | Pixel is the inverse of the MergeSrc color. | %mix_MaskNotSrc | Pixel is a combination of the colors common to both the pixel and |
| %mix_Blackness | Pixel is always 0 (black). | | | | | | |
| %mix_NotMergeSrc | Pixel is the inverse of the MergeSrc color. | | | | | | |
| %mix_MaskNotSrc | Pixel is a combination of the colors common to both the pixel and | | | | | | |

| | |
|------------------|--|
| | the inverse of the source. |
| %mix_NotCopySrc | Pixel is the inverse of the pen color. |
| %mix_MaskSrcNot | Pixel is a combination of the colors common to both the source and the inverse of the pixel. |
| %mix_Not | Pixel is the inverse of the pixel color. |
| %mix_XorSrc | Pixel is a combination of the colors in the source and in the pixel, but not in both. |
| %mix_NotMaskSrc | Pixel is the inverse of the MaskSrc color. |
| %mix_MaskSrc | Pixel is a combination of the colors common to both the source and the pixel. |
| %mix_NotXorSrc | Pixel is the inverse of the XorSrc color. |
| %mix_Nop | Pixel remains unchanged. |
| %mix_MergeNotSrc | Pixel is a combination of the source color and the inverse of the pixel color. |
| %mix_CopySrc | Pixel is the source color (default). |
| %mix_MergeSrcNot | Pixel is a combination of the source color and the inverse of the pixel color. |
| %mix_MergeSrc | Pixel is a combination of the source color and the pixel color. |
| %mix_Whiteness | Pixel is always 1 (white). |

Stretch If the *stretch&* parameter is included, it is one of the values in the following table. If not included, or it is the value zero (0), the stretch mode is unchanged. An appropriate choice of stretch mode can substantially enhance the quality of bitmaps which are changed in size. The stretch mode equates are predefined in PowerBASIC.

| Equate | Value | Description |
|---------------|-------|---|
| %BLACKONWHITE | 1 | This is the default Windows stretch mode, and is most appropriate for monochrome bitmaps, or those with blocks of color. Performs a boolean OR of eliminated and existing pixels. It preserves black pixels at the expense of white pixels. |
| %WHITEONBLACK | 2 | Performs a boolean OR of eliminated and existing pixels. It preserves white pixels at the expense of black pixels. |
| %COLORONCOLOR | 3 | Deletes eliminated lines of pixels without trying to preserve their information. |
| %HALFTONE | 4 | This provides the highest quality for complex color bitmaps. The average color of the destination pixel block is kept approximately the same as the source pixel block. |

See also [GRAPHIC COPY](#), [GRAPHIC IMAGELIST](#), [GRAPHIC RENDER](#), [GRAPHIC SET STRETCHMODE](#)

GRAPHIC STYLE statement

GRAPHIC STYLE statement

Purpose Set the line style to be used by various statements in the selected [graphic target](#).

Syntax `GRAPHIC STYLE linestyle&`

Remarks The graphic target must first be selected with [GRAPHIC ATTACH](#). Due to limitations in the Windows graphics device interface (GDI), styles are only applied if the line width is set to 1, the default. If the line width is greater than 1, the style is interpreted as 0, solid.

Available line styles are:

- 0 Solid (default)
- 1 Dash
- 2 Dot
- 3 DashDot
- 4 DashDotDot

See also [GRAPHIC ARC](#), [GRAPHIC ATTACH](#), [GRAPHIC BOX](#), [GRAPHIC ELLIPSE](#), [GRAPHIC LINE](#), [GRAPHIC PIE](#), [GRAPHIC WIDTH](#)

Example ' Draw a square box with red, dotted lines
 GRAPHIC WIDTH 1
 GRAPHIC STYLE 2
 GRAPHIC BOX (10, 10) - (110, 110), 0, %RED

GRAPHIC TEXT SIZE statement

GRAPHIC TEXT SIZE statement

IMPROVED

Purpose Calculate the size of text to be [printed](#).

Syntax GRAPHIC TEXT SIZE *txt\$* TO *WidthVar!*, *HeightVar!*

Function Form:

WidthVar! = GRAPHIC(TEXT.SIZE.X, *txt\$*)

HeightVar! = GRAPHIC(TEXT.SIZE.Y, *txt\$*)

Remarks This statement calculates the total size of the printed text, based upon the current [font](#) for the [graphic target](#). The sizes returned are specified in [Page Units](#).

This allows you to easily calculate the appropriate print position, particularly when using a proportional font.

See also [FONT NEW](#), [GRAPHIC CELL](#), [GRAPHIC CELL SIZE](#), [GRAPHIC CHR SIZE](#), [GRAPHIC PRINT](#), [GRAPHIC SET FONT](#), [GRAPHIC SCALE](#), [GRAPHIC SET WORDWRAP](#), [GRAPHIC SET WRAP](#), [GRAPHIC SPLIT](#)

GRAPHIC WAITKEY\$ statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC WAITKEY\$ statement

IMPROVED

Purpose Reads a keyboard character or extended key, waiting until one is ready.

Syntax GRAPHIC WAITKEY\$ [TO *WaitVar\$*]
 GRAPHIC WAITKEY\$ ([*KeyMask\$*] [,*TimeOut&*]) [TO *WaitVar\$*]

Function Form:

WaitVar\$ = GRAPHIC\$(WAITKEY\$)

WaitVar\$ = GRAPHIC\$(WAITKEY\$, [*KeyMask\$*] [,*TimeOutVal&*])

Remarks Reads a character or extended key from the keyboard without echoing anything to the screen. If no data is available, GRAPHIC WAITKEY\$ will wait for an event to occur. It is very similar to GRAPHIC INKEY\$, except that it waits for input to be available. While

waiting, time slices are released to the operating system to reduce CPU load.

It returns a

of one or two characters if a key was pressed. If the TO clause is omitted, the keyboard character is discarded.

If the optional *KeyMask\$* expression is included, only a limited set of keys are recognized. *KeyMask\$* may include any number of Sub-Masks, one for each key to observe. For example, GRAPHIC WAITKEY\$("YyNn") will recognize upper-case or lower-case Y or N (for yes/no answers), while any other key will be ignored. If *KeyMask\$* is omitted, or evaluates to a zero-length string, any key event will be recognized.

If the optional *TimeOutVal&* expression is included, it tells the maximum number of milliseconds to wait for a key. GRAPHIC WAITKEY\$(5000) will wait a maximum of 5 seconds. The specified TimeOut period will only be approximate, so you should not rely upon precision accuracy. If the TimeOut period is exceeded, a zero-length string is returned. If the *TimeOutVal&* parameter is omitted, or evaluates to zero (0), it will wait an infinite length of time. The maximum *TimeOut&* permitted is one hour.

A string length of one (`LEN(i$) = 1`) means that a standard character key was pressed.

The result string contains the character. An `ASC()` value between 1 and 31 indicates a control code.

A string length of two (`LEN(i$) = 2`) means that an extended key was pressed. In this case, the first character in the result string has an `ASC()` value of zero (0), and the second is the extended keyboard scan code. For example, pressing the F1 key will return `CHR$(0, 59)`.

See also [GRAPHIC INKEY\\$](#), [GRAPHIC INPUT](#), [GRAPHIC INPUT FLUSH](#), [GRAPHIC INSTAT](#), [GRAPHIC LINE INPUT](#)

GRAPHIC WIDTH statement

GRAPHIC WIDTH statement

| | |
|-----------------|--|
| Purpose | Set the line width to be used by various statements in the selected graphic target . |
| Syntax | <code>GRAPHIC WIDTH <i>linewidth&</i></code> |
| Remarks | If line width is set to a value greater than 1 (default), the line style is always interpreted to be 0 (solid). |
| See also | GRAPHIC ARC , GRAPHIC BOX , GRAPHIC ELLIPSE , GRAPHIC LINE , GRAPHIC PIE , GRAPHIC STYLE |
| Example | <pre>' Draw a square box with red, thick lines GRAPHIC WIDTH 10 GRAPHIC BOX (10, 10) - (110, 110), 0, %RED</pre> |

GRAPHIC WINDOW statement

GRAPHIC WINDOW statement

IMPROVED

| | |
|----------------|---|
| Purpose | Creates a new standalone graphic window. |
| Syntax | <pre>GRAPHIC WINDOW NEW <i>Caption\$</i>, <i>x&</i>, <i>y&</i>, <i>nWidth&</i>, <i>nHeight&</i> [, <i>hFont</i>] TO <i>hWinVar</i> [, HIDE NORMALIZE] GRAPHIC WINDOW TEXT <i>Caption\$</i>, <i>x&</i>, <i>y&</i>, <i>nRows&</i>, <i>nColumns&</i> [, <i>hFont</i>] TO <i>hWinVar</i> [, HIDE NORMALIZE]</pre> |
| Remarks | A Graphic Window is a standalone window which is used to display most any form of text |

and graphics. After a graphic window has been created with this statement, [GRAPHIC ATTACH](#) would normally be used to choose it as the selected graphic target. However, if there is no selected graphic target at the time of creation, the new Graphic Window is automatically attached and selected. You can then draw text, [lines](#), [circles](#), and other forms with various statements.

[GRAPHIC WINDOW END](#) can be used to close and destroy the selected Graphic window at any time. Otherwise, the window is automatically destroyed when the program ends.

All PowerBASIC graphical displays are persistent -- they are automatically redrawn for you after resuming from being minimized or temporarily covered by other windows.

The TEXT option is used to create a window oriented more towards the display of text.

The size of the window is specified in rows and columns (rather than [pixels](#)), based upon the size of initial font -- the default font (MS Sans Serif, 8 point) or the optional initial font specified by the [Font](#) parameter. This does not limit the ability to display graphics, as every

function is still available. It simply makes it easier to create a window of the desired size. This option is best used with fonts which have a fixed width for each character (Courier, Lucida, etc.).

The parameter *Caption\$* contains the text to be displayed in the title or [caption](#) bar of the graphic window. If *caption\$* is empty (zero-length), the window is displayed without a title bar, so the appearance is different and the window cannot be dragged by the user.

The parameters *x&* and *y&* specify the location of the window, in pixels, relative to the upper left corner of the desktop.

The parameter *nWidth&* gives the width of the [client area](#) of the window, not including the frame. The width is specified in pixels.

The Parameter *nHeight&* gives the height of the client area of the window, not including the frame. The height is specified in pixels.

The parameter *hFont* specifies the handle of the initial font to be used in the GRAPHIC WINDOW. If this optional parameter is included, it is the handle of a font created with [FONT NEW](#). This parameter is particularly important when you use the TEXT option, as the size of the window is based upon the size of the initial font. If not included, the default font (MS Sans Serif, 8 point) is selected for you.

The [Long/DWord](#) variable *hWinVar* receives the handle of the newly created window. If the window could not be created, *hWinVar* is assigned the value zero (0).

The option words HIDE or NORMALIZE determine whether the window will be made visible immediately. You may wish to initially hide the window so you can first make additional changes to it, such as with the [GRAPHIC WINDOW STABILIZE](#) statement. If neither HIDE nor NORMALIZE is chosen, the default is to show it immediately.

A newly-created GRAPHIC WINDOW automatically receives the focus. That is, keyboard input is directed to the graphic window until it is closed, or you choose another focus target.

See also

[CONTROL ADD GRAPHIC](#), [GRAPHIC ATTACH](#), [GRAPHIC CELL](#), [GRAPHIC COLOR](#), [GRAPHIC DETACH](#), [GRAPHIC SET AUTOSIZE](#), [GRAPHIC SET CAPTION](#), [GRAPHIC SET CLIENT](#), [GRAPHIC SET CLIP](#), [GRAPHIC SET FIXED](#), [GRAPHIC SET FONT](#), [GRAPHIC SET LOC](#), [GRAPHIC SET OVERLAP](#), [GRAPHIC SET SCROLLTEXT](#), [GRAPHIC SET SIZE](#), [GRAPHIC SET STRETCHMODE](#), [GRAPHIC SET VIRTUAL](#), [GRAPHIC SET WORDWRAP](#), [GRAPHIC SET WRAP](#), [GRAPHIC WINDOW CLICK](#), [GRAPHIC WINDOW END](#), [GRAPHIC WINDOW HIDE](#), [GRAPHIC WINDOW MINIMIZE](#), [GRAPHIC WINDOW NONSTABLE](#), [GRAPHIC WINDOW NORMALIZE](#), [GRAPHIC WINDOW STABILIZE](#), [TXT pseudo-object](#)

Example

```
FUNCTION PBMAIN () AS LONG
  ' Create and show a Graphic window on screen
  LOCAL hWin AS DWORD
  GRAPHIC WINDOW "Box", 300, 300, 130, 130 TO hWin
```

```

GRAPHIC ATTACH hWin, 0
GRAPHIC BOX (10, 10) - (120, 120), 0, %BLUE
SLEEP 5000 ' show it for 5 seconds, then end
END FUNCTION

```

GRAPHIC WINDOW CLICK statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC WINDOW CLICK statement

Purpose Check whether a [GRAPHIC WINDOW](#) has been clicked with the mouse.

Syntax `GRAPHIC WINDOW CLICK [hwin&] TO click&, x!, y!`

hWin& [Handle](#) of the GRAPHIC WINDOW to check.

Remarks GRAPHIC WINDOW CLICK checks whether the specified GRAPHIC WINDOW has been clicked since the last time this statement was executed on this window. If so, the value one (1) is assigned to the *click&* variable for a single click, or two (2) for a double click. Also, the mouse position is assigned to *x!* and *y!*. If there has been no click, the value zero (0) is assigned to all three result variables.

In case of a double click, a *click&* value of one (1) is returned immediately after the first click, and a *click&* value of two (2) is also returned after the second click.

If the optional handle (*hwin&*) is omitted, the graphic window which is currently selected with [GRAPHIC.ATTACH](#) is used.

See also [GRAPHIC WINDOW](#)

GRAPHIC WINDOW END statement

GRAPHIC WINDOW END statement

Purpose Close and destroy a [graphic window](#).

Syntax `GRAPHIC WINDOW END [hWin]`

Remarks The GRAPHIC WINDOW identified by the handle *hWin* is closed and destroyed. If *hWin* is omitted, or is equal to zero (0), the currently [attached](#) graphic window is destroyed.

GRAPHIC WINDOW END can be used to close and destroy a graphic window at any time. Otherwise, the window is automatically destroyed when the program ends.

See also [GRAPHIC DETACH](#), [GRAPHIC WINDOW](#), [GRAPHIC WINDOW HIDE](#)

GRAPHIC WINDOW HIDE statement

Keyword Template

Purpose
 Syntax
 Remarks
 See also
 Example

GRAPHIC WINDOW HIDE statement **New!**

Purpose Make a [graphic window](#) invisible.

Syntax GRAPHIC WINDOW HIDE [*hWin*]

Remarks The GRAPHIC WINDOW identified by the [handle](#) *hWin* is made invisible. If *hWin* is omitted, or is equal to zero (0), the currently [attached](#) graphic window is made invisible.

See also [GRAPHIC WINDOW END](#), [GRAPHIC WINDOW MINIMIZE](#), [GRAPHIC WINDOW NONSTABLE](#), [GRAPHIC WINDOW NORMALIZE](#), [GRAPHIC WINDOW STABILIZE](#)

GRAPHIC WINDOW MINIMIZE statement

Keyword Template

Purpose
 Syntax
 Remarks
 See also
 Example

GRAPHIC WINDOW MINIMIZE statement **New!**

Purpose Minimize a [graphic window](#).

Syntax GRAPHIC WINDOW MINIMIZE [*hWin*]

Remarks The GRAPHIC WINDOW identified by the [handle](#) *hWin* is minimized. If *hWin* is omitted, or is equal to zero (0), the currently [attached](#) graphic window is minimized. You can restore the graphic window to its normal state with [GRAPHIC WINDOW NORMALIZE](#).

See also [GRAPHIC WINDOW HIDE](#), [GRAPHIC WINDOW NONSTABLE](#), [GRAPHIC WINDOW NORMALIZE](#), [GRAPHIC WINDOW STABILIZE](#)

GRAPHIC WINDOW NONSTABLE statement

Keyword Template

Purpose
 Syntax
 Remarks
 See also
 Example

GRAPHIC WINDOW NONSTABLE statement

New!

| | |
|-----------------|---|
| Purpose | Make a graphic window non-stable (closeable). |
| Syntax | GRAPHIC WINDOW NONSTABLE [<i>hWin</i>] |
| Remarks | The GRAPHIC WINDOW identified by the handle <i>hWin</i> is made non-stable, meaning that it can be closed by the user. If there is a system menu, the close option and the close box are enabled. The ALT-F4 close key is also enabled. This is the default mode of operation. If <i>hWin</i> is omitted, or is equal to zero (0), the currently attached graphic window is made non-stable. |
| See also | GRAPHIC WINDOW HIDE , GRAPHIC WINDOW MINIMIZE , GRAPHIC WINDOW NORMALIZE , GRAPHIC WINDOW STABILIZE |

GRAPHIC WINDOW NORMALIZE statement

Keyword Template

Purpose
Syntax
Remarks
See also
Example

GRAPHIC WINDOW NORMALIZE statement

New!

| | |
|-----------------|---|
| Purpose | Make a graphic window visible. |
| Syntax | GRAPHIC WINDOW NORMALIZE [<i>hWin</i>] |
| Remarks | The GRAPHIC WINDOW identified by the handle <i>hWin</i> is made visible. If <i>hWin</i> is omitted, or is equal to zero (0), the currently attached graphic window is made visible. |
| See also | GRAPHIC WINDOW HIDE , GRAPHIC WINDOW MINIMIZE , GRAPHIC WINDOW NONSTABLE , GRAPHIC WINDOW STABILIZE |

GRAPHIC WINDOW STABILIZE statement

Keyword Template

Purpose
Syntax
Remarks
See also
Example

GRAPHIC WINDOW STABILIZE statement **New!**

| | |
|-----------------|--|
| Purpose | Make a graphic window stabilized (non-closeable). |
| Syntax | <code>GRAPHIC WINDOW STABILIZE [<i>hWin</i>]</code> |
| Remarks | The GRAPHIC WINDOW identified by the handle <i>hWin</i> is stabilized, meaning that it cannot be closed by the user. If there is a system menu, the close option and the close box are grayed. The ALT-F4 close key is disabled. This allows you to be certain that your operations on the graphic window can be completed. When a graphic window is stabilized, only GRAPHIC WINDOW END or program termination will close it. |
| See also | GRAPHIC WINDOW END , GRAPHIC WINDOW HIDE , GRAPHIC WINDOW MINIMIZE , GRAPHIC WINDOW NONSTABLE , GRAPHIC WINDOW NORMALIZE |

GRAPHIC WINDOW TEXT statement

GRAPHIC WINDOW statement IMPROVED

| | |
|----------------|---|
| Purpose | Creates a new standalone graphic window. |
| Syntax | <pre>GRAPHIC WINDOW NEW <i>Caption</i>\$, <i>x</i>&, <i>y</i>&, <i>nWidth</i>&, <i>nHeight</i>& [,<i>hFont</i>] TO <i>hWinVar</i> [,HIDE NORMALIZE] GRAPHIC WINDOW TEXT <i>Caption</i>\$, <i>x</i>&, <i>y</i>&, <i>nRows</i>&, <i>nColumns</i>& [,<i>hFont</i>] TO <i>hWinVar</i> [,HIDE NORMALIZE]</pre> |
| Remarks | <p>A Graphic Window is a standalone window which is used to display most any form of text and graphics. After a graphic window has been created with this statement, GRAPHIC ATTACH would normally be used to choose it as the selected graphic target. However, if there is no selected graphic target at the time of creation, the new Graphic Window is automatically attached and selected. You can then draw text, lines, circles, and other forms with various statements.</p> <p>GRAPHIC WINDOW END can be used to close and destroy the selected Graphic window at any time. Otherwise, the window is automatically destroyed when the program ends.</p> <p>All PowerBASIC graphical displays are persistent -- they are automatically redrawn for you after resuming from being minimized or temporarily covered by other windows.</p> <p>The TEXT option is used to create a window oriented more towards the display of text. The size of the window is specified in rows and columns (rather than pixels), based upon the size of initial font -- the default font (MS Sans Serif, 8 point) or the optional initial font specified by the Font parameter. This does not limit the ability to display graphics, as every</p> <p>function is still available. It simply makes it easier to create a window of the desired size. This option is best used with fonts which have a fixed width for each character (Courier, Lucida, etc.).</p> <p>The parameter <i>Caption</i>\$ contains the text to be displayed in the title or caption bar of the graphic window. If <i>caption</i>\$ is empty (zero-length), the window is displayed without a title bar, so the appearance is different and the window cannot be dragged by the user.</p> <p>The parameters <i>x</i>& and <i>y</i>& specify the location of the window, in pixels, relative to the upper left corner of the desktop.</p> <p>The parameter <i>nWidth</i>& gives the width of the client area of the window, not including the frame. The width is specified in pixels.</p> <p>The Parameter <i>nHeight</i>& gives the height of the client area of the window, not including the frame. The height is specified in pixels.</p> <p>The parameter <i>hFont</i> specifies the handle of the initial font to be used in the GRAPHIC WINDOW. If this optional parameter is included, it is the handle of a font created with FONT NEW. This parameter is particularly important when you use the TEXT option, as the size of the window is based upon the size of the initial font. If not included, the default font (MS Sans Serif, 8 point) is selected for you.</p> |

The [Long/DWord](#) variable *hWinVar* receives the handle of the newly created window. If the window could not be created, *hWinVar* is assigned the value zero (0).

The option words HIDE or NORMALIZE determine whether the window will be made visible immediately. You may wish to initially hide the window so you can first make additional changes to it, such as with the [GRAPHIC WINDOW STABILIZE](#) statement. If neither HIDE nor NORMALIZE is chosen, the default is to show it immediately.

A newly-created GRAPHIC WINDOW automatically receives the focus. That is, keyboard input is directed to the graphic window until it is closed, or you choose another focus target.

See also

[CONTROL ADD GRAPHIC](#), [GRAPHIC ATTACH](#), [GRAPHIC CELL](#), [GRAPHIC COLOR](#), [GRAPHIC DETACH](#), [GRAPHIC SET AUTOSIZE](#), [GRAPHIC SET CAPTION](#), [GRAPHIC SET CLIENT](#), [GRAPHIC SET CLIP](#), [GRAPHIC SET FIXED](#), [GRAPHIC SET FONT](#), [GRAPHIC SET LOC](#), [GRAPHIC SET OVERLAP](#), [GRAPHIC SET SCROLLTEXT](#), [GRAPHIC SET SIZE](#), [GRAPHIC SET STRETCHMODE](#), [GRAPHIC SET VIRTUAL](#), [GRAPHIC SET WORDWRAP](#), [GRAPHIC SET WRAP](#), [GRAPHIC WINDOW CLICK](#), [GRAPHIC WINDOW END](#), [GRAPHIC WINDOW HIDE](#), [GRAPHIC WINDOW MINIMIZE](#), [GRAPHIC WINDOW NONSTABLE](#), [GRAPHIC WINDOW NORMALIZE](#), [GRAPHIC WINDOW STABILIZE](#), [TXT pseudo-object](#)

Example

```
FUNCTION PBMAIN () AS LONG
  ' Create and show a Graphic window on screen
  LOCAL hWin AS DWORD
  GRAPHIC WINDOW "Box", 300, 300, 130, 130 TO hWin
  GRAPHIC ATTACH hWin, 0
  GRAPHIC BOX (10, 10) - (120, 120), 0, %BLUE
  SLEEP 5000 ' show it for 5 seconds, then end
END FUNCTION
```

GUID\$ function

GUID\$ function

Purpose Return a 16-byte (128-bit) Globally Unique Identifier ([GUID](#)) or Universally Unique Identifier (UUID) binary

Syntax

```
id$ = GUID$[()]
id$ = GUID$(guidtext$)
```

Remarks The GUID\$ function, with no parameter (or a null, zero-length string parameter) will return a new, unique 16-byte string GUID (Globally Unique Identifier). This GUID may be used as a new [class](#) identifier or an [interface](#) identifier, or for some other purpose where a unique identifier may be required, such as for a one-time encryption key.

If *guidtext\$* is specified, GUID\$ examines a text string, and converts the first standard format, human-readable GUID it finds, and returns a 16-byte binary string. This 16-byte string contains the internal GUID representation as a 128-bit data item.

To be valid, the GUID string in *guidtext\$* string must contain exactly 32 hexadecimal digits, optionally delimited by spaces or hyphens, but which must be enclosed overall by curly braces. For example: "{01234567-89AB-CDEF-FEDC-BA9876543210}".

The GUID\$ function is the logical complement to the [GUIDTXT\\$](#) function.

id\$ The return string may be assigned to a [dynamic string](#), or a [fixed-length string](#) of at least 16 bytes, or (typically) a [GUID](#) variable. See [DIM](#) for more information on creating GUID variables.

Restrictions If any errors are encountered, GUID\$ returns a null (zero-length) string instead of the 16-byte GUID string. GUID\$ can also be used in string equate assignments provided an explicit human-readable GUIDTXT\$ argument string is assigned. For example:

```
$AppGuid = GUID$("{01234567-89AB-CDEF-FEDC-BA9876543210}")
```

See also [DIM](#), [CLSIDs](#), [GUIDTXT\\$](#), [How are GUID's used with objects?](#), [INTERFACE \(Direct\)](#), [INTERFACE \(IDBind\)](#), [ISINTERFACE](#), [ISNOTHING](#), [ISOBJECT](#), [Just what is COM?](#), [LET \(with Objects\)](#), [OBJECT](#), [OBJECTIVE](#), [OBJPTR](#), [OBJRESULT](#), [PROGID\\$](#), [What is an object, anyway?](#)

Example

```
DIM oID1 AS GUID, oID2 AS GUID
oID1 = GUID$("{01234567-89AB-CDEF-FEDC-BA9876543210}")
oID2 = GUID$("The GUID we need is shown as
{0123456789ABCDEF-FEDCBA9876543210}")
```

GUIDTXT\$ function

GUIDTXT\$ function

Purpose Return a 38-byte human-readable Globally Unique Identifier ([GUID](#)) or Universally Unique Identifier (UUID) string from a 16-byte GUID

Syntax `id$ = GUIDTXT$(guid16$)`

Remarks The GUIDTXT\$ function takes a string parameter *guid16\$* that must be exactly 16-bytes long (and represents a 128-bit GUID string), and returns a 38-byte GUID text string. *guid16\$* is usually a GUID variable but may also be a [dynamic](#) or [fixed-length](#) string, etc.

The GUIDTXT\$ function is the logical complement to the [GUID\\$](#) function.

Restrictions If any errors are encountered, GUIDTXT\$ returns a null (zero-length) string instead of the 38-byte GUID text string.

See also [DIM](#), [CLSIDs](#), [GUID\\$](#), [INTERFACE \(Direct\)](#), [INTERFACE \(IDBind\)](#), [ISINTERFACE](#), [ISNOTHING](#), [ISOBJECT](#), [LET \(with Objects\)](#), [OBJECT](#), [OBJECTIVE](#), [OBJPTR](#), [OBJRESULT](#), [PROGID\\$](#), [What is an object, anyway?](#)

Example

```
oID1$ = GUID$("{01234567-89AB-CDEF-FEDC-BA9876543210}")
oID2$ = GUIDTXT$(oID1$)
```

HEADER GET COUNT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

HEADER statement New!

Purpose Manipulate a HEADER control in order to set/retrieve data.

Syntax `HEADER SEND hWin, ID&, Msg&, wParam&, lParam& [TO ResultVar&]`

hWin [Handle](#) of the window that owns the Header.

ID& The Header control [identifier](#).

Msg& The [message](#) you want to send to the Header.

wParam& The first message parameter (message dependent).

| | |
|--------------------|---|
| <i>lParam</i> & | The second message parameter (message dependent). |
| <i>ResultVar</i> & | Variable which receives the message return value. |
| Remarks | <p>The HEADER statement is used to communicate with a HEADER control to set or retrieve various types of data. While you may create a custom header control for your own purposes, the most common usage is to communicate with the HEADER control which is embedded in every LISTVIEW control.</p> <p>To communicate with a LISTVIEW HEADER, use the LISTVIEW_GET_HEADERID to get the values for the <i>hWin</i> and <i>ID</i>& parameters. Otherwise, those parameters would be assigned as with any other control.</p> |

HEADER GET COUNT *hWin, ID*& TO *CountVar*&

Retrieves the count of the items in a header control. If the operation was successful, the count value is assigned to the variable specified by *CountVar*&. If the operation failed, the value -1 is assigned to *CountVar*& instead.

HEADER GET ITEM *hWin, ID*&, *Index*&, *ItemPtr* [TO *ResultVar*&]

Retrieves an [HD_Item](#) structure which describes an item in a Header Control. *Index*& defines the item to be retrieved (1=first, 2=second, etc.). *ItemPtr* is the address of an HD_Item structure to be filled. If the operation succeeds, true is assigned to the variable specified by *ResultVar*&. If it fails, false is assigned instead.

HEADER SEND *hWin, ID*&, *Msg*&, *wParam*&, *lParam*& [TO *ResultVar*&]

A window message specified by *Msg*& is sent to the HEADER control, along with message dependent parameters (if any). If a result is returned, it is assigned to the variable specified by *ResultVar*&.

HEADER SET ITEM *hWin, ID*&, *Index*&, *ItemPtr* [TO *ResultVar*&]

Sets the attributes of the specified item in a Header Control. *Index*& defines the item to be set (1=first, 2=second, etc.). *ItemPtr* is the address of an HD_Item structure which defines the attributes. If the operation succeeds, true is assigned to the variable specified by *ResultVar*&. If it fails, false is assigned instead.

See also [LISTVIEW](#)

HEADER GET ITEM statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

HEADER statement New!

Purpose Manipulate a HEADER control in order to set/retrieve data.

Syntax `HEADER SEND hWin, ID&, Msg&, wParam&, lParam& [TO ResultVar&]`

hWin [Handle](#) of the window that owns the Header.

ID& The Header control [identifier](#).

| | |
|-----------------------|---|
| <i>Msg&</i> | The message you want to send to the Header. |
| <i>wParam&</i> | The first message parameter (message dependent). |
| <i>lParam&</i> | The second message parameter (message dependent). |
| <i>ResultVar&</i> | Variable which receives the message return value. |
| Remarks | <p>The HEADER statement is used to communicate with a HEADER control to set or retrieve various types of data. While you may create a custom header control for your own purposes, the most common usage is to communicate with the HEADER control which is embedded in every LISTVIEW control.</p> <p>To communicate with a LISTVIEW HEADER, use the LISTVIEW_GET_HEADERID to get the values for the <i>hWin</i> and <i>ID&</i> parameters. Otherwise, those parameters would be assigned as with any other control.</p> |

HEADER GET COUNT *hWin, ID& TO CountVar&*

Retrieves the count of the items in a header control. If the operation was successful, the count value is assigned to the variable specified by *CountVar&*. If the operation failed, the value -1 is assigned to *CountVar&* instead.

HEADER GET ITEM *hWin, ID&, Index&, ItemPtr [TO ResultVar&]*

Retrieves an [HD_Item](#) structure which describes an item in a Header Control. *Index&* defines the item to be retrieved (1=first, 2=second, etc.). *ItemPtr* is the address of an HD_Item structure to be filled. If the operation succeeds, true is assigned to the variable specified by *ResultVar&*. If it fails, false is assigned instead.

HEADER SEND *hWin, ID&, Msg&, wParam&, lParam& [TO ResultVar&]*

A window message specified by *Msg&* is sent to the HEADER control, along with message dependent parameters (if any). If a result is returned, it is assigned to the variable specified by *ResultVar&*.

HEADER SET ITEM *hWin, ID&, Index&, ItemPtr [TO ResultVar&]*

Sets the attributes of the specified item in a Header Control. *Index&* defines the item to be set (1=first, 2=second, etc.). *ItemPtr* is the address of an HD_Item structure which defines the attributes. If the operation succeeds, true is assigned to the variable specified by *ResultVar&*. If it fails, false is assigned instead.

See also [LISTVIEW](#)

HEADER SEND statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

HEADER statement New!

Purpose Manipulate a HEADER control in order to set/retrieve data.

Syntax `HEADER SEND hWin, ID&, Msg&, wParam&, lParam& [TO ResultVar&]`

| | |
|-----------------------|---|
| <i>hWin</i> | Handle of the window that owns the Header. |
| <i>ID&</i> | The Header control identifier . |
| <i>Msg&</i> | The message you want to send to the Header. |
| <i>wParam&</i> | The first message parameter (message dependent). |
| <i>lParam&</i> | The second message parameter (message dependent). |
| <i>ResultVar&</i> | Variable which receives the message return value. |
| Remarks | <p>The HEADER statement is used to communicate with a HEADER control to set or retrieve various types of data. While you may create a custom header control for your own purposes, the most common usage is to communicate with the HEADER control which is embedded in every LISTVIEW control.</p> <p>To communicate with a LISTVIEW HEADER, use the LISTVIEW_GET_HEADERID to get the values for the <i>hWin</i> and <i>ID&</i> parameters. Otherwise, those parameters would be assigned as with any other control.</p> |

HEADER GET COUNT *hWin, ID& TO CountVar&*

Retrieves the count of the items in a header control. If the operation was successful, the count value is assigned to the variable specified by *CountVar&*. If the operation failed, the value -1 is assigned to *CountVar&* instead.

HEADER GET ITEM *hWin, ID&, Index&, ItemPtr [TO ResultVar&]*

Retrieves an [HD_Item](#) structure which describes an item in a Header Control. *Index&* defines the item to be retrieved (1=first, 2=second, etc.). *ItemPtr* is the address of an HD_Item structure to be filled. If the operation succeeds, true is assigned to the variable specified by *ResultVar&*. If it fails, false is assigned instead.

HEADER SEND *hWin, ID&, Msg&, wParam&, lParam& [TO ResultVar&]*

A window message specified by *Msg&* is sent to the HEADER control, along with message dependent parameters (if any). If a result is returned, it is assigned to the variable specified by *ResultVar&*.

HEADER SET ITEM *hWin, ID&, Index&, ItemPtr [TO ResultVar&]*

Sets the attributes of the specified item in a Header Control. *Index&* defines the item to be set (1=first, 2=second, etc.). *ItemPtr* is the address of an HD_Item structure which defines the attributes. If the operation succeeds, true is assigned to the variable specified by *ResultVar&*. If it fails, false is assigned instead.

See also [LISTVIEW](#)

HEADER SET ITEM statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

HEADER statement **New!**

| | |
|-----------------------|---|
| Purpose | Manipulate a HEADER control in order to set/retrieve data. |
| Syntax | <code>HEADER SEND <i>hWin</i>, <i>ID&</i>, <i>Msg&</i>, <i>wParam&</i>, <i>lParam&</i> [TO <i>ResultVar&</i>]</code> |
| <i>hWin</i> | Handle of the window that owns the Header. |
| <i>ID&</i> | The Header control identifier . |
| <i>Msg&</i> | The message you want to send to the Header. |
| <i>wParam&</i> | The first message parameter (message dependent). |
| <i>lParam&</i> | The second message parameter (message dependent). |
| <i>ResultVar&</i> | Variable which receives the message return value. |
| Remarks | <p>The HEADER statement is used to communicate with a HEADER control to set or retrieve various types of data. While you may create a custom header control for your own purposes, the most common usage is to communicate with the HEADER control which is embedded in every LISTVIEW control.</p> <p>To communicate with a LISTVIEW HEADER, use the LISTVIEW_GET_HEADERID to get the values for the <i>hWin</i> and <i>ID&</i> parameters. Otherwise, those parameters would be assigned as with any other control.</p> |

HEADER GET COUNT *hWin*, *ID&* TO *CountVar&*

Retrieves the count of the items in a header control. If the operation was successful, the count value is assigned to the variable specified by *CountVar&*. If the operation failed, the value -1 is assigned to *CountVar&* instead.

HEADER GET ITEM *hWin*, *ID&*, *Index&*, *ItemPtr* [TO *ResultVar&*]

Retrieves an [HD_Item](#) structure which describes an item in a Header Control. *Index&* defines the item to be retrieved (1=first, 2=second, etc.). *ItemPtr* is the address of an HD_Item structure to be filled. If the operation succeeds, true is assigned to the variable specified by *ResultVar&*. If it fails, false is assigned instead.

HEADER SEND *hWin*, *ID&*, *Msg&*, *wParam&*, *lParam&* [TO *ResultVar&*]

A window message specified by *Msg&* is sent to the HEADER control, along with message dependent parameters (if any). If a result is returned, it is assigned to the variable specified by *ResultVar&*.

HEADER SET ITEM *hWin*, *ID&*, *Index&*, *ItemPtr* [TO *ResultVar&*]

Sets the attributes of the specified item in a Header Control. *Index&* defines the item to be set (1=first, 2=second, etc.). *ItemPtr* is the address of an HD_Item structure which defines the attributes. If the operation succeeds, true is assigned to the variable specified by *ResultVar&*. If it fails, false is assigned instead.

See also [LISTVIEW](#)

HEX\$ function

HEX\$ function

IMPROVED

| | |
|----------------|--|
| Purpose | Convert an integral value to a hexadecimal |
| Syntax | <code>s\$ = HEX\$(<i>IntVal</i> [, <i>Digits</i> [, <i>LeadSpaces</i> [, <i>TrailSpaces</i>]])</code> |
| Remarks | <i>IntVal</i> is a numeric expression in the range of a 64-bit Quad Integer (-9223372036854775808 to +9223372036854775807). Any fractional part of the value is rounded. The result string is always formatted as an integral number using all the |

significant digits in *IntVal*. It is never expressed in scientific notation.

If *Digits* is 0 (or not given), no leading characters will be added to the numeric field. If *Digits* is a positive number greater than 0, the result string will be prepended with leading zeros to achieve the desired length. If *Digits* is a negative number, leading spaces are added to reach the absolute length. *Digits* may be in the range of -16 to +16.

LeadSpaces specifies additional leading spaces to be prepended, regardless of the length of the numeric portion of the string.

TrailSpaces specifies additional trailing spaces to be appended to the end of the string.

See also [BIN\\$](#), [DEC\\$](#), [FORMAT\\$](#), [OCT\\$](#), [STR\\$](#), [TRIM\\$](#), [USING\\$](#), [VAL](#)

HI function

HI function

Purpose Extract the most significant (high-order) portion of an value.

Syntax `result = HI(DataType, value)`

Remarks The value returned by HI is unsigned if *DataType* is [BYTE](#), [WORD](#), or [DWORD](#), and signed if *DataType* is [INTEGER](#) or [LONG](#). *value* may be up to twice the size of the data type specified by *DataType*. In the following example, *n* may be up to a 16-bit value (twice the size of a BYTE):

```
b = HI(BYTE,n)
```

Restrictions HI replaces HIBYT, HIWRD, and HIINT. Note that those functions are no longer supported, so update your code to use the new syntax.

See also [LO](#), [MAK](#)

HOST ADDR statement

HOST ADDR statement

Purpose Translate a host name into a corresponding [IP](#) address.

Syntax `HOST ADDR [hostname$] TO ip&`
`HOST ADDR(index&) TO ip&`

Remarks *hostname\$* is the name of a computer on the network or a domain name such as "powerbasic.com". If *hostname\$* is zero-length or not specified, the primary IP address of the current computer is returned.

ip& receives the IP address of the specified host name. *ip&* may be a [REGISTER](#) or memory [variable](#).

It is possible for a computer to have more than one IP address. For example, if you have a network card in your computer, and you are dialed into the Internet using a modem, your computer will have two IP addresses. By using the indexed form of the statement:

```
HOST ADDR(index&) TO ip&
```

...you can retrieve the first IP address with *index&* = 1, the second with *index&* = 2, etc. If, on return, *ip&* contains zero (0), there are no further IP addresses to retrieve on that computer.

A numeric IP address can be easily converted to a dotted IP address

with the following code:

```
DIM p AS BYTE PTR
HOST ADDR "localhost" TO ip&
```

```
p = VARPTR(ip&)
a$ = USING$("#_#_#_#", @p, @p[1], @p[2], @p[3])
' returns "127.0.0.1"
```

Restrictions In order to obtain the IP address of the current computer, you must have at least one socket open, or you must first obtain the name of the computer by using the [HOST NAME](#) statement.

See also [HOST NAME](#), [TCP and UDP Communications](#), [TCP_OPEN](#), [UDP_OPEN](#)

Example HOST ADDR "powerbasic.com" TO ip& ' Primary IP

```
FUNCTION HowManyIPs() AS LONG
  DIM p AS BYTE PTR
  RESET index&
  DO
    HOST ADDR(index&+1) TO ip&
    IF ISTRUE ip& THEN
      INCR index&
      p = VARPTR(ip&)
      a$ = USING$("#_#_#_#", @p, @p[1], @p[2], @p[3])
    END IF
  LOOP UNTIL ip& = 0
  FUNCTION = index&
END FUNCTION
```

HOST NAME statement

HOST NAME statement

Purpose Translate an [IP](#) address into a corresponding host name.

Syntax HOST NAME [*ip&*] TO *hostname\$*

Remarks *ip&* is the IP address you want to look up. If *ip&* is zero (0) or not specified, the name of the current computer is returned. *hostname\$* receives the name of the host corresponding to the IP address.

In order to translate an IP address into an Internet domain name, your computer will need to be connected to a DNS server on the Internet or local Intranet.

See also [HOST ADDR](#), [TCP and UDP Communications](#), [TCP_OPEN](#), [UDP_OPEN](#)

Example HOST ADDR "powerbasic.com" TO ip&
HOST NAME ip& TO hostname\$
CALL ShowResult(hostname\$, ip&)

IDISPINFO pseudo-object

Keyword Template

Purpose

Syntax

Remarks

See also

Example

IDISPINFO pseudo-object

Purpose Sets and returns additional information about certain [Dispatch](#) Status Codes for the [OBJRESULT](#) function.

Syntax

```

info& = IDISPINFO.CODE
info& = IDISPINFO.CONTEXT
info$ = IDISPINFO.DESC$
info$ = IDISPINFO.HELP$
info$ = IDISPINFO.SOURCE$
IDISPINFO.CLEAR
IDISPINFO.SET code& [, source$, desc$, help$, context&]

```

Remarks **GET Properties**

| | | | | | | | | | | | | | | | | | | | | | |
|--------------------|--|---------------|---------------|------------|---------------|----------------|---------------|------------|---------------|----------|---------------|---------|---------------|-----------------|---------------|-----------|---------------|----------------|---------------|---------------|---------------|
| IDISPINFO.CODE | <p>When OBJRESULT is %DISP_E_EXCEPTION, this Get Property returns a long integer value which represents a more specific error code. If the value is less than 65536, it is known as a WCODE, which is usually defined by the application when found in 32-bit or 64-bit Windows. Much more common are the larger values known as an SCODE. These are usually defined by Windows, although application defined values are allowed. The most common are:</p> <table border="0" style="margin-left: 40px;"> <tr><td>%E_UNEXPECTED</td><td>= &H8000FFFF&</td></tr> <tr><td>%E_NOTIMPL</td><td>= &H80004001&</td></tr> <tr><td>%E_NOINTERFACE</td><td>= &H80004002&</td></tr> <tr><td>%E_POINTER</td><td>= &H80004003&</td></tr> <tr><td>%E_ABORT</td><td>= &H80004004&</td></tr> <tr><td>%E_FAIL</td><td>= &H80004005&</td></tr> <tr><td>%E_ACCESSDENIED</td><td>= &H80070005&</td></tr> <tr><td>%E_HANDLE</td><td>= &H80070006&</td></tr> <tr><td>%E_OUTOFMEMORY</td><td>= &H8007000E&</td></tr> <tr><td>%E_INVALIDARG</td><td>= &H80070057&</td></tr> </table> | %E_UNEXPECTED | = &H8000FFFF& | %E_NOTIMPL | = &H80004001& | %E_NOINTERFACE | = &H80004002& | %E_POINTER | = &H80004003& | %E_ABORT | = &H80004004& | %E_FAIL | = &H80004005& | %E_ACCESSDENIED | = &H80070005& | %E_HANDLE | = &H80070006& | %E_OUTOFMEMORY | = &H8007000E& | %E_INVALIDARG | = &H80070057& |
| %E_UNEXPECTED | = &H8000FFFF& | | | | | | | | | | | | | | | | | | | | |
| %E_NOTIMPL | = &H80004001& | | | | | | | | | | | | | | | | | | | | |
| %E_NOINTERFACE | = &H80004002& | | | | | | | | | | | | | | | | | | | | |
| %E_POINTER | = &H80004003& | | | | | | | | | | | | | | | | | | | | |
| %E_ABORT | = &H80004004& | | | | | | | | | | | | | | | | | | | | |
| %E_FAIL | = &H80004005& | | | | | | | | | | | | | | | | | | | | |
| %E_ACCESSDENIED | = &H80070005& | | | | | | | | | | | | | | | | | | | | |
| %E_HANDLE | = &H80070006& | | | | | | | | | | | | | | | | | | | | |
| %E_OUTOFMEMORY | = &H8007000E& | | | | | | | | | | | | | | | | | | | | |
| %E_INVALIDARG | = &H80070057& | | | | | | | | | | | | | | | | | | | | |
| IDISPINFO.CONTEXT | <p>When OBJRESULT is %DISP_E_EXCEPTION, this Get Property returns a long integer value which is the context of the topic within the help file (IDISPINFO.HELP\$). This property is only valid if IDISPINFO.HELP returns a valid string.</p> | | | | | | | | | | | | | | | | | | | | |
| IDISPINFO.DESC\$ | <p>When OBJRESULT is %DISP_E_EXCEPTION, this Get Property returns a string containing a textual, human-readable description of the status. It is intended to be read by the customer. If no description is available, a null, zero-length string is returned.</p> | | | | | | | | | | | | | | | | | | | | |
| IDISPINFO.HELP\$ | <p>When OBJRESULT is %DISP_E_EXCEPTION, this Get Property returns a string containing drive, path, and filename of a Help File with more information about this particular status code. If no help is available, a null, zero-length string is returned.</p> | | | | | | | | | | | | | | | | | | | | |
| IDISPINFO.PARAM | <p>When OBJRESULT is either %DISP_E_PARAMNOTFOUND or %DISP_E_TYPERISMATCH, this Get Property returns a long integer value which represents the parameter number of the first parameter which failed to match the requirements needed. The value is indexed to zero, which is the standard numbering convention for Dispatch parameters. The first parameter is 0, the second is 1, and so on.</p> | | | | | | | | | | | | | | | | | | | | |
| IDISPINFO.SOURCE\$ | <p>When OBJRESULT is %DISP_E_EXCEPTION, this Get Property returns a string containing a textual, human-readable description of the source of the exception. Typically, this will be the application name. If no source is available, a null, zero-length string is returned.</p> | | | | | | | | | | | | | | | | | | | | |

SET Properties

| | |
|-----------------|--|
| IDISPINFO.CLEAR | Clears all properties which may have been set by prior execution of IDISPINFO.SET in this thread. |
| IDISPINFO.SET | This statement may be executed in a METHOD or PROPERTY on a Dual Interface, so that the calling code can obtain additional information about Dispatch exception conditions. These five data items are passed back to the caller in the EXCEPINFO structure, so that they can be retrieved with IDISPINFO GET Properties, or other functions in other programming languages. This data is only available when using the Dispatch interface. It is unavailable to Direct Methods . The first parameter (<i>code&</i>) is required, and must be identical to the value which you return with METHOD OBJRESULT or PROPERTY OBJRESULT. The actual OBJRESULT will then be changed to %DISP_E_EXCEPTION, so that the caller will know that this data must also be retrieved. Note that the last four parameters are optional. |

Restrictions You should only execute the GET PROPERTY methods listed above when OBJRESULT returns the specified status code. In any other case, IDISPINFO Get Properties will return zero or a null string.

See also [OBJECT](#), [OBJRESULT](#), [OBJRESULT\\$](#), [What is an object, anyway?](#), [What is DISPATCH?](#)

Example IDISPINFO.SET &H80004040, "MyApp", "Valve stem error","C:\Help.chm", 1773

IF statement

IF statement

Purpose Test a condition and execute one or more program statements only if the condition is met.

Syntax `IF integer_expression THEN {sub | label | statements} [ELSE {sub | label | statements}]`

Remarks If *integer_expression* is [TRUE](#) (evaluates to a non-zero value), the statements following THEN are executed, and the statements following the optional ELSE are not executed. If *integer_expression* is [FALSE](#) (zero), the statements following THEN are not executed, and the statements following the optional ELSE are executed. If the ELSE clause is omitted, execution continues with the next line of the program, provided *integer_expression* evaluates to FALSE.

integer_expression will often be a result returned by a [relational operator](#) as shown here:

```
IF Income > Expenses THEN x$ = "OK!" ELSE x$ = "Uh-oh"
```

integer_expression can also be a boolean value. For example, your program could set the variable *BeepOn* to 1 (or any non-zero value) if audible beeps are requested, and to 0 if not, then use an IF statement to control output:

```
IF BeepOn THEN BEEP
```

...is equivalent to:

```
IF BeepOn <> 0 THEN BEEP
```

integer_expression can include the logical operators [AND](#) and [OR](#), as in:

```
IF (a = b) AND (c = d) THEN x$ = "They are equal"
```

label If a *label* is specified, the label must appear within the same [Sub](#), [Function](#), [Method](#), or [Property](#) as the IF statement. The GOTO keyword is implied by THEN, or can replace THEN:

```
IF EOF(1) THEN GotFile
```

```
proc IF EOF(1) GOTO GotFile
```

If *proc* is specified, it must identify a Sub, Function, Method, or Property.

The IF statement and all its associated statements, including those after an ELSE, must appear on the same logical program line. The following is therefore illegal:

```
IF a < b THEN t = 15 : u = 16 : v = 17
ELSE t = 17 : u = 16 : v = 15
```

...because the compiler treats the ELSE statement as a brand-new statement unrelated to the one above it. If you have more statements than you can fit on one line, you can use the [line continuation](#) character, the underscore "_", to spread a single logical line over several physical lines. For example, the following is a legal way of restating the last example:

```
IF a < b THEN t = 15 : u = 16 : v = 17 _
ELSE t = 17 : u = 16 : v = 15
```

A better method of programming long and complex IF/THEN constructs is to use the [IF block](#) statement.

Also note that every statement following the ELSE will be executed if *integer_expression* is FALSE. For example, you might expect the following statement:

```
Taxable = %TRUE
Price = 1.00
Rate = .05
Total = 5.00
IF Taxable THEN Tax = Price * Rate ELSE Tax = 0: Total = Total + Tax
```

...to bring *Total* to 5.05, but it won't. The Total = Total + Tax statement will only be executed if *Taxable* is FALSE. It's easy to get the correct results using the IF block:

```
IF Taxable THEN
  Tax = Price * Rate
ELSE
  Tax = 0
END IF
Total = Total + Tax
```

Short-Circuit Evaluation

Note that PowerBASIC features short-circuit evaluation of relational expressions using [AND](#) and [OR](#). This optimization means that evaluation of a relational expression in an [IF](#), [IF/END IF](#), [DO/LOOP](#), or [WHILE/WEND](#) is terminated just as soon as it is possible to tell what the result will be. For example:

```
IF LEN(a$) AND MyFunc(a$) THEN CALL ShowText("Ok!")
```

In the above example, if [LEN\(a\\$\)](#) is zero, there is no further need to evaluate the expression, because 0 and *anything* will always be FALSE. So, if [LEN\(a\\$\)](#) is zero, *MyFunc()* is not called at all, and *ShowText()* is not executed.

To give short-circuit optimization an extra boost, AND and OR are treated as a Boolean operator rather than a bitwise operator, and this can sometimes produce unexpected results. For example, consider the following expression:

```
a& = 4
b& = 2
IF a& AND b& THEN CALL ShowText("TRUE") ELSE CALL ShowText("FALSE")
```

Applying the traditional BASIC bitwise evaluation, you would expect to see FALSE displayed because (4 AND 2) = 0. Due to the short-circuit optimization though, each value is treated as a Boolean, just as if you had written:

```
IF ISTRUE a& AND ISTRUE b& THEN ...
```

If you believe this may be a problem for your particular code, you can disable the short-circuit evaluation by surrounding the entire conditional expression in parentheses:

```
IF (a& AND b&) THEN CALL ShowText("TRUE") ELSE CALL ShowText("FALSE")
```

The parentheses force the entire expression to be evaluated, so AND reverts to being a

bitwise operator.

See also [CHOOSE](#), [CHOOSE&](#), [CHOOSE\\$](#), [IF block](#), [IIF](#), [IIF&](#), [IIF\\$](#), [MAX](#), [MAX&](#), [MAX\\$](#), [MIN](#), [MIN&](#), [MIN\\$](#), [SWITCH](#), [SWITCH&](#), [SWITCH\\$](#), [SELECT](#)

Example `IF x > 100 THEN y = 3 ELSE y = 4`

IF/END IF block

IF/END IF block

Purpose Create IF/THEN/ELSE constructs with multiple lines and/or conditions.

Syntax

```
IF integer_expression THEN
    [statements]
[ELSEIF integer_expression THEN
    [statements]]
[ELSE
    [statements]]
END IF
```

Remarks In executing IF blocks, the truth of the *integer_expression* in the initial IF statement is checked first. If it evaluates to FALSE (zero), each of the following ELSEIF statements is examined in order. There can be as many ELSEIF statements as desired. As soon as one is found to be [TRUE](#) (non-zero), PowerBASIC executes the statement(s) *following* the associated THEN and *before* the next ELSEIF or ELSE.

Execution then jumps to the statement just after the terminating END IF without making any further tests. If none of the test expressions evaluates to TRUE, the statement(s) in the ELSE clause (which is optional) are executed.

Note that there must be nothing following the THEN keyword in an IF block; that's how the compiler distinguishes an IF block from a conventional IF statement. There must also be nothing on the same line as the ELSE (except for remarks).

IF blocks can be nested; that is, any of the statements after any of the THENs may contain IF blocks. Although the compiler doesn't care, the clarity of source code is improved by indenting the statements controlled by each test a couple of spaces, as shown in the example.

IF blocks must be terminated with a matching END IF statement. Note that the END IF statement requires a space and the ELSEIF statement does not.

See the [IF](#) statement for notes on PowerBASIC's [Short-circuit evaluation](#) and its possible side effects.

See also [CHOOSE](#), [CHOOSE&](#), [CHOOSE\\$](#), [EXIT](#), [IF](#), [IIF](#), [IIF&](#), [IIF\\$](#), [MAX](#), [MAX&](#), [MAX\\$](#), [MIN](#), [MIN&](#), [MIN\\$](#), [SELECT](#), [Short-circuit evaluation](#), [SWITCH](#), [SWITCH&](#), [SWITCH\\$](#), [SELECT](#)

Example

```
X = (RND * 500) + 1
IF X = 1 THEN
    x$ = "The number is 1"
ELSEIF X = 2 THEN
    x$ = "The number is 2"
ELSE
    IF X < 50 THEN
        x$ = "The number is less than 50"
    ELSEIF X < 100 THEN
        x$ = "Greater than 49 and less than 100"
    ELSE
        x$ = "The number is 100 or greater"
    END IF
END IF
```

IIF function

IIF function

| | |
|---------------------|--|
| Purpose | Return one of two values based upon a TRUE/FALSE evaluation. |
| Syntax | <pre>var = IIF(num_expression, truepart, falsepart) var& = IIF&(num_expression, truepart&, falsepart&) var\$ = IIF\$(num_expression, truepart\$, falsepart\$)</pre> |
| Remarks | <p>IIF expects parts of any numeric type. IIF& expects parts optimized for long integer type. IIF\$ expects parts of type.</p> <p>If <i>num_expression</i> evaluates to TRUE (non-zero), the <i>truepart</i> is returned, else the <i>falsepart</i> is returned. <i>num_expression</i> is evaluated as a normal PowerBASIC Boolean expression, which offers short-circuit expression evaluation as needed.</p> <p>IIF(1 AND 2, 3, 4) would return the <i>truepart</i> (3) because both terms in <i>num_expression</i> are TRUE, and therefore evaluate to TRUE.</p> <p>To force a bitwise evaluation of <i>num_expression</i>, enclose it in parentheses. For example, IIF\$((1 AND 2), "True", "False") would return "False".</p> <p>IIF% is recognized as a valid synonym for IIF&.</p> |
| Restrictions | Contrary to the implementation in some other languages, only the selected expression (<i>truepart</i> or <i>falsepart</i>) is evaluated at run-time, not both. This ensures optimum execution speed, as well as the elimination of unanticipated side effects. |
| See also | CHOOSE , CHOOSE& , CHOOSE\$, SWITCH , SWITCH& , SWITCH\$ |
| Example | <pre>iLOGFONT.lfWeight = IIF&(Weight&, 700&, 400&) Score& = Score& + IIF&(Answer = %FALSE, 0, 10)</pre> |

ILinkListCollection.ADD method

Keyword Template

| |
|-----------------|
| Purpose |
| Syntax |
| Remarks |
| See also |
| Example |

COLLECTION Object Group New!

| | |
|----------------|---|
| Purpose | <p>A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.</p> <p>You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.</p> <pre>LOCAL Collect AS IPowerCollection LET Collect = CLASS "PowerCollection"</pre> <p>Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (</p> |
|----------------|---|

, string, [UDT](#), [object](#), etc.). Collection interfaces are [DUAL](#) -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VmntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
Collobj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of [bytes](#) (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a [variant](#), while the key is passed and stored as a [wide](#) (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HRESULT of S_OK (0) is returned. If it fails because of a duplicate key, an HRESULT of E_DUPLICATEKEY (&H800A01C9) is returned, and an [Object Error](#) (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (PowerKey AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as [true](#). If not found, the value [false](#) (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified **OUT** parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the **OBJRESULT** will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar*& = ObjectVar.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar*&.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the **OBJRESULT** will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the **OBJRESULT** is set to %S_OK (0). When there are no more data items to retrieve, the **OBJRESULT** is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the **OBJRESULT** is set to %S_OK (0). When there are no more data items to retrieve, the **OBJRESULT** is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, **OBJRESULT** returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, **OBJRESULT** returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter *Flags* is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

| | |
|----------------------------|---|
| LinkList Collection | A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence. |
| Syntax | <i>The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).</i> <pre><ObjectVar>.membername(params) RetVal = <ObjectVar>.membername(params) <ObjectVar>.membername(params) TO ReturnVariable</pre> |
| Remarks | Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods. The Dispatch ID (DispID) for each member method is displayed within angle brackets. |

LinkList Collection Methods

ADD <3> (PowerItem AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (Index AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (Index AS Long, PowerItem AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (Index AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (Index AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection.

The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine [stack](#) on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection

A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax

The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the

caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also [FOR EACH/NEXT](#)

[ILinkListCollection.CLEAR method](#)

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, [UDT](#), [object](#), etc.). Collection interfaces are [DUAL](#) -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VvntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
Collobj.Add(Key$$, UDVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of [bytes](#) (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the

same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

| | |
|-------------------------|--|
| Power Collection | A Power Collection creates a set of data items, each of which is associated with an alpha-numeric key which you define. The data item is passed and stored as a variant , while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence. |
| Syntax | <i>The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).</i> <pre><ObjectVar>.membername(<i>params</i>) RetVal = <ObjectVar>.membername(<i>params</i>) <ObjectVar>.membername(<i>params</i>) TO ReturnVariable</pre> |
| Remarks | Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed. The Dispatch ID (DispID) for each member method is displayed within angle brackets. |

Power Collection Methods

ADD <3> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HRESULT of S_OK (0) is returned. If it fails because of a duplicate key, an HRESULT of E_DUPLICATEKEY (&H800A01C9) is returned, and an [Object Error](#) (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (PowerKey AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as [true](#). If not found, the value [false](#) (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (Index AS Long, OUT PowerKey as WString, OUT PowerItem as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified [OUT](#) parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (Index AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it

to the variable *IndexVar*&.

ITEM <9> (PowerKey AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (PowerKey AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (Flags AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter *Flags* is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

**LinkList
Collection**

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (PowerItem AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection.

The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

**Stack
Collection**

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine [stack](#) on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL

interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also [FOR EACH/NEXT](#)

ILinkListCollection.COUNT method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, [UDT](#), [object](#), etc.). Collection interfaces are [DUAL](#) -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VmntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
Collobj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of [bytes](#) (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a [variant](#), while the key is passed and stored as a [wide](#) (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax *The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as

either upper case or lower case, but not mixed.

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HRESULT of S_OK (0) is returned. If it fails because of a duplicate key, an HRESULT of E_DUPLICATEKEY (&H800A01C9) is returned, and an [Object Error](#) (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as [true](#). If not found, the value [false](#) (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified [OUT](#) parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar*& = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar*&.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the [OBJRESULT](#) is set to %S_OK (0). When there are no more data items to retrieve, the [OBJRESULT](#) is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved

sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (PowerKey AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (Flags AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter *Flags* is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

**LinkList
Collection**

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (PowerItem AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (Index AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (Index AS Long, PowerItem AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If

the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (Index AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (Index AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection.

The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

**Stack
Collection**

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine [stack](#) on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

The Dispatch ID (DisplD) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (Dispid) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also [FOR EACH/NEXT](#)

ILinkListCollection.FIRST method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group **New!**

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, [UDT](#), [object](#), etc.). Collection interfaces are [DUAL](#) -- member methods may

be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VmntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
collobj.Add(Key$$, UDTVVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of [bytes](#) (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a [variant](#), while the key is passed and stored as a [wide](#) (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
```

```
RetVal = <ObjectVar>.membername(params)
```

```
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HRESULT of S_OK (0) is returned. If it fails because of a duplicate key, an HRESULT of E_DUPLICATEKEY (&H800A01C9) is returned, and an [Object Error](#) (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (PowerKey AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as [true](#). If not found, the value [false](#) (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified [OUT](#) parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar*& = ObjectVar.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar*&.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter *Flags* is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position

number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkedListCollection". The INTERFACE is ILinkedListCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a LinkedListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkedList Collection Methods**ADD <3> (PowerItem AS Variant)**

The *PowerItem* variant is added to the end of the LinkedListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkedListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkedListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkedListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (Index AS Long) AS Long

The current INDEX for the LinkedListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (Index AS Long, PowerItem AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (Index AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkedListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkedListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkedListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is

successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (Index AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection.

The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine [stack](#) on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection

A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax

The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also [FOR EACH/NEXT](#)

ILinkListCollection.INDEX method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose

A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, [UDT](#), [object](#), etc.). Collection interfaces are [DUAL](#) -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VvntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
Collobj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of [bytes](#) (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should

be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a [variant](#), while the key is passed and stored as a [wide](#) (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HRESULT of S_OK (0) is returned. If it fails because of a duplicate key, an HRESULT of E_DUPLICATEKEY (&H800A01C9) is returned, and an [Object Error](#) (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (PowerKey AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as [true](#). If not found, the value [false](#) (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (Index AS Long, OUT PowerKey as WString, OUT PowerItem as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified [OUT](#) parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (Index AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (PowerKey AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter *Flags* is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

**LinkList
Collection**

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the

caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (Index AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (Index AS Long, PowerItem AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (Index AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (Index AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection.

The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

**Stack
Collection**

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine [stack](#) on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

<ObjectVar>.membername(*params*)

RetVal = <ObjectVar>.membername(*params*)

Remarks `<ObjectVar>.membername(params) TO ReturnVariable`
 The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

`<ObjectVar>.membername(params)`

`RetVal = <ObjectVar>.membername(params)`

`<ObjectVar>.membername(params) TO ReturnVariable`

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also [FOR EACH/NEXT](#)

ILinkListCollection.INSERT method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, [UDT](#), [object](#), etc.). Collection interfaces are [DUAL](#) -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VmntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
collobj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of [bytes](#) (v_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a [variant](#), while the key is passed and stored as a [wide](#) (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax *The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HRESULT of S_OK (0) is returned. If it fails because of a duplicate key, an HRESULT of E_DUPLICATEKEY (&H800A01C9) is returned, and an [Object Error](#) (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (PowerKey AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the index number of this item (range of 1 - COUNT) is returned. This value will always evaluate as [true](#). If not found, the value [false](#) (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (Index AS Long, OUT PowerKey as WString, OUT PowerItem as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified [OUT](#) parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (Index AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (PowerKey AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the [OBJRESULT](#) is set to %S_OK (0). When there are no more data items to retrieve, the [OBJRESULT](#) is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the [OBJRESULT](#) is set to %S_OK (0). When there are no more data items to retrieve, the [OBJRESULT](#) is set to %S_FALSE (1).

REMOVE <12> (PowerKey AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the *PowerCollection*. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the *PowerCollection* are sorted based upon the text in the associated *PowerKeys*. If the parameter *Flags* is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

`<ObjectVar>.membername(params)`

`RetVal = <ObjectVar>.membername(params)`

`<ObjectVar>.membername(params) TO ReturnVariable`

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar*& = ObjectVar.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar*&.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will

be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (Index AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection.

The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

**Stack
Collection**

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine [stack](#) on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

**Queue
Collection**

A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

| | |
|----------------|---|
| Syntax | <p>The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).</p> <pre><ObjectVar>.membername(params) RetVal = <ObjectVar>.membername(params) <ObjectVar>.membername(params) TO ReturnVariable</pre> |
| Remarks | The Dispatch ID (DispID) for each member method is displayed within angle brackets. |

Queue Collection Methods

CLEAR <1>

All *PowerItem*s are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also [FOR EACH/NEXT](#)

ILinkListCollection.ITEM method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (, string, [UDT](#), [object](#), etc.). Collection interfaces are [DUAL](#) -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VmntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
Collobj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of [bytes](#) (v_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a [variant](#), while the key is passed and stored as a [wide](#) (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
```

```
RetVal = <ObjectVar>.membername(params)
```

```
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HRESULT of S_OK (0) is returned. If it fails because of a duplicate key, an HRESULT of E_DUPLICATEKEY (&H800A01C9) is returned, and an [Object Error](#) (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (PowerKey AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as [true](#). If not found, the value [false](#) (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (Index AS Long, OUT PowerKey as WString, OUT PowerItem as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified [OUT](#) parameters. If the index number is less than one, or greater than the

item count, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (Index AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (PowerKey AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (PowerKey AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (Flags AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter *Flags* is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

**LinkList
Collection**

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

<ObjectVar>.membername(params)

```
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods**ADD <3> (PowerItem AS Variant)**

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (Index AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (Index AS Long, PowerItem AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (Index AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (Index AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection.

The index number of each data item past the removed item is decremented by one. If the

requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine [stack](#) on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax *The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also [FOR EACH/NEXT](#)

ILinkListCollection.LAST method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group **New!**

Purpose

A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, [UDT](#), [object](#), etc.). Collection interfaces are [DUAL](#) -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VmntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
ColObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of [bytes](#) (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

**Power
Collection**

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a [variant](#), while the key is passed and stored as a [wide](#) (Unicode) string. You can retrieve these data items

directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

Power Collection Methods**ADD <3> (PowerKey AS WString, PowerItem AS Variant)**

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HRESULT of S_OK (0) is returned. If it fails because of a duplicate key, an HRESULT of E_DUPLICATEKEY (&H800A01C9) is returned, and an [Object Error](#) (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (PowerKey AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the index number of this item (range of 1 - COUNT) is returned. This value will always evaluate as [true](#). If not found, the value [false](#) (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (Index AS Long, OUT PowerKey as WString, OUT PowerItem as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified [OUT](#) parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (Index AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (PowerKey AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent

references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (PowerKey AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (Flags AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter *Flags* is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (PowerItem AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (Index AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (Index AS Long, PowerItem AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (Index AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (Index AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine [stack](#) on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

**Queue
Collection**

A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax

The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also

[FOR EACH/NEXT](#)

ILinkListCollection.NEXT method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose

A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not

have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, [UDT](#), [object](#), etc.). Collection interfaces are [DUAL](#) -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VvntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
Collobj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of [bytes](#) (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a [variant](#), while the key is passed and stored as a [wide](#) (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
```

```
RetVal = <ObjectVar>.membername(params)
```

```
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HRESULT of S_OK (0) is returned. If it fails because of a duplicate key, an HRESULT of E_DUPLICATEKEY (&H800A01C9) is returned, and an [Object Error](#) (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (PowerKey AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as [true](#). If not found, the value [false](#) (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (Index AS Long, OUT PowerKey as WString, OUT PowerItem as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified [OUT](#) parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (Index AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (PowerKey AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the [OBJRESULT](#) is set to %S_OK (0). When there are no more data items to retrieve, the [OBJRESULT](#) is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the [OBJRESULT](#) is set to %S_OK (0). When there are no more data items to retrieve, the [OBJRESULT](#) is set to %S_FALSE (1).

REMOVE <12> (PowerKey AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, [OBJRESULT](#) returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (Flags AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter *Flags* is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

**LinkList
Collection**

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (PowerItem AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (Index AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (Index AS Long, PowerItem AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (Index AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (Index AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine [stack](#) on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods**CLEAR <1>**

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection

A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax

The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also [FOR EACH/NEXT](#)

ILinkListCollection.PREVIOUS method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, [UDT](#), [object](#), etc.). Collection interfaces are [DUAL](#) -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VvntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
collobj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of [bytes](#) (v_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a [variant](#), while the key is passed and stored as a [wide](#) (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
```

```
RetVal = <ObjectVar>.membername(params)
```

```
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HRESULT of S_OK (0) is returned. If it fails because of a duplicate key, an HRESULT of E_DUPLICATEKEY (&H800A01C9) is returned, and an [Object Error](#) (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (PowerKey AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as [true](#). If not found, the value [false](#) (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (Index AS Long, OUT PowerKey as WString, OUT PowerItem as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified [OUT](#) parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent

references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index AS Long*) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (*PowerKey AS WString*) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey AS WString*)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey AS WString, PowerItem AS Variant*)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags AS Long*)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter *Flags* is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

**LinkList
Collection**

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar*& = ObjectVar.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar*&.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection.

The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine [stack](#) on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax *The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also [FOR EACH/NEXT](#)

ILinkListCollection.REMOVE method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group **New!**

Purpose

A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, [UDT](#), [object](#), etc.). Collection interfaces are [DUAL](#) -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VmntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
Collobj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of [bytes](#) (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

**Power
Collection**

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a [variant](#), while the key is passed and stored as a [wide](#) (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL

interface).

```
<ObjectVar>.membername(params)
```

```
RetVal = <ObjectVar>.membername(params)
```

```
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HRESULT of S_OK (0) is returned. If it fails because of a duplicate key, an HRESULT of E_DUPLICATEKEY (&H800A01C9) is returned, and an [Object Error](#) (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (PowerKey AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as [true](#). If not found, the value [false](#) (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (Index AS Long, OUT PowerKey as WString, OUT PowerItem as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified [OUT](#) parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (Index AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (PowerKey AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (PowerKey AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (Flags AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter *Flags* is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

**LinkList
Collection**

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (PowerItem AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (Index AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is

not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index AS Long, PowerItem AS Variant*)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index AS Long*) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index AS Long*)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection.

The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (*Index AS Long, PowerItem AS Variant*)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine [stack](#) on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax *The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).*

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks The Dispatch ID (Dispid) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection

A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax

The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).

`<ObjectVar>.membername(params)`

`RetVal = <ObjectVar>.membername(params)`

`<ObjectVar>.membername(params) TO ReturnVariable`

Remarks

The Dispatch ID (DisplD) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also

[FOR EACH/NEXT](#)

[ILinkedListCollection.REPLACE method](#)

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose

A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined

internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, [UDT](#), [object](#), etc.). Collection interfaces are [DUAL](#) -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VvntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
collobj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of [bytes](#) (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a [variant](#), while the key is passed and stored as a [wide](#) (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HRESULT of S_OK (0) is returned. If it fails because of a duplicate key, an HRESULT of E_DUPLICATEKEY (&H800A01C9) is returned, and an [Object Error](#) (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (PowerKey AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as [true](#). If not found, the value [false](#) (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (Index AS Long, OUT PowerKey as WString, OUT PowerItem as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified [OUT](#) parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (Index AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (PowerKey AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (PowerKey AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (Flags AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter *Flags* is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
```

```
RetVal = <ObjectVar>.membername(params)
```

```
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods**ADD <3> (PowerItem AS Variant)**

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (Index AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (Index AS Long, PowerItem AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (Index AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is

returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (Index AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection.

The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

**Stack
Collection**

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine [stack](#) on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

**Queue
Collection**

A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax

The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also [FOR EACH/NEXT](#)

IMAGELIST ADD BITMAP statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

IMAGELIST statement

Purpose Create and manage an IMAGELIST object to use with other functions.

Syntax

```
IMAGELIST ADD BITMAP hLst, hBmp [,hMsk] [TO dataValue&]
IMAGELIST ADD BITMAP hLst, Bmp$ [,Msk$] [TO dataValue&]
IMAGELIST ADD ICON hLst, hIcn [TO dataValue&]
IMAGELIST ADD ICON hLst, Icn$ [TO dataValue&]
IMAGELIST ADD MASKED hLst, hBmp, rgbColor& [TO dataValue&]
IMAGELIST ADD MASKED hLst, Bmp$, rgbColor& [TO dataValue&]
IMAGELIST GET COUNT hLst TO dataValue&
IMAGELIST KILL hLst
IMAGELIST NEW BITMAP|ICON nWidth&, nHeight&, depth&, initial& TO hLst
IMAGELIST SET OVERLAY hLst, image&, overlay&
```

hBmp [Handle](#) of a Bitmap.

hIcn Handle of an Icon.

hLst Handle of the IMAGELIST.

hMsk Handle of a Mask.

dataValue& A [long integer](#) variable to which result data is assigned.

rgbColor& A [RGB](#) color used in the bitmap to specify transparent pixels.

Remarks An IMAGELIST is a structure which contains any number of graphical images, either bitmaps or icons, but not a mixture. All of the images are automatically converted to the type, size, and color depth specified when the IMAGELIST is created. A bitmap (file type *.BMP) is a single color image, while an icon (file type *.ICO) supports transparency by including both a color bitmap and a mask bitmap. The mask bitmap is a monochrome image (one bit per [pixel](#)), where each "set" bit describes a pixel which remains transparent. The IMAGELIST structure can best be described as a set, or [array](#), of

images. You can retrieve the images individually by index number, or pass the entire IMAGELIST to a control which requires it ([LISTVIEW](#), etc.).

An empty ImageList is first created with IMAGELIST NEW. Images are then added with IMAGELIST ADD, until the structure is complete. If you add an image which is wider than the size specified by *nWidth*&, the image is separated into multiple bitmaps, each of which is added in sequence. When an IMAGELIST is attached to a control like LISTVIEW, it is usually destroyed automatically when the control is destroyed. Consult the control documentation for that information. If not, you must explicitly destroy it with IMAGELIST KILL.

IMAGELIST ADD BITMAP *hLst, hBmp [,hMsk] [TO *dataValue*&]*

An image is added to the ImageList specified by *hLst*. With this syntax, the image is specified by a handle (*hBmp*), so it must have been loaded into memory (e.g. with [LoadImage](#)). If the ImageList is an ICON type, a second mask bitmap is also specified by a handle (*hMsk*). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue*&. If the operation fails, the value 0 is assigned.

IMAGELIST ADD BITMAP *hLst, Bmp\$ [,Msk\$] [TO *dataValue*&]*

An image is added to the ImageList specified by *hLst*. With this syntax, the image is specified by a name

(*Bmp\$*), which is the name of an embedded [resource](#) or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the image name is a numeric resource, it should be described with a leading pound sign ("#12345"). If the ImageList is an ICON type, a second mask bitmap is also specified by a handle (*hMsk*). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue*&. If the operation fails, the value 0 is assigned.

IMAGELIST ADD ICON *hLst, hIcn [TO *dataValue*&]*

An icon is added to the ImageList specified by *hLst*. With this syntax, the icon is specified by a handle (*hIcn*), so it must have been loaded into memory (e.g. with the [WinApi](#) LoadIcon). If the TO clause is included, the index position of the first added icon (starting with 1) is assigned to the variable designated by *dataValue*&. If the operation fails, the value 0 is assigned.

IMAGELIST ADD ICON *hLst, Icn\$ [TO *dataValue*&]*

An icon is added to the ImageList specified by *hLst*. With this syntax, the icon is specified by a name string (*Icn\$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the icon name is a numeric resource, it should be described with a leading pound sign ("#12345"). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue*&. If the operation fails, the value 0 is assigned.

IMAGELIST ADD MASKED *hLst, hBmp, rgbColor& [TO *dataValue*&]*

A bitmap is added to the icon ImageList specified by *hLst*. With this syntax, the bitmap is specified by a handle (*hBmp*), so it must have been loaded into memory (e.g. with GRAPHIC BITMAP). The parameter *rgbColor*& specifies the RGB color used in the bitmap to specify transparent pixels. Each pixel of that color is changed to the color black, and a mask bitmap is created to describe the transparent pixels. If the TO clause

is included, the index position of the first added icon (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD MASKED *hLst*, *Bmp\$*, *rgbColor&* [TO *dataValue&*]

A bitmap is added to the icon ImageList specified by *hLst*. With this syntax, the bitmap is specified by a name string (*Bmp\$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the image name is a numeric resource, it should be described with a leading pound sign ("#12345"). The parameter *rgbColor&* specifies the RGB color used in the bitmap to specify transparent pixels. Each pixel of that color is changed to the color black, and a mask bitmap is created to describe the transparent pixels. If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST GET COUNT *hLst* TO *dataValue&*

The number of images in the IMAGELIST is retrieved, and assigned to the [long integer](#) variable specified by *dataValue&*.

IMAGELIST KILL *hLst*

The IMAGELIST specified by *hLst* is destroyed. All allocated memory and resources are released.

IMAGELIST NEW BITMAP|ICON *nWidth&*, *nHeight&*, *depth&*, *initial&* TO *hLst*

A new ImageList structure is created. If you specify BITMAP, each image you add will be stored as a single bitmap. If you specify ICON, each image you add will be stored as two bitmaps in order to support transparent areas. The parameters *nWidth&* and *nHeight&* specify the size of each image in pixels. The *depth&* parameter specifies the color depth in bits per pixel (4,8,16,24,32). A depth of 4 offers 16 colors, 8 offers 256 colors, etc. The *initial&* parameter specifies the initial size of the ImageList. While it can grow beyond this number, it is most efficient to allocate space accurately at the time of creation. The variable *hLst* receives the handle of the newly created ImageList, or zero if the operation failed.

IMAGELIST SET OVERLAY *hLst*, *image&*, *overlay&*

The image specified by the index number *image&* is declared to be an overlay image. The *overlay&* parameter must be in the range of 1 to 15, and it is used later to retrieve and/or specify this particular overlay image.

See also [GRAPHIC BITMAP LOAD](#), [GRAPHIC BITMAP NEW](#), [GRAPHIC IMAGELIST](#), [LISTVIEW](#), [TAB SET IMAGELIST](#), [TREEVIEW](#), [XPRINT IMAGELIST](#)

IMAGELIST ADD ICON statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

IMAGELIST statement

Purpose Create and manage an IMAGELIST object to use with other functions.

Syntax

```

IMAGELIST ADD BITMAP hLst, hBmp [,hMsk] [TO dataValue&]
IMAGELIST ADD BITMAP hLst, Bmp$ [,Msk$] [TO dataValue&]
IMAGELIST ADD ICON hLst, hIcn [TO dataValue&]
IMAGELIST ADD ICON hLst, Icn$ [TO dataValue&]
IMAGELIST ADD MASKED hLst, hBmp, rgbColor& [TO dataValue&]
IMAGELIST ADD MASKED hLst, Bmp$, rgbColor& [TO dataValue&]
IMAGELIST GET COUNT hLst TO dataValue&
IMAGELIST KILL hLst
IMAGELIST NEW BITMAP|ICON nWidth&, nHeight&, depth&, initial& TO hLst
IMAGELIST SET OVERLAY hLst, image&, overlay&

```

hBmp [Handle](#) of a Bitmap.

hIcn Handle of an Icon.

hLst Handle of the IMAGELIST.

hMsk Handle of a Mask.

dataValue& A [long integer](#) variable to which result data is assigned.

rgbColor& A [RGB](#) color used in the bitmap to specify transparent pixels.

Remarks An IMAGELIST is a structure which contains any number of graphical images, either bitmaps or icons, but not a mixture. All of the images are automatically converted to the type, size, and color depth specified when the IMAGELIST is created. A bitmap (file type *.BMP) is a single color image, while an icon (file type *.ICO) supports transparency by including both a color bitmap and a mask bitmap. The mask bitmap is a monochrome image (one bit per [pixel](#)), where each "set" bit describes a pixel which remains transparent. The IMAGELIST structure can best be described as a set, or [array](#), of images. You can retrieve the images individually by index number, or pass the entire IMAGELIST to a control which requires it ([LISTVIEW](#), etc.).

An empty ImageList is first created with IMAGELIST NEW. Images are then added with IMAGELIST ADD, until the structure is complete. If you add an image which is wider than the size specified by *nWidth&*, the image is separated into multiple bitmaps, each of which is added in sequence. When an IMAGELIST is attached to a control like LISTVIEW, it is usually destroyed automatically when the control is destroyed. Consult the control documentation for that information. If not, you must explicitly destroy it with IMAGELIST KILL.

IMAGELIST ADD BITMAP *hLst*, *hBmp* [,*hMsk*] [TO *dataValue&*]

An image is added to the ImageList specified by *hLst*. With this syntax, the image is specified by a handle (*hBmp*), so it must have been loaded into memory (e.g. with [LoadImage](#)). If the ImageList is an ICON type, a second mask bitmap is also specified by a handle (*hMsk*). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD BITMAP *hLst*, *Bmp\$* [,*Msk\$*] [TO *dataValue&*]

An image is added to the ImageList specified by *hLst*. With this syntax, the image is specified by a name

(*Bmp\$*), which is the name of an embedded [resource](#) or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the image name is a numeric resource, it should be described with a leading pound sign

("#12345"). If the ImageList is an ICON type, a second mask bitmap is also specified by a handle (*hMsk*). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD ICON *hLst, hIcn* [TO *dataValue&*]

An icon is added to the ImageList specified by *hLst*. With this syntax, the icon is specified by a handle (*hIcn*), so it must have been loaded into memory (e.g. with the [WinApi](#) LoadIcon). If the TO clause is included, the index position of the first added icon (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD ICON *hLst, Icn\$* [TO *dataValue&*]

An icon is added to the ImageList specified by *hLst*. With this syntax, the icon is specified by a name string (*Icn\$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the icon name is a numeric resource, it should be described with a leading pound sign ("#12345"). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD MASKED *hLst, hBmp, rgbColor&* [TO *dataValue&*]

A bitmap is added to the icon ImageList specified by *hLst*. With this syntax, the bitmap is specified by a handle (*hBmp*), so it must have been loaded into memory (e.g. with GRAPHIC BITMAP). The parameter *rgbColor&* specifies the RGB color used in the bitmap to specify transparent pixels. Each pixel of that color is changed to the color black, and a mask bitmap is created to describe the transparent pixels. If the TO clause is included, the index position of the first added icon (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD MASKED *hLst, Bmp\$, rgbColor&* [TO *dataValue&*]

A bitmap is added to the icon ImageList specified by *hLst*. With this syntax, the bitmap is specified by a name string (*Bmp\$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the image name is a numeric resource, it should be described with a leading pound sign ("#12345"). The parameter *rgbColor&* specifies the RGB color used in the bitmap to specify transparent pixels. Each pixel of that color is changed to the color black, and a mask bitmap is created to describe the transparent pixels. If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST GET COUNT *hLst* TO *dataValue&*

The number of images in the IMAGELIST is retrieved, and assigned to the [long integer](#) variable specified by *dataValue&*.

IMAGELIST KILL *hLst*

The IMAGELIST specified by *hLst* is destroyed. All allocated memory and resources are released.

IMAGELIST NEW BITMAP|ICON *nWidth&, nHeight&, depth&, initial&* TO *hLst*

A new ImageList structure is created. If you specify BITMAP, each image you add will be

stored as a single bitmap. If you specify `ICON`, each image you add will be stored as two bitmaps in order to support transparent areas. The parameters `nWidth&` and `nHeight&` specify the size of each image in pixels. The `depth&` parameter specifies the color depth in bits per pixel (4,8,16,24,32). A depth of 4 offers 16 colors, 8 offers 256 colors, etc. The `initial&` parameter specifies the initial size of the `ImageList`. While it can grow beyond this number, it is most efficient to allocate space accurately at the time of creation. The variable `hLst` receives the handle of the newly created `ImageList`, or zero if the operation failed.

IMAGELIST SET OVERLAY *hLst, image&, overlay&*

The image specified by the index number `image&` is declared to be an overlay image.

The `overlay&` parameter must be in the range of 1 to 15, and it is used later to retrieve and/or specify this particular overlay image.

See also

[GRAPHIC BITMAP LOAD](#), [GRAPHIC BITMAP NEW](#), [GRAPHIC IMAGELIST](#), [LISTVIEW](#), [TAB SET IMAGELIST](#), [TREEVIEW](#), [XPRINT IMAGELIST](#)

IMAGELIST ADD MASKED statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

IMAGELIST statement

Purpose

Create and manage an `IMAGELIST` object to use with other functions.

Syntax

```
IMAGELIST ADD BITMAP hLst, hBmp [,hMsk] [TO dataValue&]
IMAGELIST ADD BITMAP hLst, Bmp$ [,Msk$] [TO dataValue&]
IMAGELIST ADD ICON hLst, hIcn [TO dataValue&]
IMAGELIST ADD ICON hLst, Icn$ [TO dataValue&]
IMAGELIST ADD MASKED hLst, hBmp, rgbColor& [TO dataValue&]
IMAGELIST ADD MASKED hLst, Bmp$, rgbColor& [TO dataValue&]
IMAGELIST GET COUNT hLst TO dataValue&
IMAGELIST KILL hLst
IMAGELIST NEW BITMAP|ICON nWidth&, nHeight&, depth&, initial& TO hLst
IMAGELIST SET OVERLAY hLst, image&, overlay&
```

hBmp

[Handle](#) of a Bitmap.

hIcn

Handle of an Icon.

hLst

Handle of the `IMAGELIST`.

hMsk

Handle of a Mask.

dataValue&

A [long integer](#) variable to which result data is assigned.

rgbColor&

A [RGB](#) color used in the bitmap to specify transparent pixels.

Remarks

An `IMAGELIST` is a structure which contains any number of graphical images, either bitmaps or icons, but not a mixture. All of the images are automatically converted to the type, size, and color depth specified when the `IMAGELIST` is created. A bitmap (file type *.BMP) is a single color image, while an icon (file type *.ICO) supports transparency by including both a color bitmap and a mask bitmap. The mask bitmap is a monochrome

image (one bit per [pixel](#)), where each "set" bit describes a pixel which remains transparent. The IMAGELIST structure can best be described as a set, or [array](#), of images. You can retrieve the images individually by index number, or pass the entire IMAGELIST to a control which requires it ([LISTVIEW](#), etc.).

An empty ImageList is first created with IMAGELIST NEW. Images are then added with IMAGELIST ADD, until the structure is complete. If you add an image which is wider than the size specified by *nWidth*&, the image is separated into multiple bitmaps, each of which is added in sequence. When an IMAGELIST is attached to a control like LISTVIEW, it is usually destroyed automatically when the control is destroyed. Consult the control documentation for that information. If not, you must explicitly destroy it with IMAGELIST KILL.

IMAGELIST ADD BITMAP *hLst, hBmp [,hMsk] [TO *dataValue*&]*

An image is added to the ImageList specified by *hLst*. With this syntax, the image is specified by a handle (*hBmp*), so it must have been loaded into memory (e.g. with [LoadImage](#)). If the ImageList is an ICON type, a second mask bitmap is also specified by a handle (*hMsk*). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue*&. If the operation fails, the value 0 is assigned.

IMAGELIST ADD BITMAP *hLst, Bmp\$ [,Msk\$] [TO *dataValue*&]*

An image is added to the ImageList specified by *hLst*. With this syntax, the image is specified by a name

(*Bmp\$*), which is the name of an embedded [resource](#) or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the image name is a numeric resource, it should be described with a leading pound sign ("#12345"). If the ImageList is an ICON type, a second mask bitmap is also specified by a handle (*hMsk*). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue*&. If the operation fails, the value 0 is assigned.

IMAGELIST ADD ICON *hLst, hIcn [TO *dataValue*&]*

An icon is added to the ImageList specified by *hLst*. With this syntax, the icon is specified by a handle (*hIcn*), so it must have been loaded into memory (e.g. with the [WinApi](#) LoadIcon). If the TO clause is included, the index position of the first added icon (starting with 1) is assigned to the variable designated by *dataValue*&. If the operation fails, the value 0 is assigned.

IMAGELIST ADD ICON *hLst, Icn\$ [TO *dataValue*&]*

An icon is added to the ImageList specified by *hLst*. With this syntax, the icon is specified by a name string (*Icn\$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the icon name is a numeric resource, it should be described with a leading pound sign ("#12345"). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue*&. If the operation fails, the value 0 is assigned.

IMAGELIST ADD MASKED *hLst, hBmp, rgbColor& [TO *dataValue*&]*

A bitmap is added to the icon ImageList specified by *hLst*. With this syntax, the bitmap is specified by a handle (*hBmp*), so it must have been loaded into memory (e.g. with GRAPHIC BITMAP). The parameter *rgbColor*& specifies the RGB color used in the

bitmap to specify transparent pixels. Each pixel of that color is changed to the color black, and a mask bitmap is created to describe the transparent pixels. If the TO clause is included, the index position of the first added icon (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD MASKED *hLst*, *Bmp\$*, *rgbColor&* [TO *dataValue&*]

A bitmap is added to the icon ImageList specified by *hLst*. With this syntax, the bitmap is specified by a name string (*Bmp\$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the image name is a numeric resource, it should be described with a leading pound sign ("#12345"). The parameter *rgbColor&* specifies the RGB color used in the bitmap to specify transparent pixels. Each pixel of that color is changed to the color black, and a mask bitmap is created to describe the transparent pixels. If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST GET COUNT *hLst* TO *dataValue&*

The number of images in the IMAGELIST is retrieved, and assigned to the [long integer](#) variable specified by *dataValue&*.

IMAGELIST KILL *hLst*

The IMAGELIST specified by *hLst* is destroyed. All allocated memory and resources are released.

IMAGELIST NEW BITMAP|ICON *nWidth&*, *nHeight&*, *depth&*, *initial&* TO *hLst*

A new ImageList structure is created. If you specify BITMAP, each image you add will be stored as a single bitmap. If you specify ICON, each image you add will be stored as two bitmaps in order to support transparent areas. The parameters *nWidth&* and *nHeight&* specify the size of each image in pixels. The *depth&* parameter specifies the color depth in bits per pixel (4,8,16,24,32). A depth of 4 offers 16 colors, 8 offers 256 colors, etc. The *initial&* parameter specifies the initial size of the ImageList. While it can grow beyond this number, it is most efficient to allocate space accurately at the time of creation. The variable *hLst* receives the handle of the newly created ImageList, or zero if the operation failed.

IMAGELIST SET OVERLAY *hLst*, *image&*, *overlay&*

The image specified by the index number *image&* is declared to be an overlay image. The *overlay&* parameter must be in the range of 1 to 15, and it is used later to retrieve and/or specify this particular overlay image.

See also

[GRAPHIC BITMAP LOAD](#), [GRAPHIC BITMAP NEW](#), [GRAPHIC IMAGELIST](#), [LISTVIEW](#), [TAB SET IMAGELIST](#), [TREEVIEW](#), [XPRINT IMAGELIST](#)

IMAGELIST GET COUNT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

IMAGELIST statement

Purpose Create and manage an IMAGELIST object to use with other functions.

Syntax

```

IMAGELIST ADD BITMAP hLst, hBmp [,hMsk] [TO dataValue&]
IMAGELIST ADD BITMAP hLst, Bmp$ [,Msk$] [TO dataValue&]
IMAGELIST ADD ICON hLst, hIcn [TO dataValue&]
IMAGELIST ADD ICON hLst, Icn$ [TO dataValue&]
IMAGELIST ADD MASKED hLst, hBmp, rgbColor& [TO dataValue&]
IMAGELIST ADD MASKED hLst, Bmp$, rgbColor& [TO dataValue&]
IMAGELIST GET COUNT hLst TO dataValue&
IMAGELIST KILL hLst
IMAGELIST NEW BITMAP|ICON nWidth&, nHeight&, depth&, initial& TO hLst
IMAGELIST SET OVERLAY hLst, image&, overlay&

```

hBmp [Handle](#) of a Bitmap.

hIcn Handle of an Icon.

hLst Handle of the IMAGELIST.

hMsk Handle of a Mask.

dataValue& A [long integer](#) variable to which result data is assigned.

rgbColor& A [RGB](#) color used in the bitmap to specify transparent pixels.

Remarks An IMAGELIST is a structure which contains any number of graphical images, either bitmaps or icons, but not a mixture. All of the images are automatically converted to the type, size, and color depth specified when the IMAGELIST is created. A bitmap (file type *.BMP) is a single color image, while an icon (file type *.ICO) supports transparency by including both a color bitmap and a mask bitmap. The mask bitmap is a monochrome image (one bit per [pixel](#)), where each "set" bit describes a pixel which remains transparent. The IMAGELIST structure can best be described as a set, or [array](#), of images. You can retrieve the images individually by index number, or pass the entire IMAGELIST to a control which requires it ([LISTVIEW](#), etc.).

An empty ImageList is first created with IMAGELIST NEW. Images are then added with IMAGELIST ADD, until the structure is complete. If you add an image which is wider than the size specified by *nWidth&*, the image is separated into multiple bitmaps, each of which is added in sequence. When an IMAGELIST is attached to a control like LISTVIEW, it is usually destroyed automatically when the control is destroyed. Consult the control documentation for that information. If not, you must explicitly destroy it with IMAGELIST KILL.

IMAGELIST ADD BITMAP *hLst*, *hBmp* [,*hMsk*] [TO *dataValue&*]

An image is added to the ImageList specified by *hLst*. With this syntax, the image is specified by a handle (*hBmp*), so it must have been loaded into memory (e.g. with `LOAD BITMAP`). If the ImageList is an ICON type, a second mask bitmap is also specified by a handle (*hMsk*). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD BITMAP *hLst*, *Bmp\$* [,*Msk\$*] [TO *dataValue&*]

An image is added to the ImageList specified by *hLst*. With this syntax, the image is specified by a name

(*Bmp\$*), which is the name of an embedded [resource](#) or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the image

name is a numeric resource, it should be described with a leading pound sign ("#12345"). If the ImageList is an ICON type, a second mask bitmap is also specified by a handle (*hMsk*). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD ICON *hLst, hIcn* [TO *dataValue&*]

An icon is added to the ImageList specified by *hLst*. With this syntax, the icon is specified by a handle (*hIcn*), so it must have been loaded into memory (e.g. with the [WinApi](#) LoadIcon). If the TO clause is included, the index position of the first added icon (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD ICON *hLst, Icn\$* [TO *dataValue&*]

An icon is added to the ImageList specified by *hLst*. With this syntax, the icon is specified by a name string (*Icn\$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the icon name is a numeric resource, it should be described with a leading pound sign ("#12345"). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD MASKED *hLst, hBmp, rgbColor&* [TO *dataValue&*]

A bitmap is added to the icon ImageList specified by *hLst*. With this syntax, the bitmap is specified by a handle (*hBmp*), so it must have been loaded into memory (e.g. with GRAPHIC BITMAP). The parameter *rgbColor&* specifies the RGB color used in the bitmap to specify transparent pixels. Each pixel of that color is changed to the color black, and a mask bitmap is created to describe the transparent pixels. If the TO clause is included, the index position of the first added icon (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD MASKED *hLst, Bmp\$, rgbColor&* [TO *dataValue&*]

A bitmap is added to the icon ImageList specified by *hLst*. With this syntax, the bitmap is specified by a name string (*Bmp\$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the image name is a numeric resource, it should be described with a leading pound sign ("#12345"). The parameter *rgbColor&* specifies the RGB color used in the bitmap to specify transparent pixels. Each pixel of that color is changed to the color black, and a mask bitmap is created to describe the transparent pixels. If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST GET COUNT *hLst* TO *dataValue&*

The number of images in the IMAGELIST is retrieved, and assigned to the [long integer](#) variable specified by *dataValue&*.

IMAGELIST KILL *hLst*

The IMAGELIST specified by *hLst* is destroyed. All allocated memory and resources are released.

IMAGELIST NEW BITMAP|ICON *nWidth&, nHeight&, depth&, initial&* TO *hLst*

A new ImageList structure is created. If you specify BITMAP, each image you add will be stored as a single bitmap. If you specify ICON, each image you add will be stored as two bitmaps in order to support transparent areas. The parameters *nWidth&* and *nHeight&* specify the size of each image in pixels. The *depth&* parameter specifies the color depth in bits per pixel (4,8,16,24,32). A depth of 4 offers 16 colors, 8 offers 256 colors, etc. The *initial&* parameter specifies the initial size of the ImageList. While it can grow beyond this number, it is most efficient to allocate space accurately at the time of creation. The variable *hLst* receives the handle of the newly created ImageList, or zero if the operation failed.

IMAGELIST SET OVERLAY *hLst, image&, overlay&*

The image specified by the index number *image&* is declared to be an overlay image.

The *overlay&* parameter must be in the range of 1 to 15, and it is used later to retrieve and/or specify this particular overlay image.

See also [GRAPHIC BITMAP LOAD](#), [GRAPHIC BITMAP NEW](#), [GRAPHIC IMAGELIST](#), [LISTVIEW](#), [TAB SET IMAGELIST](#), [TREEVIEW](#), [XPRINT IMAGELIST](#)

IMAGELIST KILL statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

IMAGELIST statement

Purpose Create and manage an IMAGELIST object to use with other functions.

Syntax

```

IMAGELIST ADD BITMAP hLst, hBmp [,hMsk] [TO dataValue&]
IMAGELIST ADD BITMAP hLst, Bmp$ [,Msk$] [TO dataValue&]
IMAGELIST ADD ICON hLst, hIcn [TO dataValue&]
IMAGELIST ADD ICON hLst, Icn$ [TO dataValue&]
IMAGELIST ADD MASKED hLst, hBmp, rgbColor& [TO dataValue&]
IMAGELIST ADD MASKED hLst, Bmp$, rgbColor& [TO dataValue&]
IMAGELIST GET COUNT hLst TO dataValue&
IMAGELIST KILL hLst
IMAGELIST NEW BITMAP|ICON nWidth&, nHeight&, depth&, initial& TO hLst
IMAGELIST SET OVERLAY hLst, image&, overlay&

```

hBmp [Handle](#) of a Bitmap.

hIcn Handle of an Icon.

hLst Handle of the IMAGELIST.

hMsk Handle of a Mask.

dataValue& A [long integer](#) variable to which result data is assigned.

rgbColor& A [RGB](#) color used in the bitmap to specify transparent pixels.

Remarks An IMAGELIST is a structure which contains any number of graphical images, either bitmaps or icons, but not a mixture. All of the images are automatically converted to the type, size, and color depth specified when the IMAGELIST is created. A bitmap (file type *.BMP) is a single color image, while an icon (file type *.ICO) supports transparency by

including both a color bitmap and a mask bitmap. The mask bitmap is a monochrome image (one bit per [pixel](#)), where each "set" bit describes a pixel which remains transparent. The IMAGELIST structure can best be described as a set, or [array](#), of images. You can retrieve the images individually by index number, or pass the entire IMAGELIST to a control which requires it ([LISTVIEW](#), etc.).

An empty ImageList is first created with IMAGELIST NEW. Images are then added with IMAGELIST ADD, until the structure is complete. If you add an image which is wider than the size specified by *nWidth*&, the image is separated into multiple bitmaps, each of which is added in sequence. When an IMAGELIST is attached to a control like LISTVIEW, it is usually destroyed automatically when the control is destroyed. Consult the control documentation for that information. If not, you must explicitly destroy it with IMAGELIST KILL.

IMAGELIST ADD BITMAP *hLst, hBmp [,hMsk] [TO *dataValue*&]*

An image is added to the ImageList specified by *hLst*. With this syntax, the image is specified by a handle (*hBmp*), so it must have been loaded into memory (e.g. with [LoadImage](#)). If the ImageList is an ICON type, a second mask bitmap is also specified by a handle (*hMsk*). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue*&. If the operation fails, the value 0 is assigned.

IMAGELIST ADD BITMAP *hLst, Bmp\$ [,Msk\$] [TO *dataValue*&]*

An image is added to the ImageList specified by *hLst*. With this syntax, the image is specified by a name

(*Bmp\$*), which is the name of an embedded [resource](#) or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the image name is a numeric resource, it should be described with a leading pound sign ("#12345"). If the ImageList is an ICON type, a second mask bitmap is also specified by a handle (*hMsk*). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue*&. If the operation fails, the value 0 is assigned.

IMAGELIST ADD ICON *hLst, hIcn [TO *dataValue*&]*

An icon is added to the ImageList specified by *hLst*. With this syntax, the icon is specified by a handle (*hIcn*), so it must have been loaded into memory (e.g. with the [WinApi](#) [LoadIcon](#)). If the TO clause is included, the index position of the first added icon (starting with 1) is assigned to the variable designated by *dataValue*&. If the operation fails, the value 0 is assigned.

IMAGELIST ADD ICON *hLst, Icn\$ [TO *dataValue*&]*

An icon is added to the ImageList specified by *hLst*. With this syntax, the icon is specified by a name string (*Icn\$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the icon name is a numeric resource, it should be described with a leading pound sign ("#12345"). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue*&. If the operation fails, the value 0 is assigned.

IMAGELIST ADD MASKED *hLst, hBmp, rgbColor& [TO *dataValue*&]*

A bitmap is added to the icon ImageList specified by *hLst*. With this syntax, the bitmap is specified by a handle (*hBmp*), so it must have been loaded into memory (e.g. with

GRAPHIC BITMAP). The parameter *rgbColor&* specifies the RGB color used in the bitmap to specify transparent pixels. Each pixel of that color is changed to the color black, and a mask bitmap is created to describe the transparent pixels. If the TO clause is included, the index position of the first added icon (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD MASKED *hLst*, *Bmp\$*, *rgbColor&* [TO *dataValue&*]

A bitmap is added to the icon ImageList specified by *hLst*. With this syntax, the bitmap is specified by a name string (*Bmp\$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the image name is a numeric resource, it should be described with a leading pound sign ("#12345"). The parameter *rgbColor&* specifies the RGB color used in the bitmap to specify transparent pixels. Each pixel of that color is changed to the color black, and a mask bitmap is created to describe the transparent pixels. If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST GET COUNT *hLst* TO *dataValue&*

The number of images in the IMAGELIST is retrieved, and assigned to the [long integer](#) variable specified by *dataValue&*.

IMAGELIST KILL *hLst*

The IMAGELIST specified by *hLst* is destroyed. All allocated memory and resources are released.

IMAGELIST NEW BITMAP|ICON *nWidth&*, *nHeight&*, *depth&*, *initial&* TO *hLst*

A new ImageList structure is created. If you specify BITMAP, each image you add will be stored as a single bitmap. If you specify ICON, each image you add will be stored as two bitmaps in order to support transparent areas. The parameters *nWidth&* and *nHeight&* specify the size of each image in pixels. The *depth&* parameter specifies the color depth in bits per pixel (4,8,16,24,32). A depth of 4 offers 16 colors, 8 offers 256 colors, etc. The *initial&* parameter specifies the initial size of the ImageList. While it can grow beyond this number, it is most efficient to allocate space accurately at the time of creation. The variable *hLst* receives the handle of the newly created ImageList, or zero if the operation failed.

IMAGELIST SET OVERLAY *hLst*, *image&*, *overlay&*

The image specified by the index number *image&* is declared to be an overlay image. The *overlay&* parameter must be in the range of 1 to 15, and it is used later to retrieve and/or specify this particular overlay image.

See also

[GRAPHIC BITMAP LOAD](#), [GRAPHIC BITMAP NEW](#), [GRAPHIC IMAGELIST](#), [LISTVIEW](#), [TAB SET IMAGELIST](#), [TREEVIEW](#), [XPRINT IMAGELIST](#)

IMAGELIST NEW BITMAP statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

IMAGELIST statement

Purpose Create and manage an IMAGELIST object to use with other functions.

Syntax

```

IMAGELIST ADD BITMAP hLst, hBmp [,hMsk] [TO dataValue&]
IMAGELIST ADD BITMAP hLst, Bmp$ [,Msk$] [TO dataValue&]
IMAGELIST ADD ICON hLst, hIcn [TO dataValue&]
IMAGELIST ADD ICON hLst, Icn$ [TO dataValue&]
IMAGELIST ADD MASKED hLst, hBmp, rgbColor& [TO dataValue&]
IMAGELIST ADD MASKED hLst, Bmp$, rgbColor& [TO dataValue&]
IMAGELIST GET COUNT hLst TO dataValue&
IMAGELIST KILL hLst
IMAGELIST NEW BITMAP|ICON nWidth&, nHeight&, depth&, initial& TO hLst
IMAGELIST SET OVERLAY hLst, image&, overlay&

```

hBmp [Handle](#) of a Bitmap.

hIcn Handle of an Icon.

hLst Handle of the IMAGELIST.

hMsk Handle of a Mask.

dataValue& A [long integer](#) variable to which result data is assigned.

rgbColor& A [RGB](#) color used in the bitmap to specify transparent pixels.

Remarks An IMAGELIST is a structure which contains any number of graphical images, either bitmaps or icons, but not a mixture. All of the images are automatically converted to the type, size, and color depth specified when the IMAGELIST is created. A bitmap (file type *.BMP) is a single color image, while an icon (file type *.ICO) supports transparency by including both a color bitmap and a mask bitmap. The mask bitmap is a monochrome image (one bit per [pixel](#)), where each "set" bit describes a pixel which remains transparent. The IMAGELIST structure can best be described as a set, or [array](#), of images. You can retrieve the images individually by index number, or pass the entire IMAGELIST to a control which requires it ([LISTVIEW](#), etc.).

An empty ImageList is first created with IMAGELIST NEW. Images are then added with IMAGELIST ADD, until the structure is complete. If you add an image which is wider than the size specified by *nWidth&*, the image is separated into multiple bitmaps, each of which is added in sequence. When an IMAGELIST is attached to a control like LISTVIEW, it is usually destroyed automatically when the control is destroyed. Consult the control documentation for that information. If not, you must explicitly destroy it with IMAGELIST KILL.

IMAGELIST ADD BITMAP *hLst*, *hBmp* [,*hMsk*] [TO *dataValue&*]

An image is added to the ImageList specified by *hLst*. With this syntax, the image is specified by a handle (*hBmp*), so it must have been loaded into memory (e.g. with [LoadImage](#)). If the ImageList is an ICON type, a second mask bitmap is also specified by a handle (*hMsk*). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD BITMAP *hLst*, *Bmp\$* [,*Msk\$*] [TO *dataValue&*]

An image is added to the ImageList specified by *hLst*. With this syntax, the image is specified by a name

(*Bmp\$*), which is the name of an embedded [resource](#) or a disk file. If the name string

contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the image name is a numeric resource, it should be described with a leading pound sign ("#12345"). If the ImageList is an ICON type, a second mask bitmap is also specified by a handle (*hMsk*). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD ICON *hLst, hIcn* [TO *dataValue&*]

An icon is added to the ImageList specified by *hLst*. With this syntax, the icon is specified by a handle (*hIcn*), so it must have been loaded into memory (e.g. with the [WinApi](#) LoadIcon). If the TO clause is included, the index position of the first added icon (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD ICON *hLst, Icn\$* [TO *dataValue&*]

An icon is added to the ImageList specified by *hLst*. With this syntax, the icon is specified by a name string (*Icn\$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the icon name is a numeric resource, it should be described with a leading pound sign ("#12345"). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD MASKED *hLst, hBmp, rgbColor&* [TO *dataValue&*]

A bitmap is added to the icon ImageList specified by *hLst*. With this syntax, the bitmap is specified by a handle (*hBmp*), so it must have been loaded into memory (e.g. with GRAPHIC BITMAP). The parameter *rgbColor&* specifies the RGB color used in the bitmap to specify transparent pixels. Each pixel of that color is changed to the color black, and a mask bitmap is created to describe the transparent pixels. If the TO clause is included, the index position of the first added icon (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD MASKED *hLst, Bmp\$, rgbColor&* [TO *dataValue&*]

A bitmap is added to the icon ImageList specified by *hLst*. With this syntax, the bitmap is specified by a name string (*Bmp\$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the image name is a numeric resource, it should be described with a leading pound sign ("#12345"). The parameter *rgbColor&* specifies the RGB color used in the bitmap to specify transparent pixels. Each pixel of that color is changed to the color black, and a mask bitmap is created to describe the transparent pixels. If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST GET COUNT *hLst* TO *dataValue&*

The number of images in the IMAGELIST is retrieved, and assigned to the [long integer](#) variable specified by *dataValue&*.

IMAGELIST KILL *hLst*

The IMAGELIST specified by *hLst* is destroyed. All allocated memory and resources are released.

IMAGELIST NEW BITMAP|ICON *nWidth*&, *nHeight*&, *depth*&, *initial*& TO *hLst*

A new ImageList structure is created. If you specify BITMAP, each image you add will be stored as a single bitmap. If you specify ICON, each image you add will be stored as two bitmaps in order to support transparent areas. The parameters *nWidth*& and *nHeight*& specify the size of each image in pixels. The *depth*& parameter specifies the color depth in bits per pixel (4,8,16,24,32). A depth of 4 offers 16 colors, 8 offers 256 colors, etc. The *initial*& parameter specifies the initial size of the ImageList. While it can grow beyond this number, it is most efficient to allocate space accurately at the time of creation. The variable *hLst* receives the handle of the newly created ImageList, or zero if the operation failed.

IMAGELIST SET OVERLAY *hLst*, *image*&, *overlay*&

The image specified by the index number *image*& is declared to be an overlay image. The *overlay*& parameter must be in the range of 1 to 15, and it is used later to retrieve and/or specify this particular overlay image.

See also

[GRAPHIC BITMAP LOAD](#), [GRAPHIC BITMAP NEW](#), [GRAPHIC IMAGELIST](#), [LISTVIEW](#), [TAB SET IMAGELIST](#), [TREEVIEW](#), [XPRINT IMAGELIST](#)

IMAGELIST NEW ICON statement**Keyword Template**

Purpose

Syntax

Remarks

See also

Example

IMAGELIST statement

Purpose Create and manage an IMAGELIST object to use with other functions.

Syntax

```
IMAGELIST ADD BITMAP hLst, hBmp [,hMsk] [TO dataValue&]
IMAGELIST ADD BITMAP hLst, Bmp$ [,Msk$] [TO dataValue&]
IMAGELIST ADD ICON hLst, hIcn [TO dataValue&]
IMAGELIST ADD ICON hLst, Icn$ [TO dataValue&]
IMAGELIST ADD MASKED hLst, hBmp, rgbColor& [TO dataValue&]
IMAGELIST ADD MASKED hLst, Bmp$, rgbColor& [TO dataValue&]
IMAGELIST GET COUNT hLst TO dataValue&
IMAGELIST KILL hLst
IMAGELIST NEW BITMAP|ICON nWidth&, nHeight&, depth&, initial& TO hLst
IMAGELIST SET OVERLAY hLst, image&, overlay&
```

hBmp [Handle](#) of a Bitmap.

hIcn Handle of an Icon.

hLst Handle of the IMAGELIST.

hMsk Handle of a Mask.

dataValue& A [long integer](#) variable to which result data is assigned.

rgbColor& A [RGB](#) color used in the bitmap to specify transparent pixels.

Remarks An IMAGELIST is a structure which contains any number of graphical images, either

bitmaps or icons, but not a mixture. All of the images are automatically converted to the type, size, and color depth specified when the IMAGELIST is created. A bitmap (file type *.BMP) is a single color image, while an icon (file type *.ICO) supports transparency by including both a color bitmap and a mask bitmap. The mask bitmap is a monochrome image (one bit per [pixel](#)), where each "set" bit describes a pixel which remains transparent. The IMAGELIST structure can best be described as a set, or [array](#), of images. You can retrieve the images individually by index number, or pass the entire IMAGELIST to a control which requires it ([LISTVIEW](#), etc.).

An empty ImageList is first created with IMAGELIST NEW. Images are then added with IMAGELIST ADD, until the structure is complete. If you add an image which is wider than the size specified by *nWidth*&, the image is separated into multiple bitmaps, each of which is added in sequence. When an IMAGELIST is attached to a control like LISTVIEW, it is usually destroyed automatically when the control is destroyed. Consult the control documentation for that information. If not, you must explicitly destroy it with IMAGELIST KILL.

IMAGELIST ADD BITMAP *hLst, hBmp [,hMsk] [TO *dataValue*&]*

An image is added to the ImageList specified by *hLst*. With this syntax, the image is specified by a handle (*hBmp*), so it must have been loaded into memory (e.g. with [LoadImage](#)). If the ImageList is an ICON type, a second mask bitmap is also specified by a handle (*hMsk*). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue*&. If the operation fails, the value 0 is assigned.

IMAGELIST ADD BITMAP *hLst, Bmp\$ [,Msk\$] [TO *dataValue*&]*

An image is added to the ImageList specified by *hLst*. With this syntax, the image is specified by a name

(*Bmp\$*), which is the name of an embedded [resource](#) or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the image name is a numeric resource, it should be described with a leading pound sign ("#12345"). If the ImageList is an ICON type, a second mask bitmap is also specified by a handle (*hMsk*). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue*&. If the operation fails, the value 0 is assigned.

IMAGELIST ADD ICON *hLst, hIcn [TO *dataValue*&]*

An icon is added to the ImageList specified by *hLst*. With this syntax, the icon is specified by a handle (*hIcn*), so it must have been loaded into memory (e.g. with the [WinApi](#) LoadIcon). If the TO clause is included, the index position of the first added icon (starting with 1) is assigned to the variable designated by *dataValue*&. If the operation fails, the value 0 is assigned.

IMAGELIST ADD ICON *hLst, Icn\$ [TO *dataValue*&]*

An icon is added to the ImageList specified by *hLst*. With this syntax, the icon is specified by a name string (*Icn\$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the icon name is a numeric resource, it should be described with a leading pound sign ("#12345"). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue*&. If the operation fails, the value 0 is assigned.

IMAGELIST ADD MASKED *hLst, hBmp, rgbColor& [TO *dataValue*&]*

A bitmap is added to the icon ImageList specified by *hLst*. With this syntax, the bitmap is specified by a handle (*hBmp*), so it must have been loaded into memory (e.g. with GRAPHIC BITMAP). The parameter *rgbColor&* specifies the RGB color used in the bitmap to specify transparent pixels. Each pixel of that color is changed to the color black, and a mask bitmap is created to describe the transparent pixels. If the TO clause is included, the index position of the first added icon (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD MASKED *hLst, Bmp\$, rgbColor& [TO *dataValue&*]*

A bitmap is added to the icon ImageList specified by *hLst*. With this syntax, the bitmap is specified by a name string (*Bmp\$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the image name is a numeric resource, it should be described with a leading pound sign ("#12345"). The parameter *rgbColor&* specifies the RGB color used in the bitmap to specify transparent pixels. Each pixel of that color is changed to the color black, and a mask bitmap is created to describe the transparent pixels. If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST GET COUNT *hLst* TO *dataValue&*

The number of images in the IMAGELIST is retrieved, and assigned to the [long integer](#) variable specified by *dataValue&*.

IMAGELIST KILL *hLst*

The IMAGELIST specified by *hLst* is destroyed. All allocated memory and resources are released.

IMAGELIST NEW BITMAP|ICON *nWidth&, nHeight&, depth&, initial& TO *hLst**

A new ImageList structure is created. If you specify BITMAP, each image you add will be stored as a single bitmap. If you specify ICON, each image you add will be stored as two bitmaps in order to support transparent areas. The parameters *nWidth&* and *nHeight&* specify the size of each image in pixels. The *depth&* parameter specifies the color depth in bits per pixel (4,8,16,24,32). A depth of 4 offers 16 colors, 8 offers 256 colors, etc. The *initial&* parameter specifies the initial size of the ImageList. While it can grow beyond this number, it is most efficient to allocate space accurately at the time of creation. The variable *hLst* receives the handle of the newly created ImageList, or zero if the operation failed.

IMAGELIST SET OVERLAY *hLst, image&, overlay&*

The image specified by the index number *image&* is declared to be an overlay image. The *overlay&* parameter must be in the range of 1 to 15, and it is used later to retrieve and/or specify this particular overlay image.

See also

[GRAPHIC BITMAP LOAD](#), [GRAPHIC BITMAP NEW](#), [GRAPHIC IMAGELIST](#), [LISTVIEW](#), [TAB SET IMAGELIST](#), [TREEVIEW](#), [XPRINT IMAGELIST](#)

IMAGELIST SET OVERLAY statement

Keyword Template

Purpose

Syntax

Remarks
See also
Example

IMAGELIST statement

Purpose Create and manage an IMAGELIST object to use with other functions.

Syntax

```

IMAGELIST ADD BITMAP hLst, hBmp [,hMsk] [TO dataValue&]
IMAGELIST ADD BITMAP hLst, Bmp$ [,Msk$] [TO dataValue&]
IMAGELIST ADD ICON hLst, hIcn [TO dataValue&]
IMAGELIST ADD ICON hLst, Icn$ [TO dataValue&]
IMAGELIST ADD MASKED hLst, hBmp, rgbColor& [TO dataValue&]
IMAGELIST ADD MASKED hLst, Bmp$, rgbColor& [TO dataValue&]
IMAGELIST GET COUNT hLst TO dataValue&
IMAGELIST KILL hLst
IMAGELIST NEW BITMAP|ICON nWidth&, nHeight&, depth&, initial& TO hLst
IMAGELIST SET OVERLAY hLst, image&, overlay&

```

hBmp [Handle](#) of a Bitmap.

hIcn Handle of an Icon.

hLst Handle of the IMAGELIST.

hMsk Handle of a Mask.

dataValue& A [long integer](#) variable to which result data is assigned.

rgbColor& A [RGB](#) color used in the bitmap to specify transparent pixels.

Remarks An IMAGELIST is a structure which contains any number of graphical images, either bitmaps or icons, but not a mixture. All of the images are automatically converted to the type, size, and color depth specified when the IMAGELIST is created. A bitmap (file type *.BMP) is a single color image, while an icon (file type *.ICO) supports transparency by including both a color bitmap and a mask bitmap. The mask bitmap is a monochrome image (one bit per [pixel](#)), where each "set" bit describes a pixel which remains transparent. The IMAGELIST structure can best be described as a set, or [array](#), of images. You can retrieve the images individually by index number, or pass the entire IMAGELIST to a control which requires it ([LISTVIEW](#), etc.).

An empty ImageList is first created with IMAGELIST NEW. Images are then added with IMAGELIST ADD, until the structure is complete. If you add an image which is wider than the size specified by *nWidth&*, the image is separated into multiple bitmaps, each of which is added in sequence. When an IMAGELIST is attached to a control like LISTVIEW, it is usually destroyed automatically when the control is destroyed. Consult the control documentation for that information. If not, you must explicitly destroy it with IMAGELIST KILL.

IMAGELIST ADD BITMAP *hLst*, *hBmp* [,*hMsk*] [TO *dataValue&*]

An image is added to the ImageList specified by *hLst*. With this syntax, the image is specified by a handle (*hBmp*), so it must have been loaded into memory (e.g. with `LOADBITMAP`). If the ImageList is an ICON type, a second mask bitmap is also specified by a handle (*hMsk*). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD BITMAP *hLst*, *Bmp\$* [,*Msk\$*] [TO *dataValue&*]

An image is added to the ImageList specified by *hLst*. With this syntax, the image is specified by a name

(*Bmp\$*), which is the name of an embedded [resource](#) or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the image name is a numeric resource, it should be described with a leading pound sign ("#12345"). If the ImageList is an ICON type, a second mask bitmap is also specified by a handle (*hMsk*). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD ICON *hLst, hIcn* [TO *dataValue&*]

An icon is added to the ImageList specified by *hLst*. With this syntax, the icon is specified by a handle (*hIcn*), so it must have been loaded into memory (e.g. with the [WinApi](#) LoadIcon. If the TO clause is included, the index position of the first added icon (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD ICON *hLst, Icn\$* [TO *dataValue&*]

An icon is added to the ImageList specified by *hLst*. With this syntax, the icon is specified by a name string (*Icn\$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the icon name is a numeric resource, it should be described with a leading pound sign ("#12345"). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD MASKED *hLst, hBmp, rgbColor&* [TO *dataValue&*]

A bitmap is added to the icon ImageList specified by *hLst*. With this syntax, the bitmap is specified by a handle (*hBmp*), so it must have been loaded into memory (e.g. with GRAPHIC BITMAP). The parameter *rgbColor&* specifies the RGB color used in the bitmap to specify transparent pixels. Each pixel of that color is changed to the color black, and a mask bitmap is created to describe the transparent pixels. If the TO clause is included, the index position of the first added icon (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD MASKED *hLst, Bmp\$, rgbColor&* [TO *dataValue&*]

A bitmap is added to the icon ImageList specified by *hLst*. With this syntax, the bitmap is specified by a name string (*Bmp\$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the image name is a numeric resource, it should be described with a leading pound sign ("#12345"). The parameter *rgbColor&* specifies the RGB color used in the bitmap to specify transparent pixels. Each pixel of that color is changed to the color black, and a mask bitmap is created to describe the transparent pixels. If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST GET COUNT *hLst* TO *dataValue&*

The number of images in the IMAGELIST is retrieved, and assigned to the [long integer](#) variable specified by *dataValue&*.

IMAGELIST KILL *hLst*

The IMAGELIST specified by *hLst* is destroyed. All allocated memory and resources are released.

IMAGELIST NEW BITMAP|ICON *nWidth*&, *nHeight*&, *depth*&, *initial*& TO *hLst*

A new ImageList structure is created. If you specify BITMAP, each image you add will be stored as a single bitmap. If you specify ICON, each image you add will be stored as two bitmaps in order to support transparent areas. The parameters *nWidth*& and *nHeight*& specify the size of each image in pixels. The *depth*& parameter specifies the color depth in bits per pixel (4,8,16,24,32). A depth of 4 offers 16 colors, 8 offers 256 colors, etc. The *initial*& parameter specifies the initial size of the ImageList. While it can grow beyond this number, it is most efficient to allocate space accurately at the time of creation. The variable *hLst* receives the handle of the newly created ImageList, or zero if the operation failed.

IMAGELIST SET OVERLAY *hLst*, *image*&, *overlay*&

The image specified by the index number *image*& is declared to be an overlay image. The *overlay*& parameter must be in the range of 1 to 15, and it is used later to retrieve and/or specify this particular overlay image.

See also

[GRAPHIC BITMAP LOAD](#), [GRAPHIC BITMAP NEW](#), [GRAPHIC IMAGELIST](#), [LISTVIEW](#), [TAB SET IMAGELIST](#), [TREEVIEW](#), [XPRINT IMAGELIST](#)

IMP operator

IMP operator

Purpose The IMP operator works as both a logical and a bitwise [arithmetic operator](#).

Syntax *p* IMP *q*

Remarks **IMP as a logical operator**

The IMP operator returns FALSE (zero) if and only if its first operand is TRUE (non-zero), and its second operand is FALSE. In all other cases, it returns TRUE.

Truth table

| x | y | x IMP y |
|---|---|---------|
| T | T | T |
| T | F | F |
| F | T | T |
| F | F | T |

Using IMP as a bitwise arithmetic operator

IMP is seldom used as a bitwise arithmetic operator, but here is a sample:

```

          1001 0111 0000 0000 = &H9700
IMP    0011 1111 1111 1111 = &H3FFF (the mask)
-----
          0111 1111 1111 1111 = &H7FFF (result)
MSB   ↑                               ↑ LSB (bit 0)
```

See also

[Arithmetic Operators](#), [AND](#), [EQV](#), [ISFALSE](#), [ISTRUE](#), [NOT](#), [OR](#), [XOR](#)

IMPORT ADDR statement

Keyword Template

Purpose

Syntax
Remarks
See also
Example

IMPORT statement **New!**

Purpose Load or free a library ([DLL](#)) to access an imported procedure.

Syntax

```
IMPORT ADDR ProcName$, LibName$ TO AddrVar& [, HndlVar&]
IMPORT CLOSE LibHndl
```

Remarks In most cases, libraries are implicitly loaded automatically when you list an IMPORT or LIB option in a [DECLARE](#) statement. While that's the easiest approach, it can cause a fatal problem if the DLL is missing, or it's a version which does not include the [Sub/Function](#) you need. In that case, your program will fail at startup, and not execute at all.

IMPORT ADDR allows you to load a DLL explicitly, by name, so that you can handle a problem gracefully if the operation fails for any reason. With IMPORT ADDR, *ProcName\$* specifies the name of the SUB or Function you wish to access, while *LibName\$* specifies the name of the DLL and where it is located. *ProcName\$* must use the correct upper/lower case for all alphabetic characters or it will fail. If the load is successful, the address of the entry point of the Sub/Function is assigned to the variable *AddrVar&*, and the handle of the DLL is assigned to the optional variable *HndlVar&*. Both of these variables must be [Long](#) Integers or [DWords](#). If the load fails for any reason, the value zero (0) is assigned to both.

After the library (DLL) is loaded successfully, you can access the Sub/Function with [CALL DWORD](#) *AddrVar&*.

Once you are through using the library, you can release it and regain the memory used by executing IMPORT CLOSE. The expression *LibHndl* must specify the value returned in *HndlVar&* when the DLL was loaded. If you do not execute an IMPORT CLOSE, the DLL will be automatically released when your program terminates.

See also [CALL DWORD](#), [DECLARE](#)

IMPORT CLOSE statement

Keyword Template

Purpose
Syntax
Remarks
See also
Example

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See also [CALL DWORD](#), [DECLARE](#)

INCR statement

INCR statement

Purpose Increment a variable by 1; increment a [pointer](#) by the size of its target; or increment the target of a numeric pointer by 1.

Syntax `INCR variable`

Remarks *variable* can be a

or a pointer [variable](#). When INCR is used with a numeric variable, 1 is added to the numeric variable.

When INCR is used with a pointer variable itself, the value of the pointer is incremented by the size of the pointer's target.

When INCR is used on a numeric pointer's target (i.e., INCR @IntPtr) the value of the target is incremented by 1.

For example, given a pointer to an array where the pointer targets element 1000, applying INCR to the pointer would result in the pointer aiming at element 1001. The actual address held by the pointer would have risen by two, because the target of the pointer is an Integer which is two bytes wide.

Conversely, if INCR was used on the target of this Integer pointer, the value of the element itself would be incremented by 1.

See also [DECR](#), [LET](#)

Example

```
DIM x&, LongPtr AS LONG POINTER
INCR x&
INCR LongPtr
INCR @LongPtr
```

INPUT# statement

INPUT# statement

Purpose Load [variables](#) with data from a [sequential file](#).

Syntax `INPUT #filenum&, variable_list`

Remarks `filenum&` is the [file number](#), or variable containing a file number, given when the file was [opened](#). `variable_list` is a comma-delimited sequence of one or more or variables. When the INPUT# statement reads an unquoted data item from a file, it removes leading spaces. If leading spaces are significant, place quotes around the file data, either directly or by using [WRITE#](#) to save the data to disk. Please note that data to be quoted should not contain embedded quotes.

The data in the file must match the type(s) of the variable(s) defined in the INPUT# statement. The file data should be separated by commas with a carriage return at the end. The WRITE# statement is ideal for creating such files.

INPUT# also supports fixed-length and [nul-terminated](#) string variables; however, data that is longer than the string is truncated to fit into the string. [Dynamic strings](#) receive the data without truncation. [UDT](#) variables may not be used, although [fixed-length](#) and nul-terminated UDT member variables are supported.

See also [LINE INPUT#](#), [PRINT#](#), [WRITE#](#)

Example

```
SUB MakeFile
  ' MakeFile opens a sequential file for output.
  ' Using WRITE#, it writes lines of different
  ' data types to the file.
  OPEN "INPUT#.DTA" FOR OUTPUT AS #1
  StringVariable$ = "I'll be back."
  IntegerVar% = 1000
  FloatingPoint! = 30000.12
  ' Write a line of text to the sequential file.
  WRITE #1, StringVariable$, IntegerVar%, FloatingPoint!
  CLOSE #1
END SUB

SUB ReadFile
  ' This procedure opens a sequential file for
  ' input. Using INPUT# it reads lines of
  ' different data types from the file.
  OPEN "INPUT#.DTA" FOR INPUT AS #1
  RESET StringVariable$
  RESET IntegerVar%
  RESET FloatingPoint!
  ' Read a line of text from the sequential file.
  INPUT #1, StringVariable$, IntegerVar%, FloatingPoint!
  CLOSE #1
END SUB
```

INPUTBOX\$ function

INPUTBOX\$ function

Purpose INPUTBOX\$ displays a dialog box containing a prompt. INPUTBOX\$ waits for the user to enter text, and accept or cancel the dialog. INPUTBOX\$ returns the contents of the text box.

Syntax `sResult$ = INPUTBOX$(prompt$ [[, title$], default$] [, xpos%, ypos%])`

Remarks `Prompt$` is the text prompt displayed in the Inputbox dialog.

`Title$` is the caption for the Inputbox dialog and is optional.

`Default$` is the default result text displayed in the edit section of the Inputbox dialog, and

is optional.

xpos% and *ypos%* specify the location on the screen to display the Inputbox, in [dialog units](#). If these are not specified, the Inputbox dialog is centered on the screen.

Restrictions The returned string value is limited to 255 characters.

See also [MSGBOX function](#), [MSGBOX statement](#), [TXT pseudo-object](#)

Example `sResult$ = INPUTBOX$("Enter your Name", , "Jane Doe")`

INSTANCE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

INSTANCE statement

Purpose Declare [INSTANCE](#) variables which are unique to each [object](#).

Syntax `INSTANCE variable[()] [AS type] [, variable[()]]`
`INSTANCE variable[()] [, variable[()]] [, ...] AS type`

Remarks INSTANCE statements are used to declare instance variables for an object. A unique set of instance variables is created for every new object, which may only be referenced from within that object. INSTANCE statements may only be placed at the beginning of a [CLASS/END CLASS](#) block, preceding all

blocks.

INSTANCE will optionally accept a list of variables, each of which are defined by the descriptor which follows it:

```
INSTANCE x as integer, y as long
```

INSTANCE will also accept a list of variables, all of which are defined by the single descriptor at the end of the list;

```
INSTANCE aaa, bbb, ccc AS INTEGER
INSTANCE vptr, aptr() AS LONG PTR
```

To declare an array as an instance variable, use an empty set of parentheses in the variable list: You can then use the [DIM](#) statement to dimension the [array](#).

See also [GLOBAL](#), [INTERFACE \(Direct\)](#), [LOCAL](#), [STATIC](#), [THREADED](#), [What is an object, anyway?](#)

INSTR function

INSTR function

Purpose Search a

for the existence of a second string.

Syntax `y& = INSTR([Position&], MainStr$, [ANY] MatchStr$)`

Remarks INSTR returns the position of *MatchStr\$* within *MainStr\$*. The return value is indexed to

one, while zero means "not found".

Position& specifies the character position to begin the search. If *Position&* is one or greater, *MainStr\$* is searched left to right. The value one starts at the first character, two the second, etc. If *Position&* is -1 or less, *MainStr\$* is searched from right to left. The value -1 starts at the last character, -2 the second to last, etc. If *Position&* is not given, the default value of +1 is assumed.

```
x& = INSTR("xyz", "y") ' returns 2
x& = INSTR("xyz", "a") ' returns 0
a$ = "My Dog" : b$ = " "
x& = INSTR(a$, b$)      ' returns 3
```

It is important to note that in all cases, even when *Position&* is negative, the return value of INSTR() is the absolute position of the match, from left to right, starting with the first character.

ANY If the ANY keyword is included, *MatchStr\$* specifies a list of single characters. INSTR searches for each of these characters individually. As soon as any one of these characters is found, INSTR returns the position of the match.

```
x& = INSTR(-2, "efcdef", ANY "ef") returns a result of 5
```

INSTR is case-sensitive, meaning that upper-case and lower-case letters must match exactly in *MatchStr\$* and *MainStr\$*.

Restrictions Special search terms are evaluated in this sequence:

1. If *Position&* is zero, or beyond the length of *MainStr\$*, the value zero is returned.
2. If *MainStr\$* is null, the value zero is returned.
3. If *MatchStr\$* is null, the absolute *Position&* value (default of 1) is returned.

See also [EXTRACT\\$, LCASE\\$, LEFT\\$, LTRIM\\$, MID\\$, RIGHT\\$, RTRIM\\$, SHRINK\\$, TALLY, TRIM\\$, UCASE\\$, VERIFY](#)

Example

```
' x$ = first command-line argument, assuming spaces, commas,
' periods, and tabs are valid delimiters.
IF INSTR(COMMAND$, ANY " ,." + CHR$(9)) > 0 THEN
  x$ = "There is more than one command-line argument"
ELSE
  x$ = "There is at most one command-line argument"
END IF
```

INT function

INT function

Purpose Convert a numeric expression to an value.

Syntax *y* = INT(*numeric_expression*)

Remarks INT rounds *numeric_expression* to the largest integral value that is less than or equal to *numeric_expression*.

See also [CEIL, CINT, FIX, FRAC, ROUND](#)

Example

```
DIM X AS SINGLE, Y AS LONG
FOR X = -1.1 TO 2.1 STEP .5
  Y = INT(X)
NEXT X
```

Result

| X | Y |
|------|----|
| -1.1 | -2 |
| -0.6 | -1 |
| -0.1 | -1 |
| 0.4 | 0 |
| 0.9 | 0 |

| | |
|-----|---|
| 1.4 | 1 |
| 1.9 | 1 |

INTERFACE / END INTERFACE Block (Direct)

Keyword Template

Purpose

Syntax

Remarks

See also

Example

INTERFACE / END INTERFACE Block (Direct)

Purpose Declare a direct [object](#) interface and its member [Methods/Properties](#).

Syntax

```
INTERFACE interfacename [$GUID] [AS EVENT] [AS HIDDEN]
    {METHOD | PROPERTY} name [(arguments)] [AS type]
END INTERFACE
```

Remarks The first line in an Interface Block must be an [INHERIT](#) statement. INHERIT specifies the [base class](#) or the user interface upon which this new interface is built. It defines the base methods available, the optional user methods which are available, and the calling conventions which will apply. In the current version of PowerBASIC, the following may be used:

INHERIT IUnknown

This defines a Custom Interface with only direct access to the interface [methods](#). [OBJRESULT](#) (an HRESULT value) is not supported. Return values are typically passed in CPU/FPU registers, just like a user defined [FUNCTION](#). This is the format most often used for internal objects, as it offers access to more data types than the other forms. You may substitute the word CUSTOM for IUNKNOWN, as they are synonyms.

INHERIT IAutomation

This defines an Automation Interface with only direct access to the interface methods. [OBJRESULT](#) (an HRESULT value) is always supported. Return values are passed as a hidden, last parameter (automatically, by PowerBASIC). Parameters and return values are limited to [COM](#) data types. A [User Defined Type](#) used as a return value or parameter will be converted to a BYVAL DWORD. This is the format most often used for [COM objects](#) which do not require access to the IDispatch interface. You may substitute the word AUTOMATION for IAUTOMATION, as they are synonyms.

INHERIT IDispatch

This defines a Dual Interface, which offers both direct access and Dispatch access to the interface methods. [OBJRESULT](#) (an HRESULT value) is always supported. This interface inherits from IAutomation, so the calling conventions are identical to IAutomation when used for direct access. You may substitute the word DUAL for IDISPATCH, as they are synonyms.

INHERIT <UserClass>, <UserInterface>

This defines an inherited user-written interface, so the new interface implements the base class (Unknown, IDispatch, etc.) and all of the Methods and Properties, as well. It's necessary to specify both the class and the interface name to be inherited, because it's

possible to have multiple implementations of any particular interface.

INTERFACE / END INTERFACE statements enclose the METHOD and PROPERTY definitions which constitute a class. There are two forms of the INTERFACE / END INTERFACE block. When it appears outside of a [CLASS](#) block, it is simply a declaration of the interface, much like [DECLARE](#) statements are used for functions:

```
INTERFACE name [$GUID] [AS EVENT]
  INHERIT IUnknown
  METHOD MyMethod(xyz AS LONG)
  PROPERTY GET MyProp() AS STRING
END INTERFACE
```

The above form is used to declare an interface which is implemented in another .EXE or .DLL, but will be accessed here through COM services. It may also be used for added self-documentation of internal classes. If it appears within a CLASS block, it is the implementation of the Methods/Properties for the Class. The interface implementation must precisely match any prior interface declaration.

```
CLASS name [$GUID] [AS COM]
  INTERFACE name [$GUID] [AS HIDDEN]
    INHERIT iUnknown
    METHOD MyMethod(xyz AS LONG)
      [statements]
    END METHOD
    PROPERTY GET MyProp() AS STRING
      [statements]
    END PROPERTY
  END INTERFACE
END CLASS
```

The name and optional [\\$GUID](#) are supplied by the programmer to uniquely identify the interface. The first entry in every INTERFACE block must be the base class upon which it is built. Every interface must ultimately inherit from IUnknown, which is a requirement.

By default, a class is considered private, so that the methods are accessible only from within the EXE or DLL where it is defined. The AS COM attribute to the CLASS statement makes the class available externally, to virtually any process which is COM-aware.

The optional AS HIDDEN attribute to the INTERFACE statement prevents the interface from being documented when the type library is created. When marked as hidden, any and all uses of the interface are hidden, even if they appear in multiple classes.

With an internal class, the \$GUID on CLASS and INTERFACE statements may be freely omitted, as PowerBASIC can readily identify them by name. With a published COM class, you should insert a specific [GUID](#) of your choice. If omitted, a random GUID will be created by the compiler, but it will change every time you compile the program. This will be difficult to synchronize with other programs which wish to identify and access your object.

The following code defines a dual interface whose methods are available for both direct access and Dispatch access. This is the form you will typically use for COM objects, since it offers the best compatibility with varied client modules.

```
INTERFACE DispatchIface
  INHERIT IDispatch
  METHOD MethodDef()
    [statements]
  END METHOD
END INTERFACE
```

You should note that the IDispatch interface itself inherits from IUnknown, so that both interfaces are ultimately available. As an additional required base class, the IDispatch declaration is built into the PowerBASIC Compiler.

Every method and property in a dual interface needs a positive, [long integer](#) value to identify it. That integral value is known as a Dispid (Dispatch ID), and it's used internally by COM services to call the correct function on a Dispatch interface. You can specify a particular Dispid by enclosing it in angle brackets immediately following the Method/Property name in an Interface definition block.

```
INTERFACE Dualiface
  INHERIT IDispatch
  METHOD MethodOne <76> ()
  METHOD MethodTwo <77> ()
END INTERFACE
```

If you don't specify a Dispid, PowerBASIC will assign a random value for you. This is fine for internal objects, but may cause a failure for published COM objects, as the Dispid could change each time you compile your program. It is particularly important that you specify a Dispid for each Method/Property in a COM Event Interface.

Inherited User-Written Interfaces

PowerBASIC offers Implementation Inheritance of user-written interfaces. That is, an interface can inherit all of the code in the methods and properties of a selected interface. You can then add additional methods and properties to the new interface. When you inherit a user-written interface, you must specify both the class name and the interface name, since COM allows you to have multiple implementations of any particular interface.

You can override an inherited method or property by coding a replacement which is preceded by the word **OVERRIDE**. It's possible to one or many override procedures, but they must appear in the same sequence as the ones they replace.

```
CLASS MyClass
  INTERFACE MyFace
    INHERIT IDispatch
    METHOD aaa()
      ' code...
    END METHOD
    METHOD bbb()
      ' code...
    END METHOD
    METHOD ccc()
      ' code...
    END METHOD
    METHOD ddd()
      ' code...
    END METHOD
  END INTERFACE
END CLASS

CLASS TheClass
  INTERFACE TheFace
    INHERIT MyClass, MyFace
    OVERRIDE METHOD bbb()
      ' new code...
    END METHOD
    OVERRIDE METHOD ddd()
      ' new code...
    END METHOD
    METHOD xxx()
      ' code...
    END METHOD
  END INTERFACE
END CLASS
```

Note that in the above example, the new interface "TheFace" first inherits all four methods

from "MyFace" (aaa,bbb,ccc,ddd). However, because of the OVERRIDE statements, both bbb() and ddd() are replaced by newer versions of the methods. Because of the nature of Virtual Function Tables, the OVERRIDE procedures must remain in the original sequence. That is, bbb() must precede ddd(), and both must precede any added methods, such as xxx().

Because of the nature of code replacement necessary in implementation inheritance, the interface to be inherited must always physically precede the new, child interface.

See also [INTERFACE \(IDBind\)](#), [CLASS](#), [INSTANCE](#), [ISINTERFACE](#), [LET \(with Objects\)](#), [ME](#), [METHOD](#), [MYBASE](#), [PROPERTY](#), [What does an Interface look like?](#), [What is inheritance?](#)

INTERFACE/END INTERFACE block (Dispatch)

INTERFACE/END INTERFACE block (IDBind)

Purpose Declare a [dispatch](#) interface and its member [Methods/Properties](#) for the purposes of [IDBinding](#) to a Dispatch COM interface.

Syntax

```
INTERFACE IDBIND interfacename
  MEMBER {CALL | GET | SET | LET} membername <dispid> ( [[OPTIONAL
    [IN | OUT | INOUT]] paramname <dispid> [AS type] [,...]] )
    [AS {vartype | interface}]
  [...]
END INTERFACE
```

Remarks In order to provide IDBinding services, PowerBASIC must be able to pre-construct the references to the DISPATCH [COM](#) interface members at compile-time. Without an [interface](#) definition block, only [late-binding](#) at run-time would be possible. Late-binding is less efficient than IDBinding.

You may list every Method/Property in the interface, or just the ones that are referenced in the code. They can appear in any sequence. Member names may contain (normally) reserved keywords such as [INPUT](#) or [KILL](#), etc

The most important aspect of an interface block is that it clearly associates a *dispid* with the each Method/Property name. Named parameters in the *paramname* list also require an appropriate *dispid* value, as does any Property which returns an object to be used in a nested object reference. All *dispid* values must be enclosed in angle brackets (< and >), and may be expressed as hexadecimal or decimal numeric literals.

You can look up the *dispid* values of COM servers using an [Object Browser](#), or by reading your object documentation. You can even insert additional information about the types and return value for your own reference, even though the compiler does not use them.

Previous versions of PowerBASIC compilers used an older style syntax of "INTERFACE DISPATCH *interfacename*" for this structure. It was updated to better reflect the nature of the description. While the older syntax will be recognized in this version, we suggest you update the word DISPATCH to IDBIND soon.

Restrictions If the compiler cannot resolve the interface name definition specified in a [DIM](#) or [LET](#) statement, a [compile-time error](#) is generated accordingly.

interfacename must not be a PowerBASIC keyword. If a keyword conflict arises, the addition of an arbitrary prefix is acceptable. For example, INTERFACE IDBIND Shell() could be changed to INTERFACE IDBIND MyShell() and PowerBASIC will still resolve the interface correctly.

Method/Property *membername* items may freely use PowerBASIC keywords without concern for conflicts with normal code syntax. For example, MEMBER CALL Open() is a valid syntax for an interface method.

See also [DIM](#), [ID Binding](#), [INTERFACE \(Direct\)](#), [ISINTERFACE](#), [LET \(with Objects\)](#), [Late Binding](#), [LET \(with Variants\)](#), [OBJECTIVE](#), [OBJECT](#), [OBJPTR](#), [OBJRESULT](#), [PROGID\\$](#), [What is an object, anyway?](#), [What is DISPATCH?](#)

Example

```

INTERFACE IDBIND IAPPUser
    MEMBER CALL DELETE<&H1>()
    MEMBER GET Name<&H2>() AS STRING
    MEMBER LET Name<&H2>() 'Param Type As String
    MEMBER LET Password<&H3>() 'Param Type As String
    MEMBER GET ReadOnly<&H4>() AS LONG
    MEMBER LET ReadOnly<&H4>() 'Param Type As Long
    MEMBER GET ProjectRights<&H5>(OPTIONAL IN Project AS STRING<&H0>) AS
LONG
    MEMBER LET ProjectRights<&H5>(OPTIONAL IN Project AS STRING<&H0>)
    MEMBER CALL RemoveProjectRights<&H6>(IN Project AS STRING<&H0>)
END INTERFACE

INTERFACE IDBIND IAPPItems
    MEMBER GET Count<&H1>() AS LONG
    MEMBER GET Item<&H0>(IN sItem AS VARIANT<&H0>) AS IAPPItem
END INTERFACE

DIM oApp AS IAPPUser
LET oApp = NEW IAPPUser IN "com.server.0"

```

IPowerArray.ARRAYBASE method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of [arrays](#). It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a [VARIANT](#) variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

```

%vt_i2          = 2          %vt_ui4          = 19

```

| | | | |
|---------------------------|------|------------------------------|-------|
| <code>%vt_i4</code> | = 3 | <code>%vt_i8</code> | = 20 |
| <code>%vt_r4</code> | = 4 | <code>%vt_int</code> | = 22 |
| <code>%vt_r8</code> | = 5 | <code>%vt_uint</code> | = 23 |
| <code>%vt_cy</code> | = 6 | <code>%vt_ptr</code> | = 26 |
| <code>%vt_date</code> | = 7 | <code>%vt_userdefined</code> | = 29 |
| <code>%vt_bstr</code> | = 8 | <code>%vt_filetime</code> | = 64 |
| <code>%vt_dispatch</code> | = 9 | <code>%vt_astr</code> | = 201 |
| <code>%vt_bool</code> | = 11 | <code>%vt_stringfix</code> | = 203 |
| <code>%vt_variant</code> | = 12 | <code>%vt_wstringfix</code> | = 204 |
| <code>%vt_unknown</code> | = 13 | <code>%vt_stringz</code> | = 205 |
| <code>%vt_decimal</code> | = 14 | <code>%vt_wstringz</code> | = 206 |
| <code>%vt_i1</code> | = 16 | <code>%vt_type</code> | = 211 |
| <code>%vt_ui1</code> | = 17 | <code>%vt_ext</code> | = 221 |
| <code>%vt_ui2</code> | = 18 | <code>%vt_curx</code> | = 222 |

The array dimensions are stated at the time the array is created by executing the [DIM](#) method. The `ByRef Bounds` parameter refers to a PowerBounds UDT which is predefined in the compiler. `Bound` is a PowerBOUND UDT for use with [RedimPreserve](#). It is also predefined in the compiler.

```

TYPE PowerBounds
    Elements1 AS LONG
    LowBound1 AS LONG
    Elements2 AS LONG
    LowBound2 AS LONG
    Elements3 AS LONG
    LowBound3 AS LONG
    Elements4 AS LONG
    LowBound4 AS LONG
END TYPE

TYPE PowerBound
    Elements AS LONG
    LowBound AS LONG
END TYPE

```

This class is named `PowerArray`, and the interface is named `IPowerArray`. If any of the following operations should fail, the [OBJRESULT](#) function will return a non-zero result rather than `%S_OK` (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the `SAFEARRAY` descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a [wide text](#) string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = WString <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a [wide dynamic string](#) to the array.

METHOD CLONE (PowerArray) <4>

The parameter `PowerArray` is another object of the same class as this object, which is `PowerArray`. An exact duplicate of the `SafeArray` in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef Variant) <5>

An exact copy is made of the `SafeArray` contained in the parameter `Variant`. The array copy is stored in this `PowerArray` object.

METHOD COPYTOVARIANT (ByRef Variant) <6>

An exact copy is made of the `SafeArray` in this object. The array copy is stored in the parameter `Variant`. Only arrays of data items which are Automation compatible may be

stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

**METHOD ELEMENTPTR (ByVal Index1&, Opt ByVal Index2&, _
Opt ByVal Index3&, Opt ByVal Index4&)**

AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (Subscript&) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef Variant) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETO VARIANT (ByRef Variant) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef Bound) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (Subscript&) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef GetVar, ByVal Index1&, Opt ByVal Index2&, _
_ Opt ByVal Index3&, Opt ByVal Index4&) AS
LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef SetVar, ByVal Index1&, Opt ByVal Index2&, _
_ Opt ByVal Index3&, Opt ByVal Index4&) AS
LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also [ARRAY ASSIGN](#), [ARRAY DELETE](#), [ARRAY INSERT](#), [ARRAY SCAN](#), [ARRAY SORT](#), [DIM](#), [LBOUND](#), [REDIM](#), [UBOUND](#)

IPowerArray.ARRAYDESC method

Keyword Template

Purpose**Syntax****Remarks****See also****Example**

POWERARRAY Object New!

Purpose

The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of [arrays](#). It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a [VARIANT](#) variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not

recognize them, giving undefined results.

| | | | |
|---------------------------|------|------------------------------|-------|
| <code>%vt_i2</code> | = 2 | <code>%vt_ui4</code> | = 19 |
| <code>%vt_i4</code> | = 3 | <code>%vt_i8</code> | = 20 |
| <code>%vt_r4</code> | = 4 | <code>%vt_int</code> | = 22 |
| <code>%vt_r8</code> | = 5 | <code>%vt_uint</code> | = 23 |
| <code>%vt_cy</code> | = 6 | <code>%vt_ptr</code> | = 26 |
| <code>%vt_date</code> | = 7 | <code>%vt_userdefined</code> | = 29 |
| <code>%vt_bstr</code> | = 8 | <code>%vt_filetime</code> | = 64 |
| <code>%vt_dispatch</code> | = 9 | <code>%vt_astr</code> | = 201 |
| <code>%vt_bool</code> | = 11 | <code>%vt_stringfix</code> | = 203 |
| <code>%vt_variant</code> | = 12 | <code>%vt_wstringfix</code> | = 204 |
| <code>%vt_unknown</code> | = 13 | <code>%vt_stringz</code> | = 205 |
| <code>%vt_decimal</code> | = 14 | <code>%vt_wstringz</code> | = 206 |
| <code>%vt_i1</code> | = 16 | <code>%vt_type</code> | = 211 |
| <code>%vt_ui1</code> | = 17 | <code>%vt_ext</code> | = 221 |
| <code>%vt_ui2</code> | = 18 | <code>%vt_curx</code> | = 222 |

The array dimensions are stated at the time the array is created by executing the [DIM](#) method. The `ByRef Bounds` parameter refers to a `PowerBounds` UDT which is predefined in the compiler. `Bound` is a `PowerBOUND` UDT for use with [RedimPreserve](#). It is also predefined in the compiler.

```

TYPE PowerBounds
    Elements1 AS LONG
    LowBound1 AS LONG
    Elements2 AS LONG
    LowBound2 AS LONG
    Elements3 AS LONG
    LowBound3 AS LONG
    Elements4 AS LONG
    LowBound4 AS LONG
END TYPE

TYPE PowerBound
    Elements AS LONG
    LowBound AS LONG
END TYPE

```

This class is named `PowerArray`, and the interface is named `IPowerArray`. If any of the following operations should fail, the [OBJRESULT](#) function will return a non-zero result rather than `%S_OK` (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the `SAFEARRAY` descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a [wide text](#) string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = WString <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a [wide dynamic string](#) to the array.

METHOD CLONE (PowerArray) <4>

The parameter `PowerArray` is another object of the same class as this object, which is `PowerArray`. An exact duplicate of the `SafeArray` in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef Variant) <5>

An exact copy is made of the `SafeArray` contained in the parameter `Variant`. The array copy is stored in this `PowerArray` object.

METHOD COPYTOVARIANT (ByRef Variant) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

**METHOD ELEMENTPTR (ByVal Index1&, Opt ByVal Index2&, _
Opt ByVal Index3&, Opt ByVal Index4&)
AS LONG <11>**

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (Subscript&) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef Variant) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETO VARIANT (ByRef Variant) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef Bound) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (Subscript&) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef GetVar, ByVal Index1&, Opt ByVal Index2&, _
_ Opt ByVal Index3&, Opt ByVal Index4&) AS
LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef SetVar, ByVal Index1&, Opt ByVal Index2&, _
_ Opt ByVal Index3&, Opt ByVal Index4&) AS
LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also

[ARRAY ASSIGN](#), [ARRAY DELETE](#), [ARRAY INSERT](#), [ARRAY SCAN](#), [ARRAY SORT](#), [DIM](#), [LBOUND](#), [REDIM](#), [UBOUND](#)

IPowerArray.ARRAYINFO property get

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

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A SAFEARRAY is frequently contained in a [VARIANT](#) variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is

identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

| | | | |
|---------------------------|------|------------------------------|-------|
| <code>%vt_i2</code> | = 2 | <code>%vt_ui4</code> | = 19 |
| <code>%vt_i4</code> | = 3 | <code>%vt_i8</code> | = 20 |
| <code>%vt_r4</code> | = 4 | <code>%vt_int</code> | = 22 |
| <code>%vt_r8</code> | = 5 | <code>%vt_uint</code> | = 23 |
| <code>%vt_cy</code> | = 6 | <code>%vt_ptr</code> | = 26 |
| <code>%vt_date</code> | = 7 | <code>%vt_userdefined</code> | = 29 |
| <code>%vt_bstr</code> | = 8 | <code>%vt_filetime</code> | = 64 |
| <code>%vt_dispatch</code> | = 9 | <code>%vt_astr</code> | = 201 |
| <code>%vt_bool</code> | = 11 | <code>%vt_stringfix</code> | = 203 |
| <code>%vt_variant</code> | = 12 | <code>%vt_wstringfix</code> | = 204 |
| <code>%vt_unknown</code> | = 13 | <code>%vt_stringz</code> | = 205 |
| <code>%vt_decimal</code> | = 14 | <code>%vt_wstringz</code> | = 206 |
| <code>%vt_i1</code> | = 16 | <code>%vt_type</code> | = 211 |
| <code>%vt_ui1</code> | = 17 | <code>%vt_ext</code> | = 221 |
| <code>%vt_ui2</code> | = 18 | <code>%vt_curx</code> | = 222 |

The array dimensions are stated at the time the array is created by executing the [DIM](#) method. The `ByRef Bounds` parameter refers to a `PowerBounds` UDT which is predefined in the compiler. `Bound` is a `PowerBOUND` UDT for use with [RedimPreserve](#). It is also predefined in the compiler.

```

TYPE PowerBounds
    Elements1 AS LONG
    LowBound1 AS LONG
    Elements2 AS LONG
    LowBound2 AS LONG
    Elements3 AS LONG
    LowBound3 AS LONG
    Elements4 AS LONG
    LowBound4 AS LONG
END TYPE

TYPE PowerBound
    Elements AS LONG
    LowBound AS LONG
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```

This class is named `PowerArray`, and the interface is named `IPowerArray`. If any of the following operations should fail, the [OBJRESULT](#) function will return a non-zero result rather than `%S_OK` (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the `SAFEARRAY` descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a [wide text](#) string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = WString <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a [wide dynamic string](#) to the array.

METHOD CLONE (PowerArray) <4>

The parameter `PowerArray` is another object of the same class as this object, which is `PowerArray`. An exact duplicate of the `SafeArray` in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef Variant) <5>

An exact copy is made of the `SafeArray` contained in the parameter `Variant`. The array copy is stored in this `PowerArray` object.

METHOD COPYTOVARIANT (ByRef Variant) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

**METHOD ELEMENTPTR (ByVal Index1&, Opt ByVal Index2&, _
Opt ByVal Index3&, Opt ByVal Index4&)****AS LONG <11>**

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (Subscript&) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef Variant) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef Variant) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef Bound) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript*&) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript*& parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1*&, Opt ByVal *Index2*&, _
_ Opt ByVal *Index3*&, Opt ByVal *Index4*&) AS
LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1*&, Opt ByVal *Index2*&, _
_ Opt ByVal *Index3*&, Opt ByVal *Index4*&) AS
LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also

[ARRAY ASSIGN](#), [ARRAY DELETE](#), [ARRAY INSERT](#), [ARRAY SCAN](#), [ARRAY SORT](#), [DIM](#), [LBOUND](#), [REDIM](#), [UBOUND](#)

IPowerArray.ARRAYINFO property set

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose

The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of [arrays](#). It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a [VARIANT](#) variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a

PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

| | | | |
|--------------|------|-----------------|-------|
| %vt_i2 | = 2 | %vt_ui4 | = 19 |
| %vt_i4 | = 3 | %vt_i8 | = 20 |
| %vt_r4 | = 4 | %vt_int | = 22 |
| %vt_r8 | = 5 | %vt_uint | = 23 |
| %vt_cy | = 6 | %vt_ptr | = 26 |
| %vt_date | = 7 | %vt_userdefined | = 29 |
| %vt_bstr | = 8 | %vt_filetime | = 64 |
| %vt_dispatch | = 9 | %vt_astr | = 201 |
| %vt_bool | = 11 | %vt_stringfix | = 203 |
| %vt_variant | = 12 | %vt_wstringfix | = 204 |
| %vt_unknown | = 13 | %vt_stringz | = 205 |
| %vt_decimal | = 14 | %vt_wstringz | = 206 |
| %vt_i1 | = 16 | %vt_type | = 211 |
| %vt_ui1 | = 17 | %vt_ext | = 221 |
| %vt_ui2 | = 18 | %vt_curx | = 222 |

The array dimensions are stated at the time the array is created by executing the [DIM](#) method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with [RedimPreserve](#). It is also predefined in the compiler.

```

TYPE PowerBounds
    Elements1 AS LONG
    LowBound1 AS LONG
    Elements2 AS LONG
    LowBound2 AS LONG
    Elements3 AS LONG
    LowBound3 AS LONG
    Elements4 AS LONG
    LowBound4 AS LONG
END TYPE

TYPE PowerBound
    Elements AS LONG
    LowBound AS LONG
END TYPE

```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the [OBJRESULT](#) function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a [wide text](#) string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = WString <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a [wide dynamic string](#) to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef Variant) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array

copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef Variant) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

**METHOD ELEMENTPTR (ByVal Index1&, Opt ByVal Index2&, _
Opt ByVal Index3&, Opt ByVal Index4&)**

AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (Subscript&) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef Variant) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef Variant) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef Bound) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also [ARRAY ASSIGN](#), [ARRAY DELETE](#), [ARRAY INSERT](#), [ARRAY SCAN](#), [ARRAY SORT](#), [DIM](#), [LBOUND](#), [REDIM](#), [UBOUND](#)

IPowerArray.CLONE method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of [arrays](#). It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a [VARIANT](#) variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

| | | | |
|--------------|------|-----------------|-------|
| %vt_i2 | = 2 | %vt_ui4 | = 19 |
| %vt_i4 | = 3 | %vt_i8 | = 20 |
| %vt_r4 | = 4 | %vt_int | = 22 |
| %vt_r8 | = 5 | %vt_uint | = 23 |
| %vt_cy | = 6 | %vt_ptr | = 26 |
| %vt_date | = 7 | %vt_userdefined | = 29 |
| %vt_bstr | = 8 | %vt_filetime | = 64 |
| %vt_dispatch | = 9 | %vt astr | = 201 |
| %vt_bool | = 11 | %vt_stringfix | = 203 |
| %vt_variant | = 12 | %vt_wstringfix | = 204 |
| %vt_unknown | = 13 | %vt_stringz | = 205 |
| %vt_decimal | = 14 | %vt_wstringz | = 206 |
| %vt_i1 | = 16 | %vt_type | = 211 |
| %vt_ui1 | = 17 | %vt_ext | = 221 |
| %vt_ui2 | = 18 | %vt_curx | = 222 |

The array dimensions are stated at the time the array is created by executing the [DIM](#) method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with [RedimPreserve](#). It is also predefined in the compiler.

```

TYPE PowerBounds
    Elements1 AS LONG
    LowBound1 AS LONG
    Elements2 AS LONG
    LowBound2 AS LONG
    Elements3 AS LONG
    LowBound3 AS LONG
    Elements4 AS LONG
    LowBound4 AS LONG
END TYPE

TYPE PowerBound
    Elements AS LONG
    LowBound AS LONG
END TYPE

```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the [OBJRESULT](#) function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a [wide text](#) string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = WString <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a [wide dynamic string](#) to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef Variant) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef Variant) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

**METHOD ELEMENTPTR (ByVal Index1&, Opt ByVal Index2&, _
Opt ByVal Index3&, Opt ByVal Index4&)**

AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (Subscript&) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef Variant) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef Variant) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef Bound) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also [ARRAY ASSIGN](#), [ARRAY DELETE](#), [ARRAY INSERT](#), [ARRAY SCAN](#), [ARRAY SORT](#), [DIM](#), [LBOUND](#), [REDIM](#), [UBOUND](#)

IPowerArray.COPYFROMVARIANT method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of [arrays](#). It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a [VARIANT](#) variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

| | | | |
|--------------|------|-----------------|-------|
| %vt_i2 | = 2 | %vt_ui4 | = 19 |
| %vt_i4 | = 3 | %vt_i8 | = 20 |
| %vt_r4 | = 4 | %vt_int | = 22 |
| %vt_r8 | = 5 | %vt_uint | = 23 |
| %vt_cy | = 6 | %vt_ptr | = 26 |
| %vt_date | = 7 | %vt_userdefined | = 29 |
| %vt_bstr | = 8 | %vt_filetime | = 64 |
| %vt_dispatch | = 9 | %vt_astr | = 201 |
| %vt_bool | = 11 | %vt_stringfix | = 203 |
| %vt_variant | = 12 | %vt_wstringfix | = 204 |
| %vt_unknown | = 13 | %vt_stringz | = 205 |
| %vt_decimal | = 14 | %vt_wstringz | = 206 |
| %vt_i1 | = 16 | %vt_type | = 211 |
| %vt_ui1 | = 17 | %vt_ext | = 221 |
| %vt_ui2 | = 18 | %vt_curx | = 222 |

The array dimensions are stated at the time the array is created by executing the [DIM](#) method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with [RedimPreserve](#). It is also predefined in the compiler.

```

TYPE PowerBounds
    Elements1 AS LONG
    LowBound1 AS LONG
    Elements2 AS LONG
    LowBound2 AS LONG
    Elements3 AS LONG
    LowBound3 AS LONG
    Elements4 AS LONG
    LowBound4 AS LONG
END TYPE

TYPE PowerBound
    Elements AS LONG
    LowBound AS LONG
END TYPE

```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the [OBJRESULT](#) function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a [wide text](#) string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = WString <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a [wide dynamic string](#) to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef Variant) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef Variant) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

**METHOD ELEMENTPTR (ByVal Index1&, Opt ByVal Index2&, _
Opt ByVal Index3&, Opt ByVal Index4&)**

AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (Subscript&) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

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Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

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METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1*&, Opt ByVal *Index2*&, _
_ Opt ByVal *Index3*&, Opt ByVal *Index4*&) AS
LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1*&, Opt ByVal *Index2*&, _
_ Opt ByVal *Index3*&, Opt ByVal *Index4*&) AS
LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also [ARRAY ASSIGN](#), [ARRAY DELETE](#), [ARRAY INSERT](#), [ARRAY SCAN](#), [ARRAY SORT](#), [DIM](#), [LBOUND](#), [REDIM](#), [UBOUND](#)

IPowerArray.COPYTOVARIANT method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

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Remarks

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| | | | |
|--------------|------|-----------------|-------|
| %vt_i2 | = 2 | %vt_ui4 | = 19 |
| %vt_i4 | = 3 | %vt_i8 | = 20 |
| %vt_r4 | = 4 | %vt_int | = 22 |
| %vt_r8 | = 5 | %vt_uint | = 23 |
| %vt_cy | = 6 | %vt_ptr | = 26 |
| %vt_date | = 7 | %vt_userdefined | = 29 |
| %vt_bstr | = 8 | %vt_filetime | = 64 |
| %vt_dispatch | = 9 | %vt_astr | = 201 |
| %vt_bool | = 11 | %vt_stringfix | = 203 |
| %vt_variant | = 12 | %vt_wstringfix | = 204 |
| %vt_unknown | = 13 | %vt_stringz | = 205 |
| %vt_decimal | = 14 | %vt_wstringz | = 206 |
| %vt_i1 | = 16 | %vt_type | = 211 |
| %vt_ui1 | = 17 | %vt_ext | = 221 |
| %vt_ui2 | = 18 | %vt_curx | = 222 |

The array dimensions are stated at the time the array is created by executing the [DIM](#) method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with [RedimPreserve](#). It is also predefined in the compiler.

```

TYPE PowerBounds
    Elements1 AS LONG
    LowBound1 AS LONG
    Elements2 AS LONG
    LowBound2 AS LONG
    Elements3 AS LONG
    LowBound3 AS LONG
    Elements4 AS LONG
    LowBound4 AS LONG
END TYPE

TYPE PowerBound
    Elements AS LONG
    LowBound AS LONG
END TYPE

```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the [OBJRESULT](#) function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a [wide text](#) string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = WString <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a [wide dynamic string](#) to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef Variant) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef Variant) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

**METHOD ELEMENTPTR (ByVal Index1&, Opt ByVal Index2&, _
Opt ByVal Index3&, Opt ByVal Index4&)**

AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (Subscript&) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef Variant) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef Variant) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef Bound) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also [ARRAY ASSIGN](#), [ARRAY DELETE](#), [ARRAY INSERT](#), [ARRAY SCAN](#), [ARRAY SORT](#), [DIM](#), [LBOUND](#), [REDIM](#), [UBOUND](#)

IPowerArray.DIM method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of [arrays](#). It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a [VARIANT](#) variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

| | | | |
|--------------|------|-----------------|-------|
| %vt_i2 | = 2 | %vt_ui4 | = 19 |
| %vt_i4 | = 3 | %vt_i8 | = 20 |
| %vt_r4 | = 4 | %vt_int | = 22 |
| %vt_r8 | = 5 | %vt_uint | = 23 |
| %vt_cy | = 6 | %vt_ptr | = 26 |
| %vt_date | = 7 | %vt_userdefined | = 29 |
| %vt_bstr | = 8 | %vt_filetime | = 64 |
| %vt_dispatch | = 9 | %vt astr | = 201 |
| %vt_bool | = 11 | %vt_stringfix | = 203 |
| %vt_variant | = 12 | %vt_wstringfix | = 204 |
| %vt_unknown | = 13 | %vt_stringz | = 205 |
| %vt_decimal | = 14 | %vt_wstringz | = 206 |
| %vt_i1 | = 16 | %vt_type | = 211 |
| %vt_ui1 | = 17 | %vt_ext | = 221 |
| %vt_ui2 | = 18 | %vt_curx | = 222 |

The array dimensions are stated at the time the array is created by executing the [DIM](#) method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with [RedimPreserve](#). It is also predefined in the compiler.

```

TYPE PowerBounds
    Elements1 AS LONG
    LowBound1 AS LONG
    Elements2 AS LONG
    LowBound2 AS LONG
    Elements3 AS LONG
    LowBound3 AS LONG
    Elements4 AS LONG
    LowBound4 AS LONG
END TYPE

TYPE PowerBound
    Elements AS LONG
    LowBound AS LONG
END TYPE

```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the [OBJRESULT](#) function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a [wide text](#) string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = WString <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a [wide dynamic string](#) to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef Variant) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef Variant) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

**METHOD ELEMENTPTR (ByVal Index1&, Opt ByVal Index2&, _
Opt ByVal Index3&, Opt ByVal Index4&)**

AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (Subscript&) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef Variant) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef Variant) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef Bound) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also [ARRAY ASSIGN](#), [ARRAY DELETE](#), [ARRAY INSERT](#), [ARRAY SCAN](#), [ARRAY SORT](#), [DIM](#), [LBOUND](#), [REDIM](#), [UBOUND](#)

IPowerArray.ELEMENTPTR method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of [arrays](#). It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a [VARIANT](#) variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

| | | | |
|--------------|------|-----------------|-------|
| %vt_i2 | = 2 | %vt_ui4 | = 19 |
| %vt_i4 | = 3 | %vt_i8 | = 20 |
| %vt_r4 | = 4 | %vt_int | = 22 |
| %vt_r8 | = 5 | %vt_uint | = 23 |
| %vt_cy | = 6 | %vt_ptr | = 26 |
| %vt_date | = 7 | %vt_userdefined | = 29 |
| %vt_bstr | = 8 | %vt_filetime | = 64 |
| %vt_dispatch | = 9 | %vt_astr | = 201 |
| %vt_bool | = 11 | %vt_stringfix | = 203 |
| %vt_variant | = 12 | %vt_wstringfix | = 204 |
| %vt_unknown | = 13 | %vt_stringz | = 205 |
| %vt_decimal | = 14 | %vt_wstringz | = 206 |
| %vt_i1 | = 16 | %vt_type | = 211 |
| %vt_ui1 | = 17 | %vt_ext | = 221 |
| %vt_ui2 | = 18 | %vt_curx | = 222 |

The array dimensions are stated at the time the array is created by executing the [DIM](#) method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with [RedimPreserve](#). It is also predefined in the compiler.

```

TYPE PowerBounds
    Elements1 AS LONG
    LowBound1 AS LONG
    Elements2 AS LONG
    LowBound2 AS LONG
    Elements3 AS LONG
    LowBound3 AS LONG
    Elements4 AS LONG
    LowBound4 AS LONG
END TYPE

TYPE PowerBound
    Elements AS LONG
    LowBound AS LONG
END TYPE

```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the [OBJRESULT](#) function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a [wide text](#) string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = WString <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a [wide dynamic string](#) to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef Variant) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef Variant) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

**METHOD ELEMENTPTR (ByVal Index1&, Opt ByVal Index2&, _
Opt ByVal Index3&, Opt ByVal Index4&)**

AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (Subscript&) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef Variant) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef Variant) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef Bound) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also [ARRAY ASSIGN](#), [ARRAY DELETE](#), [ARRAY INSERT](#), [ARRAY SCAN](#), [ARRAY SORT](#), [DIM](#), [LBOUND](#), [REDIM](#), [UBOUND](#)

IPowerArray.ELEMENTSIZE method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose

The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of [arrays](#). It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a [VARIANT](#) variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

| | | | |
|--------------|------|-----------------|-------|
| %vt_i2 | = 2 | %vt_ui4 | = 19 |
| %vt_i4 | = 3 | %vt_i8 | = 20 |
| %vt_r4 | = 4 | %vt_int | = 22 |
| %vt_r8 | = 5 | %vt_uint | = 23 |
| %vt_cy | = 6 | %vt_ptr | = 26 |
| %vt_date | = 7 | %vt_userdefined | = 29 |
| %vt_bstr | = 8 | %vt_filetime | = 64 |
| %vt_dispatch | = 9 | %vt astr | = 201 |
| %vt_bool | = 11 | %vt_stringfix | = 203 |
| %vt_variant | = 12 | %vt_wstringfix | = 204 |
| %vt_unknown | = 13 | %vt_stringz | = 205 |
| %vt_decimal | = 14 | %vt_wstringz | = 206 |
| %vt_i1 | = 16 | %vt_type | = 211 |
| %vt_ui1 | = 17 | %vt_ext | = 221 |
| %vt_ui2 | = 18 | %vt_curx | = 222 |

The array dimensions are stated at the time the array is created by executing the [DIM](#) method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with [RedimPreserve](#). It is also predefined in the compiler.

```

TYPE PowerBounds
    Elements1 AS LONG
    LowBound1 AS LONG
    Elements2 AS LONG
    LowBound2 AS LONG
    Elements3 AS LONG
    LowBound3 AS LONG
    Elements4 AS LONG
    LowBound4 AS LONG
END TYPE

TYPE PowerBound
    Elements AS LONG
    LowBound AS LONG
END TYPE

```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the [OBJRESULT](#) function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a [wide text](#) string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = WString <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a [wide dynamic string](#) to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef Variant) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef Variant) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

**METHOD ELEMENTPTR (ByVal Index1&, Opt ByVal Index2&, _
Opt ByVal Index3&, Opt ByVal Index4&)**

AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (Subscript&) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef Variant) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef Variant) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef Bound) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also [ARRAY ASSIGN](#), [ARRAY DELETE](#), [ARRAY INSERT](#), [ARRAY SCAN](#), [ARRAY SORT](#), [DIM](#), [LBOUND](#), [REDIM](#), [UBOUND](#)

IPowerArray.ERASE method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of [arrays](#). It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a [VARIANT](#) variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

| | | | |
|--------------|------|-----------------|-------|
| %vt_i2 | = 2 | %vt_ui4 | = 19 |
| %vt_i4 | = 3 | %vt_i8 | = 20 |
| %vt_r4 | = 4 | %vt_int | = 22 |
| %vt_r8 | = 5 | %vt_uint | = 23 |
| %vt_cy | = 6 | %vt_ptr | = 26 |
| %vt_date | = 7 | %vt_userdefined | = 29 |
| %vt_bstr | = 8 | %vt_filetime | = 64 |
| %vt_dispatch | = 9 | %vt_astr | = 201 |
| %vt_bool | = 11 | %vt_stringfix | = 203 |
| %vt_variant | = 12 | %vt_wstringfix | = 204 |
| %vt_unknown | = 13 | %vt_stringz | = 205 |
| %vt_decimal | = 14 | %vt_wstringz | = 206 |
| %vt_i1 | = 16 | %vt_type | = 211 |
| %vt_ui1 | = 17 | %vt_ext | = 221 |
| %vt_ui2 | = 18 | %vt_curx | = 222 |

The array dimensions are stated at the time the array is created by executing the [DIM](#) method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with [RedimPreserve](#). It is also predefined in the compiler.

```

TYPE PowerBounds
    Elements1 AS LONG
    LowBound1 AS LONG
    Elements2 AS LONG
    LowBound2 AS LONG
    Elements3 AS LONG
    LowBound3 AS LONG
    Elements4 AS LONG
    LowBound4 AS LONG
END TYPE

TYPE PowerBound
    Elements AS LONG
    LowBound AS LONG
END TYPE

```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the [OBJRESULT](#) function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a [wide text](#) string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = WString <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a [wide dynamic string](#) to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef Variant) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef Variant) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

**METHOD ELEMENTPTR (ByVal Index1&, Opt ByVal Index2&, _
Opt ByVal Index3&, Opt ByVal Index4&)**

AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (Subscript&) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef Variant) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef Variant) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef Bound) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also [ARRAY ASSIGN](#), [ARRAY DELETE](#), [ARRAY INSERT](#), [ARRAY SCAN](#), [ARRAY SORT](#), [DIM](#), [LBOUND](#), [REDIM](#), [UBOUND](#)

IPowerArray.LBOUND method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of [arrays](#). It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a [VARIANT](#) variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

| | | | |
|--------------|------|-----------------|-------|
| %vt_i2 | = 2 | %vt_ui4 | = 19 |
| %vt_i4 | = 3 | %vt_i8 | = 20 |
| %vt_r4 | = 4 | %vt_int | = 22 |
| %vt_r8 | = 5 | %vt_uint | = 23 |
| %vt_cy | = 6 | %vt_ptr | = 26 |
| %vt_date | = 7 | %vt_userdefined | = 29 |
| %vt_bstr | = 8 | %vt_filetime | = 64 |
| %vt_dispatch | = 9 | %vt_astr | = 201 |
| %vt_bool | = 11 | %vt_stringfix | = 203 |
| %vt_variant | = 12 | %vt_wstringfix | = 204 |
| %vt_unknown | = 13 | %vt_stringz | = 205 |
| %vt_decimal | = 14 | %vt_wstringz | = 206 |
| %vt_i1 | = 16 | %vt_type | = 211 |
| %vt_ui1 | = 17 | %vt_ext | = 221 |
| %vt_ui2 | = 18 | %vt_curx | = 222 |

The array dimensions are stated at the time the array is created by executing the [DIM](#) method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with [RedimPreserve](#). It is also predefined in the compiler.

```

TYPE PowerBounds
    Elements1 AS LONG
    LowBound1 AS LONG
    Elements2 AS LONG
    LowBound2 AS LONG
    Elements3 AS LONG
    LowBound3 AS LONG
    Elements4 AS LONG
    LowBound4 AS LONG
END TYPE

TYPE PowerBound
    Elements AS LONG
    LowBound AS LONG
END TYPE

```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the [OBJRESULT](#) function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a [wide text](#) string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = WString <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a [wide dynamic string](#) to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef Variant) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef Variant) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

**METHOD ELEMENTPTR (ByVal Index1&, Opt ByVal Index2&, _
Opt ByVal Index3&, Opt ByVal Index4&)**

AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (Subscript&) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef Variant) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef Variant) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef Bound) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also [ARRAY ASSIGN](#), [ARRAY DELETE](#), [ARRAY INSERT](#), [ARRAY SCAN](#), [ARRAY SORT](#), [DIM](#), [LBOUND](#), [REDIM](#), [UBOUND](#)

IPowerArray.LOCK method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of [arrays](#). It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a [VARIANT](#) variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

| | | | |
|--------------|------|-----------------|-------|
| %vt_i2 | = 2 | %vt_ui4 | = 19 |
| %vt_i4 | = 3 | %vt_i8 | = 20 |
| %vt_r4 | = 4 | %vt_int | = 22 |
| %vt_r8 | = 5 | %vt_uint | = 23 |
| %vt_cy | = 6 | %vt_ptr | = 26 |
| %vt_date | = 7 | %vt_userdefined | = 29 |
| %vt_bstr | = 8 | %vt_filetime | = 64 |
| %vt_dispatch | = 9 | %vt_astr | = 201 |
| %vt_bool | = 11 | %vt_stringfix | = 203 |
| %vt_variant | = 12 | %vt_wstringfix | = 204 |
| %vt_unknown | = 13 | %vt_stringz | = 205 |
| %vt_decimal | = 14 | %vt_wstringz | = 206 |
| %vt_i1 | = 16 | %vt_type | = 211 |
| %vt_ui1 | = 17 | %vt_ext | = 221 |
| %vt_ui2 | = 18 | %vt_curx | = 222 |

The array dimensions are stated at the time the array is created by executing the [DIM](#) method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with [RedimPreserve](#). It is also predefined in the compiler.

```

TYPE PowerBounds
    Elements1 AS LONG
    LowBound1 AS LONG
    Elements2 AS LONG
    LowBound2 AS LONG
    Elements3 AS LONG
    LowBound3 AS LONG
    Elements4 AS LONG
    LowBound4 AS LONG
END TYPE

TYPE PowerBound
    Elements AS LONG
    LowBound AS LONG
END TYPE

```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the [OBJRESULT](#) function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a [wide text](#) string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = WString <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a [wide dynamic string](#) to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef Variant) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef Variant) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

**METHOD ELEMENTPTR (ByVal Index1&, Opt ByVal Index2&, _
Opt ByVal Index3&, Opt ByVal Index4&)**

AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (Subscript&) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef Variant) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

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Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef Bound) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also [ARRAY ASSIGN](#), [ARRAY DELETE](#), [ARRAY INSERT](#), [ARRAY SCAN](#), [ARRAY SORT](#), [DIM](#), [LBOUND](#), [REDIM](#), [UBOUND](#)

IPowerArray.MOVEFROMVARIANT

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of [arrays](#). It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a [VARIANT](#) variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

| | | | |
|--------------|------|-----------------|-------|
| %vt_i2 | = 2 | %vt_ui4 | = 19 |
| %vt_i4 | = 3 | %vt_i8 | = 20 |
| %vt_r4 | = 4 | %vt_int | = 22 |
| %vt_r8 | = 5 | %vt_uint | = 23 |
| %vt_cy | = 6 | %vt_ptr | = 26 |
| %vt_date | = 7 | %vt_userdefined | = 29 |
| %vt_bstr | = 8 | %vt_filetime | = 64 |
| %vt_dispatch | = 9 | %vt_astr | = 201 |
| %vt_bool | = 11 | %vt_stringfix | = 203 |
| %vt_variant | = 12 | %vt_wstringfix | = 204 |
| %vt_unknown | = 13 | %vt_stringz | = 205 |
| %vt_decimal | = 14 | %vt_wstringz | = 206 |
| %vt_i1 | = 16 | %vt_type | = 211 |
| %vt_ui1 | = 17 | %vt_ext | = 221 |
| %vt_ui2 | = 18 | %vt_curx | = 222 |

The array dimensions are stated at the time the array is created by executing the [DIM](#) method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with [RedimPreserve](#). It is also predefined in the compiler.

```

TYPE PowerBounds
    Elements1 AS LONG
    LowBound1 AS LONG
    Elements2 AS LONG
    LowBound2 AS LONG
    Elements3 AS LONG
    LowBound3 AS LONG
    Elements4 AS LONG
    LowBound4 AS LONG
END TYPE

TYPE PowerBound
    Elements AS LONG
    LowBound AS LONG
END TYPE

```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the [OBJRESULT](#) function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a [wide text](#) string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = WString <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a [wide dynamic string](#) to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef Variant) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef Variant) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

**METHOD ELEMENTPTR (ByVal Index1&, Opt ByVal Index2&, _
Opt ByVal Index3&, Opt ByVal Index4&)**

AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (Subscript&) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef Variant) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef Variant) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef Bound) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also [ARRAY ASSIGN](#), [ARRAY DELETE](#), [ARRAY INSERT](#), [ARRAY SCAN](#), [ARRAY SORT](#), [DIM](#), [LBOUND](#), [REDIM](#), [UBOUND](#)

IPowerArray.MOVETO VARIANT

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of [arrays](#). It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a [VARIANT](#) variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

| | | | |
|--------------|------|-----------------|-------|
| %vt_i2 | = 2 | %vt_ui4 | = 19 |
| %vt_i4 | = 3 | %vt_i8 | = 20 |
| %vt_r4 | = 4 | %vt_int | = 22 |
| %vt_r8 | = 5 | %vt_uint | = 23 |
| %vt_cy | = 6 | %vt_ptr | = 26 |
| %vt_date | = 7 | %vt_userdefined | = 29 |
| %vt_bstr | = 8 | %vt_filetime | = 64 |
| %vt_dispatch | = 9 | %vt astr | = 201 |
| %vt_bool | = 11 | %vt_stringfix | = 203 |
| %vt_variant | = 12 | %vt_wstringfix | = 204 |
| %vt_unknown | = 13 | %vt_stringz | = 205 |
| %vt_decimal | = 14 | %vt_wstringz | = 206 |
| %vt_i1 | = 16 | %vt_type | = 211 |
| %vt_ui1 | = 17 | %vt_ext | = 221 |
| %vt_ui2 | = 18 | %vt_curx | = 222 |

The array dimensions are stated at the time the array is created by executing the [DIM](#) method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with [RedimPreserve](#). It is also predefined in the compiler.

```

TYPE PowerBounds
    Elements1 AS LONG
    LowBound1 AS LONG
    Elements2 AS LONG
    LowBound2 AS LONG
    Elements3 AS LONG
    LowBound3 AS LONG
    Elements4 AS LONG
    LowBound4 AS LONG
END TYPE

TYPE PowerBound
    Elements AS LONG
    LowBound AS LONG
END TYPE

```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the [OBJRESULT](#) function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a [wide text](#) string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = WString <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a [wide dynamic string](#) to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef Variant) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef Variant) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

**METHOD ELEMENTPTR (ByVal Index1&, Opt ByVal Index2&, _
Opt ByVal Index3&, Opt ByVal Index4&)**

AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (Subscript&) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef Variant) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef Variant) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef Bound) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also [ARRAY ASSIGN](#), [ARRAY DELETE](#), [ARRAY INSERT](#), [ARRAY SCAN](#), [ARRAY SORT](#), [DIM](#), [LBOUND](#), [REDIM](#), [UBOUND](#)

IPowerArray.REDIM method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of [arrays](#). It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a [VARIANT](#) variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

| | | | |
|--------------|------|-----------------|-------|
| %vt_i2 | = 2 | %vt_ui4 | = 19 |
| %vt_i4 | = 3 | %vt_i8 | = 20 |
| %vt_r4 | = 4 | %vt_int | = 22 |
| %vt_r8 | = 5 | %vt_uint | = 23 |
| %vt_cy | = 6 | %vt_ptr | = 26 |
| %vt_date | = 7 | %vt_userdefined | = 29 |
| %vt_bstr | = 8 | %vt_filetime | = 64 |
| %vt_dispatch | = 9 | %vt astr | = 201 |
| %vt_bool | = 11 | %vt_stringfix | = 203 |
| %vt_variant | = 12 | %vt_wstringfix | = 204 |
| %vt_unknown | = 13 | %vt_stringz | = 205 |
| %vt_decimal | = 14 | %vt_wstringz | = 206 |
| %vt_i1 | = 16 | %vt_type | = 211 |
| %vt_ui1 | = 17 | %vt_ext | = 221 |
| %vt_ui2 | = 18 | %vt_curx | = 222 |

The array dimensions are stated at the time the array is created by executing the [DIM](#) method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with [RedimPreserve](#). It is also predefined in the compiler.

```

TYPE PowerBounds
    Elements1 AS LONG
    LowBound1 AS LONG
    Elements2 AS LONG
    LowBound2 AS LONG
    Elements3 AS LONG
    LowBound3 AS LONG
    Elements4 AS LONG
    LowBound4 AS LONG
END TYPE

TYPE PowerBound
    Elements AS LONG
    LowBound AS LONG
END TYPE

```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the [OBJRESULT](#) function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a [wide text](#) string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = WString <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a [wide dynamic string](#) to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef Variant) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef Variant) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

**METHOD ELEMENTPTR (ByVal Index1&, Opt ByVal Index2&, _
Opt ByVal Index3&, Opt ByVal Index4&)**

AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (Subscript&) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef Variant) <17>

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Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <19>

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METHOD REDIMPRESERVE (ByRef Bound) <20>

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METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also [ARRAY ASSIGN](#), [ARRAY DELETE](#), [ARRAY INSERT](#), [ARRAY SCAN](#), [ARRAY SORT](#), [DIM](#), [LBOUND](#), [REDIM](#), [UBOUND](#)

IPowerArray.REDIMPRESERVE method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

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Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

| | | | |
|--------------|------|-----------------|-------|
| %vt_i2 | = 2 | %vt_ui4 | = 19 |
| %vt_i4 | = 3 | %vt_i8 | = 20 |
| %vt_r4 | = 4 | %vt_int | = 22 |
| %vt_r8 | = 5 | %vt_uint | = 23 |
| %vt_cy | = 6 | %vt_ptr | = 26 |
| %vt_date | = 7 | %vt_userdefined | = 29 |
| %vt_bstr | = 8 | %vt_filetime | = 64 |
| %vt_dispatch | = 9 | %vt astr | = 201 |
| %vt_bool | = 11 | %vt_stringfix | = 203 |
| %vt_variant | = 12 | %vt_wstringfix | = 204 |
| %vt_unknown | = 13 | %vt_stringz | = 205 |
| %vt_decimal | = 14 | %vt_wstringz | = 206 |
| %vt_i1 | = 16 | %vt_type | = 211 |
| %vt_ui1 | = 17 | %vt_ext | = 221 |
| %vt_ui2 | = 18 | %vt_curx | = 222 |

The array dimensions are stated at the time the array is created by executing the [DIM](#) method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with [RedimPreserve](#). It is also predefined in the compiler.

```

TYPE PowerBounds
    Elements1 AS LONG
    LowBound1 AS LONG
    Elements2 AS LONG
    LowBound2 AS LONG
    Elements3 AS LONG
    LowBound3 AS LONG
    Elements4 AS LONG
    LowBound4 AS LONG
END TYPE

TYPE PowerBound
    Elements AS LONG
    LowBound AS LONG
END TYPE

```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the [OBJRESULT](#) function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a [wide text](#) string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = WString <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a [wide dynamic string](#) to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef Variant) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef Variant) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

**METHOD ELEMENTPTR (ByVal Index1&, Opt ByVal Index2&, _
Opt ByVal Index3&, Opt ByVal Index4&)**

AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (Subscript&) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef Variant) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef Variant) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef Bound) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript*&) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript*& parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1*&, Opt ByVal *Index2*&, _
_ Opt ByVal *Index3*&, Opt ByVal *Index4*&) AS
LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1*&, Opt ByVal *Index2*&, _
_ Opt ByVal *Index3*&, Opt ByVal *Index4*&) AS
LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also

[ARRAY ASSIGN](#), [ARRAY DELETE](#), [ARRAY INSERT](#), [ARRAY SCAN](#), [ARRAY SORT](#), [DIM](#), [LBOUND](#), [REDIM](#), [UBOUND](#)

IPowerArray.RESET method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose

The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of [arrays](#). It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a [VARIANT](#) variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

| | | | |
|--------------|------|-----------------|-------|
| %vt_i2 | = 2 | %vt_ui4 | = 19 |
| %vt_i4 | = 3 | %vt_i8 | = 20 |
| %vt_r4 | = 4 | %vt_int | = 22 |
| %vt_r8 | = 5 | %vt_uint | = 23 |
| %vt_cy | = 6 | %vt_ptr | = 26 |
| %vt_date | = 7 | %vt_userdefined | = 29 |
| %vt_bstr | = 8 | %vt_filetime | = 64 |
| %vt_dispatch | = 9 | %vt_astr | = 201 |
| %vt_bool | = 11 | %vt_stringfix | = 203 |
| %vt_variant | = 12 | %vt_wstringfix | = 204 |
| %vt_unknown | = 13 | %vt_stringz | = 205 |
| %vt_decimal | = 14 | %vt_wstringz | = 206 |
| %vt_i1 | = 16 | %vt_type | = 211 |
| %vt_ui1 | = 17 | %vt_ext | = 221 |
| %vt_ui2 | = 18 | %vt_curx | = 222 |

The array dimensions are stated at the time the array is created by executing the [DIM](#) method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with [RedimPreserve](#). It is also predefined in the compiler.

```

TYPE PowerBounds
    Elements1 AS LONG
    LowBound1 AS LONG
    Elements2 AS LONG
    LowBound2 AS LONG
    Elements3 AS LONG
    LowBound3 AS LONG
    Elements4 AS LONG
    LowBound4 AS LONG
END TYPE

TYPE PowerBound
    Elements AS LONG
    LowBound AS LONG
END TYPE

```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the [OBJRESULT](#) function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a [wide text](#) string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = WString <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a [wide dynamic string](#) to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef Variant) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef Variant) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

**METHOD ELEMENTPTR (ByVal Index1&, Opt ByVal Index2&, _
Opt ByVal Index3&, Opt ByVal Index4&)**

AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (Subscript&) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef Variant) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef Variant) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef Bound) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also [ARRAY ASSIGN](#), [ARRAY DELETE](#), [ARRAY INSERT](#), [ARRAY SCAN](#), [ARRAY SORT](#), [DIM](#), [LBOUND](#), [REDIM](#), [UBOUND](#)

IPowerArray.SUBSCRIPTS method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of [arrays](#). It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a [VARIANT](#) variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

| | | | |
|--------------|------|-----------------|-------|
| %vt_i2 | = 2 | %vt_ui4 | = 19 |
| %vt_i4 | = 3 | %vt_i8 | = 20 |
| %vt_r4 | = 4 | %vt_int | = 22 |
| %vt_r8 | = 5 | %vt_uint | = 23 |
| %vt_cy | = 6 | %vt_ptr | = 26 |
| %vt_date | = 7 | %vt_userdefined | = 29 |
| %vt_bstr | = 8 | %vt_filetime | = 64 |
| %vt_dispatch | = 9 | %vt_astr | = 201 |
| %vt_bool | = 11 | %vt_stringfix | = 203 |
| %vt_variant | = 12 | %vt_wstringfix | = 204 |
| %vt_unknown | = 13 | %vt_stringz | = 205 |
| %vt_decimal | = 14 | %vt_wstringz | = 206 |
| %vt_i1 | = 16 | %vt_type | = 211 |
| %vt_ui1 | = 17 | %vt_ext | = 221 |
| %vt_ui2 | = 18 | %vt_curx | = 222 |

The array dimensions are stated at the time the array is created by executing the [DIM](#) method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with [RedimPreserve](#). It is also predefined in the compiler.

```

TYPE PowerBounds
    Elements1 AS LONG
    LowBound1 AS LONG
    Elements2 AS LONG
    LowBound2 AS LONG
    Elements3 AS LONG
    LowBound3 AS LONG
    Elements4 AS LONG
    LowBound4 AS LONG
END TYPE

TYPE PowerBound
    Elements AS LONG
    LowBound AS LONG
END TYPE

```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the [OBJRESULT](#) function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a [wide text](#) string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = WString <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a [wide dynamic string](#) to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef Variant) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef Variant) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

**METHOD ELEMENTPTR (ByVal Index1&, Opt ByVal Index2&, _
Opt ByVal Index3&, Opt ByVal Index4&)**

AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (Subscript&) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef Variant) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef Variant) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef Bound) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also [ARRAY ASSIGN](#), [ARRAY DELETE](#), [ARRAY INSERT](#), [ARRAY SCAN](#), [ARRAY SORT](#), [DIM](#), [LBOUND](#), [REDIM](#), [UBOUND](#)

IPowerArray.UBOUND method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of [arrays](#). It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a [VARIANT](#) variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

| | | | |
|--------------|------|-----------------|-------|
| %vt_i2 | = 2 | %vt_ui4 | = 19 |
| %vt_i4 | = 3 | %vt_i8 | = 20 |
| %vt_r4 | = 4 | %vt_int | = 22 |
| %vt_r8 | = 5 | %vt_uint | = 23 |
| %vt_cy | = 6 | %vt_ptr | = 26 |
| %vt_date | = 7 | %vt_userdefined | = 29 |
| %vt_bstr | = 8 | %vt_filetime | = 64 |
| %vt_dispatch | = 9 | %vt_astr | = 201 |
| %vt_bool | = 11 | %vt_stringfix | = 203 |
| %vt_variant | = 12 | %vt_wstringfix | = 204 |
| %vt_unknown | = 13 | %vt_stringz | = 205 |
| %vt_decimal | = 14 | %vt_wstringz | = 206 |
| %vt_i1 | = 16 | %vt_type | = 211 |
| %vt_ui1 | = 17 | %vt_ext | = 221 |
| %vt_ui2 | = 18 | %vt_curx | = 222 |

The array dimensions are stated at the time the array is created by executing the [DIM](#) method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with [RedimPreserve](#). It is also predefined in the compiler.

```

TYPE PowerBounds
    Elements1 AS LONG
    LowBound1 AS LONG
    Elements2 AS LONG
    LowBound2 AS LONG
    Elements3 AS LONG
    LowBound3 AS LONG
    Elements4 AS LONG
    LowBound4 AS LONG
END TYPE

TYPE PowerBound
    Elements AS LONG
    LowBound AS LONG
END TYPE

```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the [OBJRESULT](#) function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a [wide text](#) string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = WString <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a [wide dynamic string](#) to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef Variant) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef Variant) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

**METHOD ELEMENTPTR (ByVal Index1&, Opt ByVal Index2&, _
Opt ByVal Index3&, Opt ByVal Index4&)**

AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (Subscript&) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef Variant) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef Variant) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef Bound) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also [ARRAY ASSIGN](#), [ARRAY DELETE](#), [ARRAY INSERT](#), [ARRAY SCAN](#), [ARRAY SORT](#), [DIM](#), [LBOUND](#), [REDIM](#), [UBOUND](#)

IPowerArray.UNLOCK method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of [arrays](#). It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a [VARIANT](#) variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

| | | | |
|--------------|------|-----------------|-------|
| %vt_i2 | = 2 | %vt_ui4 | = 19 |
| %vt_i4 | = 3 | %vt_i8 | = 20 |
| %vt_r4 | = 4 | %vt_int | = 22 |
| %vt_r8 | = 5 | %vt_uint | = 23 |
| %vt_cy | = 6 | %vt_ptr | = 26 |
| %vt_date | = 7 | %vt_userdefined | = 29 |
| %vt_bstr | = 8 | %vt_filetime | = 64 |
| %vt_dispatch | = 9 | %vt_astr | = 201 |
| %vt_bool | = 11 | %vt_stringfix | = 203 |
| %vt_variant | = 12 | %vt_wstringfix | = 204 |
| %vt_unknown | = 13 | %vt_stringz | = 205 |
| %vt_decimal | = 14 | %vt_wstringz | = 206 |
| %vt_i1 | = 16 | %vt_type | = 211 |
| %vt_ui1 | = 17 | %vt_ext | = 221 |
| %vt_ui2 | = 18 | %vt_curx | = 222 |

The array dimensions are stated at the time the array is created by executing the [DIM](#) method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with [RedimPreserve](#). It is also predefined in the compiler.

```

TYPE PowerBounds
    Elements1 AS LONG
    LowBound1 AS LONG
    Elements2 AS LONG
    LowBound2 AS LONG
    Elements3 AS LONG
    LowBound3 AS LONG
    Elements4 AS LONG
    LowBound4 AS LONG
END TYPE

TYPE PowerBound
    Elements AS LONG
    LowBound AS LONG
END TYPE

```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the [OBJRESULT](#) function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a [wide text](#) string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = WString <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a [wide dynamic string](#) to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef Variant) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef Variant) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

**METHOD ELEMENTPTR (ByVal Index1&, Opt ByVal Index2&, _
Opt ByVal Index3&, Opt ByVal Index4&)**

AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (Subscript&) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef Variant) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef Variant) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef Bound) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also [ARRAY ASSIGN](#), [ARRAY DELETE](#), [ARRAY INSERT](#), [ARRAY SCAN](#), [ARRAY SORT](#), [DIM](#), [LBOUND](#), [REDIM](#), [UBOUND](#)

IPowerArray.VALUEGET method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of [arrays](#). It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a [VARIANT](#) variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

| | | | |
|--------------|------|-----------------|-------|
| %vt_i2 | = 2 | %vt_ui4 | = 19 |
| %vt_i4 | = 3 | %vt_i8 | = 20 |
| %vt_r4 | = 4 | %vt_int | = 22 |
| %vt_r8 | = 5 | %vt_uint | = 23 |
| %vt_cy | = 6 | %vt_ptr | = 26 |
| %vt_date | = 7 | %vt_userdefined | = 29 |
| %vt_bstr | = 8 | %vt_filetime | = 64 |
| %vt_dispatch | = 9 | %vt astr | = 201 |
| %vt_bool | = 11 | %vt_stringfix | = 203 |
| %vt_variant | = 12 | %vt_wstringfix | = 204 |
| %vt_unknown | = 13 | %vt_stringz | = 205 |
| %vt_decimal | = 14 | %vt_wstringz | = 206 |
| %vt_i1 | = 16 | %vt_type | = 211 |
| %vt_ui1 | = 17 | %vt_ext | = 221 |
| %vt_ui2 | = 18 | %vt_curx | = 222 |

The array dimensions are stated at the time the array is created by executing the [DIM](#) method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with [RedimPreserve](#). It is also predefined in the compiler.

```

TYPE PowerBounds
    Elements1 AS LONG
    LowBound1 AS LONG
    Elements2 AS LONG
    LowBound2 AS LONG
    Elements3 AS LONG
    LowBound3 AS LONG
    Elements4 AS LONG
    LowBound4 AS LONG
END TYPE

TYPE PowerBound
    Elements AS LONG
    LowBound AS LONG
END TYPE

```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the [OBJRESULT](#) function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a [wide text](#) string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = WString <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a [wide dynamic string](#) to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef Variant) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef Variant) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

**METHOD ELEMENTPTR (ByVal Index1&, Opt ByVal Index2&, _
Opt ByVal Index3&, Opt ByVal Index4&)**

AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (Subscript&) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef Variant) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef Variant) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef Bound) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also [ARRAY ASSIGN](#), [ARRAY DELETE](#), [ARRAY INSERT](#), [ARRAY SCAN](#), [ARRAY SORT](#), [DIM](#), [LBOUND](#), [REDIM](#), [UBOUND](#)

IPowerArray.VALUESET method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of [arrays](#). It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a [VARIANT](#) variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

| | | | |
|--------------|------|-----------------|-------|
| %vt_i2 | = 2 | %vt_ui4 | = 19 |
| %vt_i4 | = 3 | %vt_i8 | = 20 |
| %vt_r4 | = 4 | %vt_int | = 22 |
| %vt_r8 | = 5 | %vt_uint | = 23 |
| %vt_cy | = 6 | %vt_ptr | = 26 |
| %vt_date | = 7 | %vt_userdefined | = 29 |
| %vt_bstr | = 8 | %vt_filetime | = 64 |
| %vt_dispatch | = 9 | %vt_astr | = 201 |
| %vt_bool | = 11 | %vt_stringfix | = 203 |
| %vt_variant | = 12 | %vt_wstringfix | = 204 |
| %vt_unknown | = 13 | %vt_stringz | = 205 |
| %vt_decimal | = 14 | %vt_wstringz | = 206 |
| %vt_i1 | = 16 | %vt_type | = 211 |
| %vt_ui1 | = 17 | %vt_ext | = 221 |
| %vt_ui2 | = 18 | %vt_curx | = 222 |

The array dimensions are stated at the time the array is created by executing the [DIM](#) method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with [RedimPreserve](#). It is also predefined in the compiler.

```

TYPE PowerBounds
    Elements1 AS LONG
    LowBound1 AS LONG
    Elements2 AS LONG
    LowBound2 AS LONG
    Elements3 AS LONG
    LowBound3 AS LONG
    Elements4 AS LONG
    LowBound4 AS LONG
END TYPE

TYPE PowerBound
    Elements AS LONG
    LowBound AS LONG
END TYPE

```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the [OBJRESULT](#) function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a [wide text](#) string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = WString <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a [wide dynamic string](#) to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef Variant) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef Variant) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

**METHOD ELEMENTPTR (ByVal Index1&, Opt ByVal Index2&, _
Opt ByVal Index3&, Opt ByVal Index4&)**

AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (Subscript&) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef Variant) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef Variant) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef Bound) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also [ARRAY ASSIGN](#), [ARRAY DELETE](#), [ARRAY INSERT](#), [ARRAY SCAN](#), [ARRAY SORT](#), [DIM](#), [LBOUND](#), [REDIM](#), [UBOUND](#)

IPowerArray.VALUETYPE method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of [arrays](#). It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a [VARIANT](#) variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

| | | | |
|--------------|------|-----------------|-------|
| %vt_i2 | = 2 | %vt_ui4 | = 19 |
| %vt_i4 | = 3 | %vt_i8 | = 20 |
| %vt_r4 | = 4 | %vt_int | = 22 |
| %vt_r8 | = 5 | %vt_uint | = 23 |
| %vt_cy | = 6 | %vt_ptr | = 26 |
| %vt_date | = 7 | %vt_userdefined | = 29 |
| %vt_bstr | = 8 | %vt_filetime | = 64 |
| %vt_dispatch | = 9 | %vt astr | = 201 |
| %vt_bool | = 11 | %vt_stringfix | = 203 |
| %vt_variant | = 12 | %vt_wstringfix | = 204 |
| %vt_unknown | = 13 | %vt_stringz | = 205 |
| %vt_decimal | = 14 | %vt_wstringz | = 206 |
| %vt_i1 | = 16 | %vt_type | = 211 |
| %vt_ui1 | = 17 | %vt_ext | = 221 |
| %vt_ui2 | = 18 | %vt_curx | = 222 |

The array dimensions are stated at the time the array is created by executing the [DIM](#) method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with [RedimPreserve](#). It is also predefined in the compiler.

```

TYPE PowerBounds
    Elements1 AS LONG
    LowBound1 AS LONG
    Elements2 AS LONG
    LowBound2 AS LONG
    Elements3 AS LONG
    LowBound3 AS LONG
    Elements4 AS LONG
    LowBound4 AS LONG
END TYPE

TYPE PowerBound
    Elements AS LONG
    LowBound AS LONG
END TYPE

```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the [OBJRESULT](#) function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a [wide text](#) string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = WString <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a [wide dynamic string](#) to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef Variant) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef Variant) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

**METHOD ELEMENTPTR (ByVal Index1&, Opt ByVal Index2&, _
Opt ByVal Index3&, Opt ByVal Index4&)**

AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (Subscript&) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef Variant) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef Variant) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef Bound) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
_ Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS
LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also [ARRAY ASSIGN](#), [ARRAY DELETE](#), [ARRAY INSERT](#), [ARRAY SCAN](#), [ARRAY SORT](#), [DIM](#), [LBOUND](#), [REDIM](#), [UBOUND](#)

IPowerCollection.ADD method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group **New!**

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, [UDT](#), [object](#), etc.). Collection interfaces are [DUAL](#) -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VmntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
Collobj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of [bytes](#) (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a [variant](#), while the key is passed and stored as a [wide](#) (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HRESULT of S_OK (0) is returned. If it fails because of a duplicate key, an HRESULT of E_DUPLICATEKEY (&H800A01C9) is returned, and an [Object Error](#) (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (PowerKey AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as [true](#). If not found, the value [false](#) (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified **OUT** parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the **OBJRESULT** will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar*& = ObjectVar.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar*&.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the **OBJRESULT** will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the **OBJRESULT** is set to %S_OK (0). When there are no more data items to retrieve, the **OBJRESULT** is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the **OBJRESULT** is set to %S_OK (0). When there are no more data items to retrieve, the **OBJRESULT** is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, **OBJRESULT** returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, **OBJRESULT** returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter *Flags* is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

| | |
|----------------------------|---|
| LinkList Collection | A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence. |
| Syntax | <i>The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).</i> <pre><ObjectVar>.membername(params) RetVal = <ObjectVar>.membername(params) <ObjectVar>.membername(params) TO ReturnVariable</pre> |
| Remarks | Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods. The Dispatch ID (DispID) for each member method is displayed within angle brackets. |

LinkList Collection Methods

ADD <3> (PowerItem AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (Index AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (Index AS Long, PowerItem AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (Index AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (Index AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection.

The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine [stack](#) on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection

A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax

The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the

caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also [FOR EACH/NEXT](#)

IPowerCollection.CLEAR method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, [UDT](#), [object](#), etc.). Collection interfaces are [DUAL](#) -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VvntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
Collobj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of [bytes](#) (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the

same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

| | |
|-------------------------|--|
| Power Collection | A Power Collection creates a set of data items, each of which is associated with an alpha-numeric key which you define. The data item is passed and stored as a variant , while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence. |
| Syntax | <i>The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).</i> <pre><ObjectVar>.membername(<i>params</i>) RetVal = <ObjectVar>.membername(<i>params</i>) <ObjectVar>.membername(<i>params</i>) TO ReturnVariable</pre> |
| Remarks | Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed. The Dispatch ID (DispID) for each member method is displayed within angle brackets. |

Power Collection Methods

ADD <3> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HRESULT of S_OK (0) is returned. If it fails because of a duplicate key, an HRESULT of E_DUPLICATEKEY (&H800A01C9) is returned, and an [Object Error](#) (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (PowerKey AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as [true](#). If not found, the value [false](#) (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (Index AS Long, OUT PowerKey as WString, OUT PowerItem as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified [OUT](#) parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (Index AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it

to the variable *IndexVar*&.

ITEM <9> (PowerKey AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (PowerKey AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (Flags AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter *Flags* is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

**LinkList
Collection**

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (PowerItem AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar*& = ObjectVar.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar*&.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection.

The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

**Stack
Collection**

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine [stack](#) on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL

interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also [FOR EACH/NEXT](#)

IPowerCollection.CONTAINS method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, [UDT](#), [object](#), etc.). Collection interfaces are [DUAL](#) -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VmntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
Collobj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of [bytes](#) (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a [variant](#), while the key is passed and stored as a [wide](#) (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax *The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as

either upper case or lower case, but not mixed.

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HRESULT of S_OK (0) is returned. If it fails because of a duplicate key, an HRESULT of E_DUPLICATEKEY (&H800A01C9) is returned, and an [Object Error](#) (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as [true](#). If not found, the value [false](#) (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified [OUT](#) parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar*& = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar*&.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the [OBJRESULT](#) is set to %S_OK (0). When there are no more data items to retrieve, the [OBJRESULT](#) is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved

sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (PowerKey AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (Flags AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter *Flags* is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

**LinkList
Collection**

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (PowerItem AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (Index AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (Index AS Long, PowerItem AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If

the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (Index AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (Index AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection.

The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

**Stack
Collection**

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine [stack](#) on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

The Dispatch ID (DisplD) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (Dispid) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also [FOR EACH/NEXT](#)

IPowerCollection.COUNT method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, [UDT](#), [object](#), etc.). Collection interfaces are [DUAL](#) -- member methods may

be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VvntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
collobj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of [bytes](#) (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a [variant](#), while the key is passed and stored as a [wide](#) (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
```

```
RetVal = <ObjectVar>.membername(params)
```

```
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HRESULT of S_OK (0) is returned. If it fails because of a duplicate key, an HRESULT of E_DUPLICATEKEY (&H800A01C9) is returned, and an [Object Error](#) (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (PowerKey AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as [true](#). If not found, the value [false](#) (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified **OUT** parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the **OBJRESULT** will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar*& = ObjectVar.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar*&.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the **OBJRESULT** will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the **OBJRESULT** is set to %S_OK (0). When there are no more data items to retrieve, the **OBJRESULT** is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the **OBJRESULT** is set to %S_OK (0). When there are no more data items to retrieve, the **OBJRESULT** is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, **OBJRESULT** returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, **OBJRESULT** returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter *Flags* is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

**LinkList
Collection**

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position

number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkedListCollection". The INTERFACE is ILinkedListCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a LinkedListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkedList Collection Methods**ADD <3> (PowerItem AS Variant)**

The *PowerItem* variant is added to the end of the LinkedListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkedListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkedListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkedListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (Index AS Long) AS Long

The current INDEX for the LinkedListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (Index AS Long, PowerItem AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (Index AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkedListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkedListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkedListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is

successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (Index AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection.

The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

| | |
|-------------------------|---|
| Stack Collection | A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods. |
| Syntax | <i>The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).</i> <pre><ObjectVar>.membername(params) RetVal = <ObjectVar>.membername(params) <ObjectVar>.membername(params) TO ReturnVariable</pre> |
| Remarks | The Dispatch ID (DispID) for each member method is displayed within angle brackets. |

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

| | |
|-------------------------|--|
| Queue Collection | A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods. |
| Syntax | <i>The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).</i> <pre><ObjectVar>.membername(params) RetVal = <ObjectVar>.membername(params) <ObjectVar>.membername(params) TO ReturnVariable</pre> |
| Remarks | The Dispatch ID (DispID) for each member method is displayed within angle brackets. |

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also [FOR EACH/NEXT](#)

IPowerCollection.ENTRY method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose

A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, [UDT](#), [object](#), etc.). Collection interfaces are [DUAL](#) -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VmntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
Collobj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of [bytes](#) (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should

be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a [variant](#), while the key is passed and stored as a [wide](#) (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HRESULT of S_OK (0) is returned. If it fails because of a duplicate key, an HRESULT of E_DUPLICATEKEY (&H800A01C9) is returned, and an [Object Error](#) (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (PowerKey AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as [true](#). If not found, the value [false](#) (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (Index AS Long, OUT PowerKey as WString, OUT PowerItem as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified [OUT](#) parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (Index AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (PowerKey AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter *Flags* is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

**LinkList
Collection**

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the

caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (Index AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (Index AS Long, PowerItem AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (Index AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (Index AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection.

The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

**Stack
Collection**

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine [stack](#) on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

<ObjectVar>.membername(*params*)

RetVal = <ObjectVar>.membername(*params*)

Remarks `<ObjectVar>.membername(params) TO ReturnVariable`
 The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

`<ObjectVar>.membername(params)`

`RetVal = <ObjectVar>.membername(params)`

`<ObjectVar>.membername(params) TO ReturnVariable`

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also [FOR EACH/NEXT](#)

IPowerCollection.FIRST method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose

A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, [UDT](#), [object](#), etc.). Collection interfaces are [DUAL](#) -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VmntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
collobj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of [bytes](#) (v_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a [variant](#), while the key is passed and stored as a [wide](#) (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HRESULT of S_OK (0) is returned. If it fails because of a duplicate key, an HRESULT of E_DUPLICATEKEY (&H800A01C9) is returned, and an [Object Error](#) (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (PowerKey AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as [true](#). If not found, the value [false](#) (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (Index AS Long, OUT PowerKey as WString, OUT PowerItem as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified [OUT](#) parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (Index AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (PowerKey AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the [OBJRESULT](#) is set to %S_OK (0). When there are no more data items to retrieve, the [OBJRESULT](#) is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the [OBJRESULT](#) is set to %S_OK (0). When there are no more data items to retrieve, the [OBJRESULT](#) is set to %S_FALSE (1).

REMOVE <12> (PowerKey AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the *PowerCollection*. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the *PowerCollection* are sorted based upon the text in the associated *PowerKeys*. If the parameter *Flags* is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

`<ObjectVar>.membername(params)`

`RetVal = <ObjectVar>.membername(params)`

`<ObjectVar>.membername(params) TO ReturnVariable`

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar*& = ObjectVar.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar*&.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will

be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (Index AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection.

The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

**Stack
Collection**

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine [stack](#) on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

**Queue
Collection**

A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

| | |
|----------------|---|
| Syntax | <p>The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).</p> <pre><ObjectVar>.membername(params) RetVal = <ObjectVar>.membername(params) <ObjectVar>.membername(params) TO ReturnVariable</pre> |
| Remarks | The Dispatch ID (DispID) for each member method is displayed within angle brackets. |

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also [FOR EACH/NEXT](#)

IPowerCollection.INDEX method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, [UDT](#), [object](#), etc.). Collection interfaces are [DUAL](#) -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VmntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
Collobj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of [bytes](#) (v_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a [variant](#), while the key is passed and stored as a [wide](#) (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
```

```
RetVal = <ObjectVar>.membername(params)
```

```
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HRESULT of S_OK (0) is returned. If it fails because of a duplicate key, an HRESULT of E_DUPLICATEKEY (&H800A01C9) is returned, and an [Object Error](#) (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (PowerKey AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as [true](#). If not found, the value [false](#) (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (Index AS Long, OUT PowerKey as WString, OUT PowerItem as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified [OUT](#) parameters. If the index number is less than one, or greater than the

item count, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (Index AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (PowerKey AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (PowerKey AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (Flags AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter *Flags* is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

**LinkList
Collection**

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

`<ObjectVar>.membername(params)`

```
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods**ADD <3> (PowerItem AS Variant)**

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (Index AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (Index AS Long, PowerItem AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (Index AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (Index AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection.

The index number of each data item past the removed item is decremented by one. If the

requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine [stack](#) on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax *The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also [FOR EACH/NEXT](#)

IPowerCollection.ITEM method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group **New!**

Purpose

A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, [UDT](#), [object](#), etc.). Collection interfaces are [DUAL](#) -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VmntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
ColObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of [bytes](#) (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

**Power
Collection**

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a [variant](#), while the key is passed and stored as a [wide](#) (Unicode) string. You can retrieve these data items

directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax *The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HRESULT of S_OK (0) is returned. If it fails because of a duplicate key, an HRESULT of E_DUPLICATEKEY (&H800A01C9) is returned, and an [Object Error](#) (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (PowerKey AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as [true](#). If not found, the value [false](#) (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (Index AS Long, OUT PowerKey as WString, OUT PowerItem as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified [OUT](#) parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (Index AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (PowerKey AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent

references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (PowerKey AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (Flags AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter *Flags* is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
```

```
RetVal = <ObjectVar>.membername(params)
```

```
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (PowerItem AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (Index AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (Index AS Long, PowerItem AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (Index AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (Index AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

**Stack
Collection**

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine [stack](#) on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection

A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax

The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also

[FOR EACH/NEXT](#)

IPowerCollection.LAST method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose

A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not

have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, [UDT](#), [object](#), etc.). Collection interfaces are [DUAL](#) -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VvntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of [bytes](#) (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a [variant](#), while the key is passed and stored as a [wide](#) (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
```

```
RetVal = <ObjectVar>.membername(params)
```

```
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HRESULT of S_OK (0) is returned. If it fails because of a duplicate key, an HRESULT of E_DUPLICATEKEY (&H800A01C9) is returned, and an [Object Error](#) (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the *PowerCollection*.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The *PowerCollection* is scanned to determine if the specified *PowerKey* is present. If found, the index number of this item (range of 1 - COUNT) is returned. This value will always evaluate as [true](#). If not found, the value [false](#) (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the *PowerCollection* is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The *PowerCollection* entry specified by the *Index* number is returned to the caller in the two specified [OUT](#) parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the *PowerCOLLECTION* is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the *PowerCOLLECTION* is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar*& = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar*&.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the *PowerCOLLECTION* is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the *PowerCollection* data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the [OBJRESULT](#) is set to %S_OK (0). When there are no more data items to retrieve, the [OBJRESULT](#) is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the *PowerCollection* data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the [OBJRESULT](#) is set to %S_OK (0). When there are no more data items to retrieve, the [OBJRESULT](#) is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the *PowerCollection*. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, [OBJRESULT](#) returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (Flags AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter *Flags* is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (PowerItem AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (Index AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (Index AS Long, PowerItem AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (Index AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (Index AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine [stack](#) on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods**CLEAR <1>**

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection

A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax

The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also [FOR EACH/NEXT](#)

IPowerCollection.NEXT method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, [UDT](#), [object](#), etc.). Collection interfaces are [DUAL](#) -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VvntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
col1Obj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of [bytes](#) (v_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a [variant](#), while the key is passed and stored as a [wide](#) (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
```

```
RetVal = <ObjectVar>.membername(params)
```

```
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HRESULT of S_OK (0) is returned. If it fails because of a duplicate key, an HRESULT of E_DUPLICATEKEY (&H800A01C9) is returned, and an [Object Error](#) (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (PowerKey AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as [true](#). If not found, the value [false](#) (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (Index AS Long, OUT PowerKey as WString, OUT PowerItem as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified [OUT](#) parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent

references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index AS Long*) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (*PowerKey AS WString*) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey AS WString*)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey AS WString, PowerItem AS Variant*)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags AS Long*)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter *Flags* is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

**LinkList
Collection**

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar*& = ObjectVar.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar*&.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection.

The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine [stack](#) on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax *The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also [FOR EACH/NEXT](#)

IPowerCollection.PREVIOUS method

Keyword Template

Purpose**Syntax****Remarks****See also****Example**

COLLECTION Object Group **New!**

Purpose

A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, [UDT](#), [object](#), etc.). Collection interfaces are [DUAL](#) -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VmntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
Collobj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of [bytes](#) (v_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a [variant](#), while the key is passed and stored as a [wide](#) (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL

interface).

```
<ObjectVar>.membername(params)
```

```
RetVal = <ObjectVar>.membername(params)
```

```
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HRESULT of S_OK (0) is returned. If it fails because of a duplicate key, an HRESULT of E_DUPLICATEKEY (&H800A01C9) is returned, and an [Object Error](#) (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (PowerKey AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as [true](#). If not found, the value [false](#) (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (Index AS Long, OUT PowerKey as WString, OUT PowerItem as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified [OUT](#) parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (Index AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (PowerKey AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (PowerKey AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (Flags AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter *Flags* is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

**LinkList
Collection**

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (PowerItem AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (Index AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is

not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index AS Long, PowerItem AS Variant*)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index AS Long*) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index AS Long*)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection.

The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (*Index AS Long, PowerItem AS Variant*)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine [stack](#) on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

The Dispatch ID (Dispid) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection

A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax

The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).

`<ObjectVar>.membername(params)`

`RetVal = <ObjectVar>.membername(params)`

`<ObjectVar>.membername(params) TO ReturnVariable`

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also

[FOR EACH/NEXT](#)

IPowerCollection.REMOVE method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose

A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined

internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, [UDT](#), [object](#), etc.). Collection interfaces are [DUAL](#) -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VvntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
colObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of [bytes](#) (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a [variant](#), while the key is passed and stored as a [wide](#) (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HRESULT of S_OK (0) is returned. If it fails because of a duplicate key, an HRESULT of E_DUPLICATEKEY (&H800A01C9) is returned, and an [Object Error](#) (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as [true](#). If not found, the value [false](#) (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified [OUT](#) parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar*& = ObjectVar.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar*&.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (Flags AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter *Flags* is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
```

```
RetVal = <ObjectVar>.membername(params)
```

```
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods**ADD <3> (PowerItem AS Variant)**

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (Index AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (Index AS Long, PowerItem AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (Index AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is

returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (Index AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection.

The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

**Stack
Collection**

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine [stack](#) on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

**Queue
Collection**

A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax

The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also

[FOR EACH/NEXT](#)

IPowerCollection.REPLACE method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose

A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, [UDT](#), [object](#), etc.). Collection interfaces are [DUAL](#) -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VmntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of [bytes](#) (v_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a [variant](#), while the key is passed and stored as a [wide](#) (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HRESULT of S_OK (0) is returned. If it fails because of a duplicate key, an HRESULT of E_DUPLICATEKEY (&H800A01C9) is returned, and an [Object Error](#) (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (PowerKey AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as [true](#). If not found, the value [false](#) (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (Index AS Long, OUT PowerKey as WString, OUT PowerItem as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified [OUT](#) parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (Index AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the

parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (*PowerKey AS WString*) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey AS WString*)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey AS WString, PowerItem AS Variant*)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags AS Long*)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter *Flags* is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem AS Variant*)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar*& = ObjectVar.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar*&.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection.

The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

**Stack
Collection**

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine [stack](#) on

your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax *The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also [FOR EACH/NEXT](#)

IPowerCollection.SORT method

Keyword Template

Purpose

Syntax
 Remarks
 See also
 Example

COLLECTION Object Group **New!**

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, [UDT](#), [object](#), etc.). Collection interfaces are [DUAL](#) -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VvntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of [bytes](#) (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a [variant](#), while the key is passed and stored as a [wide](#) (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax *The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks Items in a PowerCollection may be retrieved by their key using the ITEM method. They

may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HRESULT of S_OK (0) is returned. If it fails because of a duplicate key, an HRESULT of E_DUPLICATEKEY (&H800A01C9) is returned, and an [Object Error](#) (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (PowerKey AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as [true](#). If not found, the value [false](#) (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (Index AS Long, OUT PowerKey as WString, OUT PowerItem as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified [OUT](#) parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (Index AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (PowerKey AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the [OBJRESULT](#) is set to %S_OK (0). When there are no more data items to retrieve, the [OBJRESULT](#) is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (PowerKey AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (Flags AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter *Flags* is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

**LinkList
Collection**

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods**ADD <3> (PowerItem AS Variant)**

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (Index AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (Index AS Long, PowerItem AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection.

The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

**Stack
Collection**

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine [stack](#) on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

The Dispatch ID (DisplID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DisplD) for each member method is displayed within angle brackets.

Queue Collection Methods**CLEAR <1>**

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also [FOR EACH/NEXT](#)

IPowerThread.Close method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object New!

Purpose

A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level.

THREAD [objects](#) offer a collection of [methods](#) which allow you to easily create and maintain additional threads of execution in your programs.

A thread can be completely encapsulated (contained) within a thread object.

Encapsulation makes an object the perfect vehicle to host a thread. With thread objects, you'll have easy access to multiple thread parameters, private methods, and thread local storage of data. In short, a complete program-within-a-program which can be executed

with ease.

We liken this to the concept that "Threads are Alive". When a thread object is created and launched, it takes on a life of its own. It lives (and executes) until its lifetime is over and the thread ends. The life of the thread parallels the life of the object which makes it quite easy to manage.

PowerBASIC provides a pre-defined [interface](#) named "IPowerThread", which is a DUAL interface ([Dispatch](#) and [direct](#) access). When you create a thread object, you first [inherit](#) IPowerThread, giving you immediate access to all of its member methods. Next, you add a THREAD METHOD, a special form of private [CLASS METHOD](#), which is automatically executed when the thread is launched.

It's important to remember that the THREAD METHOD you create contains the code which will be executed in the thread. When you start the thread (by calling the [LAUNCH](#) method), it executes your THREAD METHOD. When you reach the end of the THREAD METHOD, the thread ends, and its lifetime is over. The THREAD METHOD acts just like the [MAIN](#) (or [PBMAIN](#)) function in your executable.

You may give the THREAD METHOD any name you wish. However, it is recommended you name it MAIN or PBMAIN. This bit of self-documentation will be a simple reminder of the functionality when you review the code a year from now! Generally speaking, most thread objects consist primarily of CLASS METHODS which are called from the THREAD METHOD. If there are any Member Methods (visible from outside the class), they are not usually called from within the thread. Instead, they are typically called from other threads to monitor the status and progress.

There must be exactly one THREAD METHOD per Class. No more. No less. The THREAD METHOD is executed automatically; it may never be called from within your program.

[Instance](#) variables are declared just as in any other class. Unique parameters are passed to each object when it is launched. Finally, public methods and properties may be added to monitor and manipulate the life of your thread.

Here's a synopsis of THREAD OBJECT usage:

1. Create a class with an interface which inherits IPowerThread.
2. Create a THREAD METHOD, best named MAIN or PBMAIN.
3. Create an INSTANCE variable named THREADPARAM which will hold the parameter(s) you choose to pass to the thread when it begins execution. This is usually another [object variable](#).
4. Create CLASS METHODS as needed, which will be called from the THREAD METHOD for support of that code.
5. From the main thread, create an object variable of the thread class and interface.
6. Call the LAUNCH method, passing the appropriate parameter to be used as THREADPARAM. Your thread is now running and alive.

Syntax

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

With the advent of multi-core CPU's and multi-CPU computers, it's clearly desirable to encapsulate all of the information about a particular thread in a single component. We recommend that all new code use THREAD OBJECTS exclusively, rather than the [Thread Code Group](#). Thread objects provide much greater control, and much better thread parameter handling for the programmer.

IPowerThread Methods

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

METHOD CLOSE() <2>

Releases the thread handle of this thread. Note that it does not stop a thread if it is still running; it simply releases the thread handle (i.e., the resources used to track the

thread).

Thread handles should not be released until there is no further need to use other thread methods or properties. If a thread does not need to be monitored, its handle can be released immediately. The thread resources will be freed automatically when the thread terminates naturally.

THREADCOUNT continues to report a thread tally that will include threads whose handle has already been released. A thread ID value may not be used interchangeably with a thread handle value.

METHOD EQUALS(*ObjectVar* AS *InterfaceName*) AS Long <3>

Compares the parameter *ObjectVar* to determine if it references the same object as this object. If they both reference the same object, [true](#) (-1) is returned; if not, [false](#) (0) is returned.

METHOD HANDLE() AS Long <4>

Retrieves the handle of the thread for use with Windows API functions.

METHOD ID() AS Long <5>

Retrieves the ID of the thread for use with Windows API functions.

METHOD ISALIVE() AS Long <6>

Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value [true](#) (-1) is returned; if not, the value [false](#) (0) is returned.

METHOD JOIN(*ThreadObjectVar* AS *InterfaceName*, *TimeOutVal* AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeOutVal* specifies the maximum length of time to wait, in MilliSeconds. If *TimeOutVal* is zero (0), the time to wait is infinite.

METHOD LAUNCH(*ByRef Param* as *UDT*) <8>

LAUNCH begins execution of the thread, passing parameter data to it. Since the thread is hosted by an object, it is only fitting that the parameter data be contained in the most robust form, another object.

THREADPARAM is a mandatory Instance variable which you must define in each thread class. It is normally declared as the interface name of your choice:

```
INSTANCE ThreadParam as MyInterface
```

When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is the normally the best choice, as it allows virtually any number of data items to be contained.

In simpler cases, you may choose to declare THREADPARAM as a [Long Integer](#), or [Dword](#). In that case, you must pass the launch parameter using a [pointer](#) option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
```

```
...
```

```
MyThread.Launch(ByVal MyNumber&)
```

Of course, the Pointer parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a user-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER
```

```
THREAD METHOD MyMethod() AS LONG
```

```
xyz# = ThreadParam.member1
```

```
... other code
```

```
END METHOD
```

```
...
```

```
MyThread.Launch(ByVal VARPTR(MyType))
```

PROPERTY GET PRIORITY() AS Long <9>

Retrieves the priority value for this thread. The thread priority value is one of the following:

```
%THREAD_PRIORITY_IDLE           = -15
%THREAD_PRIORITY_LOWEST          = -2
%THREAD_PRIORITY_BELOW_NORMAL   = -1
%THREAD_PRIORITY_NORMAL         = 0
%THREAD_PRIORITY_ABOVE_NORMAL   = +1
%THREAD_PRIORITY_HIGHEST        = +2
%THREAD_PRIORITY_TIME_CRITICAL  = +15
```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

```
%THREAD_PRIORITY_IDLE           = -15
%THREAD_PRIORITY_LOWEST          = -2
%THREAD_PRIORITY_BELOW_NORMAL   = -1
%THREAD_PRIORITY_NORMAL         = 0
%THREAD_PRIORITY_ABOVE_NORMAL   = +1
%THREAD_PRIORITY_HIGHEST        = +2
%THREAD_PRIORITY_TIME_CRITICAL  = +15
```

METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the THREAD METHOD is retrieved and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the [OBJRESULT](#) is set to %S_OK (0). If the thread has not ended, the value zero (0) is returned, and the OBJRESULT is set to %S_FALSE (1).

METHOD RESUME() AS Long <11>

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running at that time.

PROPERTY GET STACKSIZE() AS Long <13>

Retrieves the size of the [stack](#) for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

PROPERTY SET STACKSIZE(Long) <13>

Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

METHOD SUSPEND() AS Long <14>

Suspends execution of the thread. The suspend count of the thread is incremented. If the suspend was successful, the suspend count is returned; otherwise, -1 is returned.

If SUSPEND is executed prior to LAUNCH of the thread, the suspend count is incremented, and the subsequent LAUNCH is treated as a suspended launch. That is, all the necessary setup tasks are performed, but the thread is suspended just before execution of your THREAD METHOD begins. You can continue execution with RESUME.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running while suspended.

METHOD TIMECREATE() AS Quad <16>

Retrieves the date and time-of-day of the thread creation, and returns it as a [Quad](#) Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format of Month/Day/Year/Time.

METHOD TIMEEXIT() AS Quad <17>

Retrieves the date and time-of-day of the thread exit, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time. If the thread has not yet exited, the return value is undefined.

METHOD TIMEKERNEL() AS Quad <18>

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

METHOD TIMEUSER() AS Quad <19>

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime object](#) to convert it to a human readable format.

Restrictions

Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed when you reference one particular thread.

See also

[PowerTime](#), [THREAD Code Group](#)

Example

```

CLASS MyClass
  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD

  INTERFACE MyFace
    INHERIT IPOWERTHREAD

    METHOD abc
      END METHOD
  END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
      METHOD = 77
    END METHOD
  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"

  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION

```

IPowerThread.Equals method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object **New!**

Purpose

A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level.

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We liken this to the concept that "Threads are Alive". When a thread object is created and launched, it takes on a life of its own. It lives (and executes) until its lifetime is over and the thread ends. The life of the thread parallels the life of the object which makes it quite easy to manage.

PowerBASIC provides a pre-defined [interface](#) named "IPowerThread", which is a DUAL interface ([Dispatch](#) and [direct](#) access). When you create a thread object, you first [inherit](#) IPowerThread, giving you immediate access to all of its member methods. Next, you add a THREAD METHOD, a special form of private [CLASS METHOD](#), which is automatically executed when the thread is launched.

It's important to remember that the THREAD METHOD you create contains the code which will be executed in the thread. When you start the thread (by calling the [LAUNCH](#) method), it executes your THREAD METHOD. When you reach the end of the THREAD METHOD, the thread ends, and its lifetime is over. The THREAD METHOD acts just like the [MAIN](#) (or [PBMAIN](#)) function in your executable.

You may give the THREAD METHOD any name you wish. However, it is recommended you name it MAIN or PBMAIN. This bit of self-documentation will be a simple reminder of the functionality when you review the code a year from now! Generally speaking, most thread objects consist primarily of CLASS METHODS which are called from the THREAD METHOD. If there are any Member Methods (visible from outside the class), they are not usually called from within the thread. Instead, they are typically called from other threads to monitor the status and progress.

There must be exactly one THREAD METHOD per Class. No more. No less. The THREAD METHOD is executed automatically; it may never be called from within your program.

[Instance](#) variables are declared just as in any other class. Unique parameters are passed

to each object when it is launched. Finally, public methods and properties may be added to monitor and manipulate the life of your thread.

Here's a synopsis of THREAD OBJECT usage:

1. Create a class with an interface which inherits IPowerThread.
2. Create a THREAD METHOD, best named MAIN or PBMAIN.
3. Create an INSTANCE variable named THREADPARAM which will hold the parameter(s) you choose to pass to the thread when it begins execution. This is usually another [object variable](#).
4. Create CLASS METHODS as needed, which will be called from the THREAD METHOD for support of that code.
5. From the main thread, create an object variable of the thread class and interface.
6. Call the LAUNCH method, passing the appropriate parameter to be used as THREADPARAM. Your thread is now running and alive.

Syntax

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

With the advent of multi-core CPU's and multi-CPU computers, it's clearly desirable to encapsulate all of the information about a particular thread in a single component. We recommend that all new code use THREAD OBJECTS exclusively, rather than the [Thread Code Group](#). Thread objects provide much greater control, and much better thread parameter handling for the programmer.

IPowerThread Methods

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

METHOD CLOSE() <2>

Releases the thread handle of this thread. Note that it does not stop a thread if it is still running; it simply releases the thread handle (i.e., the resources used to track the thread).

Thread handles should not be released until there is no further need to use other thread methods or properties. If a thread does not need to be monitored, its handle can be released immediately. The thread resources will be freed automatically when the thread terminates naturally.

THREADCOUNT continues to report a thread tally that will include threads whose handle has already been released. A thread ID value may not be used interchangeably with a thread handle value.

METHOD EQUALS(ObjectVar AS InterfaceName) AS Long <3>

Compares the parameter *ObjectVar* to determine if it references the same object as this object. If they both reference the same object, [true](#) (-1) is returned; if not, [false](#) (0) is returned.

METHOD HANDLE() AS Long <4>

Retrieves the handle of the thread for use with Windows API functions.

METHOD ID() AS Long <5>

Retrieves the ID of the thread for use with Windows API functions.

METHOD ISALIVE() AS Long <6>

Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value true (-1) is returned; if not, the value false (0) is returned.

METHOD JOIN(ThreadObjectVar AS InterfaceName, TimeOutVal AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeOutVal* specifies the maximum length of time to wait, in Milliseconds. If *TimeOutVal* is zero (0), the time to wait is infinite.

METHOD LAUNCH(ByRef Param as UDT) <8>

LAUNCH begins execution of the thread, passing parameter data to it. Since the thread is hosted by an object, it is only fitting that the parameter data be contained in the most robust form, another object.

THREADPARAM is a mandatory Instance variable which you must define in each thread class. It is normally declared as the interface name of your choice:

```
INSTANCE ThreadParam as MyInterface
```

When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is normally the best choice, as it allows virtually any number of data items to be contained.

In simpler cases, you may choose to declare THREADPARAM as a [Long Integer](#), or [Dword](#). In that case, you must pass the launch parameter using a `POINTER` option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
```

```
...
```

```
MyThread.Launch(ByVal MyNumber&)
```

Of course, the `POINTER` parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a user-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER
```

```
THREAD METHOD MyMethod() AS LONG
```

```
xyz# = ThreadParam.member1
```

```
... other code
```

```
END METHOD
```

```
...
```

```
MyThread.Launch(ByVal VARPTR(MyType))
```

PROPERTY GET PRIORITY() AS Long <9>

Retrieves the priority value for this thread. The thread priority value is one of the following:

```
%THREAD_PRIORITY_IDLE           = -15
%THREAD_PRIORITY_LOWEST          = -2
%THREAD_PRIORITY_BELOW_NORMAL    = -1
%THREAD_PRIORITY_NORMAL          = 0
%THREAD_PRIORITY_ABOVE_NORMAL    = +1
%THREAD_PRIORITY_HIGHEST         = +2
%THREAD_PRIORITY_TIME_CRITICAL   = +15
```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

```
%THREAD_PRIORITY_IDLE           = -15
%THREAD_PRIORITY_LOWEST          = -2
%THREAD_PRIORITY_BELOW_NORMAL    = -1
%THREAD_PRIORITY_NORMAL          = 0
%THREAD_PRIORITY_ABOVE_NORMAL    = +1
%THREAD_PRIORITY_HIGHEST         = +2
%THREAD_PRIORITY_TIME_CRITICAL   = +15
```

METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the `THREAD METHOD` is retrieved and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the `OBJRESULT` is set to `%S_OK` (0). If the thread has not ended, the value zero (0) is returned, and the `OBJRESULT` is set to `%S_FALSE`.

(1).

METHOD RESUME() AS Long <11>

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running at that time.

PROPERTY GET STACKSIZE() AS Long <13>

Retrieves the size of the [stack](#) for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

PROPERTY SET STACKSIZE(Long) <13>

Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

METHOD SUSPEND() AS Long <14>

Suspends execution of the thread. The suspend count of the thread is incremented. If the suspend was successful, the suspend count is returned; otherwise, -1 is returned.

If SUSPEND is executed prior to LAUNCH of the thread, the suspend count is incremented, and the subsequent LAUNCH is treated as a suspended launch. That is, all the necessary setup tasks are performed, but the thread is suspended just before execution of your THREAD METHOD begins. You can continue execution with RESUME.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running while suspended.

METHOD TIMECREATE() AS Quad <16>

Retrieves the date and time-of-day of the thread creation, and returns it as a [Quad](#) Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format of Month/Day/Year/Time.

METHOD TIMEEXIT() AS Quad <17>

Retrieves the date and time-of-day of the thread exit, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format of Month/Day/Year/Time. If the thread has not yet exited, the return value is undefined.

METHOD TIMEKERNEL() AS Quad <18>

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format.

METHOD TIMEUSER() AS Quad <19>

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime object](#) to convert it to a human readable format.

Restrictions

Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed when you reference one particular thread.

See also

[PowerTime](#), [THREAD Code Group](#)

Example

```
CLASS MyClass
  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD
```

```

INTERFACE MyFace
  INHERIT IPOWERTHREAD

  METHOD abc
    END METHOD
  END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
    METHOD = 77
  END METHOD

  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"

  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION

```

IPowerThread.Handle method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object New!

Purpose A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level. THREAD [objects](#) offer a collection of [methods](#) which allow you to easily create and maintain additional threads of execution in your programs.

A thread can be completely encapsulated (contained) within a thread object.

Encapsulation makes an object the perfect vehicle to host a thread. With thread objects, you'll have easy access to multiple thread parameters, private methods, and thread local storage of data. In short, a complete program-within-a-program which can be executed

with ease.

We liken this to the concept that "Threads are Alive". When a thread object is created and launched, it takes on a life of its own. It lives (and executes) until its lifetime is over and the thread ends. The life of the thread parallels the life of the object which makes it quite easy to manage.

PowerBASIC provides a pre-defined [interface](#) named "IPowerThread", which is a DUAL interface ([Dispatch](#) and [direct](#) access). When you create a thread object, you first [inherit](#) IPowerThread, giving you immediate access to all of its member methods. Next, you add a THREAD METHOD, a special form of private [CLASS METHOD](#), which is automatically executed when the thread is launched.

It's important to remember that the THREAD METHOD you create contains the code which will be executed in the thread. When you start the thread (by calling the [LAUNCH](#) method), it executes your THREAD METHOD. When you reach the end of the THREAD METHOD, the thread ends, and its lifetime is over. The THREAD METHOD acts just like the [MAIN](#) (or [PBMAIN](#)) function in your executable.

You may give the THREAD METHOD any name you wish. However, it is recommended you name it MAIN or PBMAIN. This bit of self-documentation will be a simple reminder of the functionality when you review the code a year from now! Generally speaking, most thread objects consist primarily of CLASS METHODS which are called from the THREAD METHOD. If there are any Member Methods (visible from outside the class), they are not usually called from within the thread. Instead, they are typically called from other threads to monitor the status and progress.

There must be exactly one THREAD METHOD per Class. No more. No less. The THREAD METHOD is executed automatically; it may never be called from within your program.

[Instance](#) variables are declared just as in any other class. Unique parameters are passed to each object when it is launched. Finally, public methods and properties may be added to monitor and manipulate the life of your thread.

Here's a synopsis of THREAD OBJECT usage:

1. Create a class with an interface which inherits IPowerThread.
2. Create a THREAD METHOD, best named MAIN or PBMAIN.
3. Create an INSTANCE variable named THREADPARAM which will hold the parameter(s) you choose to pass to the thread when it begins execution. This is usually another [object variable](#).
4. Create CLASS METHODS as needed, which will be called from the THREAD METHOD for support of that code.
5. From the main thread, create an object variable of the thread class and interface.
6. Call the LAUNCH method, passing the appropriate parameter to be used as THREADPARAM. Your thread is now running and alive.

Syntax

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

With the advent of multi-core CPU's and multi-CPU computers, it's clearly desirable to encapsulate all of the information about a particular thread in a single component. We recommend that all new code use THREAD OBJECTS exclusively, rather than the [Thread Code Group](#). Thread objects provide much greater control, and much better thread parameter handling for the programmer.

IPowerThread Methods

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

METHOD CLOSE() <2>

Releases the thread handle of this thread. Note that it does not stop a thread if it is still running; it simply releases the thread handle (i.e., the resources used to track the

thread).

Thread handles should not be released until there is no further need to use other thread methods or properties. If a thread does not need to be monitored, its handle can be released immediately. The thread resources will be freed automatically when the thread terminates naturally.

THREADCOUNT continues to report a thread tally that will include threads whose handle has already been released. A thread ID value may not be used interchangeably with a thread handle value.

METHOD EQUALS(*ObjectVar* AS *InterfaceName*) AS Long <3>

Compares the parameter *ObjectVar* to determine if it references the same object as this object. If they both reference the same object, [true](#) (-1) is returned; if not, [false](#) (0) is returned.

METHOD HANDLE() AS Long <4>

Retrieves the handle of the thread for use with Windows API functions.

METHOD ID() AS Long <5>

Retrieves the ID of the thread for use with Windows API functions.

METHOD ISALIVE() AS Long <6>

Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value [true](#) (-1) is returned; if not, the value [false](#) (0) is returned.

METHOD JOIN(*ThreadObjectVar* AS *InterfaceName*, *TimeOutVal* AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeOutVal* specifies the maximum length of time to wait, in *Milliseconds*. If *TimeOutVal* is zero (0), the time to wait is infinite.

METHOD LAUNCH(*ByRef Param* as *UDT*) <8>

LAUNCH begins execution of the thread, passing parameter data to it. Since the thread is hosted by an object, it is only fitting that the parameter data be contained in the most robust form, another object.

THREADPARAM is a mandatory Instance variable which you must define in each thread class. It is normally declared as the interface name of your choice:

```
INSTANCE ThreadParam as MyInterface
```

When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is the normally the best choice, as it allows virtually any number of data items to be contained.

In simpler cases, you may choose to declare THREADPARAM as a [Long Integer](#), or [Dword](#). In that case, you must pass the launch parameter using a [pointer](#) option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
```

```
...
```

```
MyThread.Launch(ByVal MyNumber&)
```

Of course, the [Pointer](#) parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a user-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER
```

```
THREAD METHOD MyMethod() AS LONG
```

```
xyz# = ThreadParam.member1
```

```
... other code
```

```
END METHOD
```

```
...
```

```
MyThread.Launch(ByVal VARPTR(MyType))
```

PROPERTY GET PRIORITY() AS Long <9>

Retrieves the priority value for this thread. The thread priority value is one of the following:

```
%THREAD_PRIORITY_IDLE           = -15
%THREAD_PRIORITY_LOWEST          = -2
%THREAD_PRIORITY_BELOW_NORMAL   = -1
%THREAD_PRIORITY_NORMAL         = 0
%THREAD_PRIORITY_ABOVE_NORMAL   = +1
%THREAD_PRIORITY_HIGHEST        = +2
%THREAD_PRIORITY_TIME_CRITICAL  = +15
```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

```
%THREAD_PRIORITY_IDLE           = -15
%THREAD_PRIORITY_LOWEST          = -2
%THREAD_PRIORITY_BELOW_NORMAL   = -1
%THREAD_PRIORITY_NORMAL         = 0
%THREAD_PRIORITY_ABOVE_NORMAL   = +1
%THREAD_PRIORITY_HIGHEST        = +2
%THREAD_PRIORITY_TIME_CRITICAL  = +15
```

METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the THREAD METHOD is retrieved and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the [OBJRESULT](#) is set to %S_OK (0). If the thread has not ended, the value zero (0) is returned, and the OBJRESULT is set to %S_FALSE (1).

METHOD RESUME() AS Long <11>

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running at that time.

PROPERTY GET STACKSIZE() AS Long <13>

Retrieves the size of the [stack](#) for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

PROPERTY SET STACKSIZE(Long) <13>

Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

METHOD SUSPEND() AS Long <14>

Suspends execution of the thread. The suspend count of the thread is incremented. If the suspend was successful, the suspend count is returned; otherwise, -1 is returned.

If SUSPEND is executed prior to LAUNCH of the thread, the suspend count is incremented, and the subsequent LAUNCH is treated as a suspended launch. That is, all the necessary setup tasks are performed, but the thread is suspended just before execution of your THREAD METHOD begins. You can continue execution with RESUME.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running while suspended.

METHOD TIMECREATE() AS Quad <16>

Retrieves the date and time-of-day of the thread creation, and returns it as a [Quad](#) Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format of Month/Day/Year/Time.

METHOD TIMEEXIT() AS Quad <17>

Retrieves the date and time-of-day of the thread exit, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time. If the thread has not yet exited, the return value is undefined.

METHOD TIMEKERNEL() AS Quad <18>

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

METHOD TIMEUSER() AS Quad <19>

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime object](#) to convert it to a human readable format.

Restrictions

Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed when you reference one particular thread.

See also

[PowerTime](#), [THREAD Code Group](#)

Example

```

CLASS MyClass
  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD

  INTERFACE MyFace
    INHERIT IPOWERTHREAD

    METHOD abc
      END METHOD
  END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
      METHOD = 77
    END METHOD
  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"

  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION

```

IPowerThread.Id method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object **New!**

Purpose

A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level.

THREAD [objects](#) offer a collection of [methods](#) which allow you to easily create and maintain additional threads of execution in your programs.

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You may give the THREAD METHOD any name you wish. However, it is recommended you name it MAIN or PBMAIN. This bit of self-documentation will be a simple reminder of the functionality when you review the code a year from now! Generally speaking, most thread objects consist primarily of CLASS METHODS which are called from the THREAD METHOD. If there are any Member Methods (visible from outside the class), they are not usually called from within the thread. Instead, they are typically called from other threads to monitor the status and progress.

There must be exactly one THREAD METHOD per Class. No more. No less. The THREAD METHOD is executed automatically; it may never be called from within your program.

[Instance](#) variables are declared just as in any other class. Unique parameters are passed

to each object when it is launched. Finally, public methods and properties may be added to monitor and manipulate the life of your thread.

Here's a synopsis of THREAD OBJECT usage:

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2. Create a THREAD METHOD, best named MAIN or PBMAIN.
3. Create an INSTANCE variable named THREADPARAM which will hold the parameter(s) you choose to pass to the thread when it begins execution. This is usually another [object variable](#).
4. Create CLASS METHODS as needed, which will be called from the THREAD METHOD for support of that code.
5. From the main thread, create an object variable of the thread class and interface.
6. Call the LAUNCH method, passing the appropriate parameter to be used as THREADPARAM. Your thread is now running and alive.

Syntax

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

With the advent of multi-core CPU's and multi-CPU computers, it's clearly desirable to encapsulate all of the information about a particular thread in a single component. We recommend that all new code use THREAD OBJECTS exclusively, rather than the [Thread Code Group](#). Thread objects provide much greater control, and much better thread parameter handling for the programmer.

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The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

METHOD CLOSE() <2>

Releases the thread handle of this thread. Note that it does not stop a thread if it is still running; it simply releases the thread handle (i.e., the resources used to track the thread).

Thread handles should not be released until there is no further need to use other thread methods or properties. If a thread does not need to be monitored, its handle can be released immediately. The thread resources will be freed automatically when the thread terminates naturally.

THREADCOUNT continues to report a thread tally that will include threads whose handle has already been released. A thread ID value may not be used interchangeably with a thread handle value.

METHOD EQUALS(ObjectVar AS InterfaceName) AS Long <3>

Compares the parameter *ObjectVar* to determine if it references the same object as this object. If they both reference the same object, [true](#) (-1) is returned; if not, [false](#) (0) is returned.

METHOD HANDLE() AS Long <4>

Retrieves the handle of the thread for use with Windows API functions.

METHOD ID() AS Long <5>

Retrieves the ID of the thread for use with Windows API functions.

METHOD ISALIVE() AS Long <6>

Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value true (-1) is returned; if not, the value false (0) is returned.

METHOD JOIN(ThreadObjectVar AS InterfaceName, TimeoutVal AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeoutVal* specifies the maximum length of time to wait, in Milliseconds. If *TimeoutVal* is zero (0), the time to wait is infinite.

METHOD LAUNCH(ByRef Param as UDT) <8>

LAUNCH begins execution of the thread, passing parameter data to it. Since the thread is hosted by an object, it is only fitting that the parameter data be contained in the most robust form, another object.

THREADPARAM is a mandatory Instance variable which you must define in each thread class. It is normally declared as the interface name of your choice:

```
INSTANCE ThreadParam as MyInterface
```

When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is normally the best choice, as it allows virtually any number of data items to be contained.

In simpler cases, you may choose to declare THREADPARAM as a [Long Integer](#), or [Dword](#). In that case, you must pass the launch parameter using a `POINTER` option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
```

```
...
```

```
MyThread.Launch(ByVal MyNumber&)
```

Of course, the Pointer parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a user-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER
```

```
THREAD METHOD MyMethod() AS LONG
```

```
xyz# = ThreadParam.member1
```

```
... other code
```

```
END METHOD
```

```
...
```

```
MyThread.Launch(ByVal VARPTR(MyType))
```

PROPERTY GET PRIORITY() AS Long <9>

Retrieves the priority value for this thread. The thread priority value is one of the following:

```
%THREAD_PRIORITY_IDLE           = -15
%THREAD_PRIORITY_LOWEST         = -2
%THREAD_PRIORITY_BELOW_NORMAL  = -1
%THREAD_PRIORITY_NORMAL        = 0
%THREAD_PRIORITY_ABOVE_NORMAL  = +1
%THREAD_PRIORITY_HIGHEST       = +2
%THREAD_PRIORITY_TIME_CRITICAL = +15
```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

```
%THREAD_PRIORITY_IDLE           = -15
%THREAD_PRIORITY_LOWEST         = -2
%THREAD_PRIORITY_BELOW_NORMAL  = -1
%THREAD_PRIORITY_NORMAL        = 0
%THREAD_PRIORITY_ABOVE_NORMAL  = +1
%THREAD_PRIORITY_HIGHEST       = +2
%THREAD_PRIORITY_TIME_CRITICAL = +15
```

METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the THREAD METHOD is retrieved and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the [OBJRESULT](#) is set to %S_OK (0). If the thread has not ended, the value zero (0) is returned, and the OBJRESULT is set to %S_FALSE

(1).

METHOD RESUME() AS Long <11>

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running at that time.

PROPERTY GET STACKSIZE() AS Long <13>

Retrieves the size of the [stack](#) for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

PROPERTY SET STACKSIZE(Long) <13>

Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

METHOD SUSPEND() AS Long <14>

Suspends execution of the thread. The suspend count of the thread is incremented. If the suspend was successful, the suspend count is returned; otherwise, -1 is returned.

If SUSPEND is executed prior to LAUNCH of the thread, the suspend count is incremented, and the subsequent LAUNCH is treated as a suspended launch. That is, all the necessary setup tasks are performed, but the thread is suspended just before execution of your THREAD METHOD begins. You can continue execution with RESUME.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running while suspended.

METHOD TIMECREATE() AS Quad <16>

Retrieves the date and time-of-day of the thread creation, and returns it as a [Quad](#) Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format of Month/Day/Year/Time.

METHOD TIMEEXIT() AS Quad <17>

Retrieves the date and time-of-day of the thread exit, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format of Month/Day/Year/Time. If the thread has not yet exited, the return value is undefined.

METHOD TIMEKERNEL() AS Quad <18>

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format.

METHOD TIMEUSER() AS Quad <19>

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime object](#) to convert it to a human readable format.

Restrictions

Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed when you reference one particular thread.

See also

[PowerTime](#), [THREAD Code Group](#)

Example

```
CLASS MyClass
  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD
```

```

INTERFACE MyFace
  INHERIT IPOWERTHREAD

  METHOD abc
    END METHOD
  END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
    METHOD = 77
  END METHOD

  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"

  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION

```

IPowerThread.IsAlive method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object New!

Purpose A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level. THREAD [objects](#) offer a collection of [methods](#) which allow you to easily create and maintain additional threads of execution in your programs.

A thread can be completely encapsulated (contained) within a thread object.

Encapsulation makes an object the perfect vehicle to host a thread. With thread objects, you'll have easy access to multiple thread parameters, private methods, and thread local storage of data. In short, a complete program-within-a-program which can be executed

with ease.

We liken this to the concept that "Threads are Alive". When a thread object is created and launched, it takes on a life of its own. It lives (and executes) until its lifetime is over and the thread ends. The life of the thread parallels the life of the object which makes it quite easy to manage.

PowerBASIC provides a pre-defined [interface](#) named "IPowerThread", which is a DUAL interface ([Dispatch](#) and [direct](#) access). When you create a thread object, you first [inherit](#) IPowerThread, giving you immediate access to all of its member methods. Next, you add a THREAD METHOD, a special form of private [CLASS METHOD](#), which is automatically executed when the thread is launched.

It's important to remember that the THREAD METHOD you create contains the code which will be executed in the thread. When you start the thread (by calling the [LAUNCH](#) method), it executes your THREAD METHOD. When you reach the end of the THREAD METHOD, the thread ends, and its lifetime is over. The THREAD METHOD acts just like the [MAIN](#) (or [PBMAIN](#)) function in your executable.

You may give the THREAD METHOD any name you wish. However, it is recommended you name it MAIN or PBMAIN. This bit of self-documentation will be a simple reminder of the functionality when you review the code a year from now! Generally speaking, most thread objects consist primarily of CLASS METHODS which are called from the THREAD METHOD. If there are any Member Methods (visible from outside the class), they are not usually called from within the thread. Instead, they are typically called from other threads to monitor the status and progress.

There must be exactly one THREAD METHOD per Class. No more. No less. The THREAD METHOD is executed automatically; it may never be called from within your program.

[Instance](#) variables are declared just as in any other class. Unique parameters are passed to each object when it is launched. Finally, public methods and properties may be added to monitor and manipulate the life of your thread.

Here's a synopsis of THREAD OBJECT usage:

1. Create a class with an interface which inherits IPowerThread.
2. Create a THREAD METHOD, best named MAIN or PBMAIN.
3. Create an INSTANCE variable named THREADPARAM which will hold the parameter(s) you choose to pass to the thread when it begins execution. This is usually another [object variable](#).
4. Create CLASS METHODS as needed, which will be called from the THREAD METHOD for support of that code.
5. From the main thread, create an object variable of the thread class and interface.
6. Call the LAUNCH method, passing the appropriate parameter to be used as THREADPARAM. Your thread is now running and alive.

Syntax

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

With the advent of multi-core CPU's and multi-CPU computers, it's clearly desirable to encapsulate all of the information about a particular thread in a single component. We recommend that all new code use THREAD OBJECTS exclusively, rather than the [Thread Code Group](#). Thread objects provide much greater control, and much better thread parameter handling for the programmer.

IPowerThread Methods

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

METHOD CLOSE() <2>

Releases the thread handle of this thread. Note that it does not stop a thread if it is still running; it simply releases the thread handle (i.e., the resources used to track the

thread).

Thread handles should not be released until there is no further need to use other thread methods or properties. If a thread does not need to be monitored, its handle can be released immediately. The thread resources will be freed automatically when the thread terminates naturally.

THREADCOUNT continues to report a thread tally that will include threads whose handle has already been released. A thread ID value may not be used interchangeably with a thread handle value.

METHOD EQUALS(*ObjectVar* AS *InterfaceName*) AS Long <3>

Compares the parameter *ObjectVar* to determine if it references the same object as this object. If they both reference the same object, [true](#) (-1) is returned; if not, [false](#) (0) is returned.

METHOD HANDLE() AS Long <4>

Retrieves the handle of the thread for use with Windows API functions.

METHOD ID() AS Long <5>

Retrieves the ID of the thread for use with Windows API functions.

METHOD ISALIVE() AS Long <6>

Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value [true](#) (-1) is returned; if not, the value [false](#) (0) is returned.

METHOD JOIN(*ThreadObjectVar* AS *InterfaceName*, *TimeOutVal* AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeOutVal* specifies the maximum length of time to wait, in *Milliseconds*. If *TimeOutVal* is zero (0), the time to wait is infinite.

METHOD LAUNCH(*ByRef Param* as *UDT*) <8>

LAUNCH begins execution of the thread, passing parameter data to it. Since the thread is hosted by an object, it is only fitting that the parameter data be contained in the most robust form, another object.

THREADPARAM is a mandatory Instance variable which you must define in each thread class. It is normally declared as the interface name of your choice:

```
INSTANCE ThreadParam as MyInterface
```

When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is the normally the best choice, as it allows virtually any number of data items to be contained.

In simpler cases, you may choose to declare THREADPARAM as a [Long Integer](#), or [Dword](#). In that case, you must pass the launch parameter using a [pointer](#) option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
```

```
...
```

```
MyThread.Launch(ByVal MyNumber&)
```

Of course, the [Pointer](#) parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a user-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER
```

```
THREAD METHOD MyMethod() AS LONG
```

```
xyz# = ThreadParam.member1
```

```
... other code
```

```
END METHOD
```

```
...
```

```
MyThread.Launch(ByVal VARPTR(MyType))
```

PROPERTY GET PRIORITY() AS Long <9>

Retrieves the priority value for this thread. The thread priority value is one of the following:

```
%THREAD_PRIORITY_IDLE           = -15
%THREAD_PRIORITY_LOWEST         = -2
%THREAD_PRIORITY_BELOW_NORMAL  = -1
%THREAD_PRIORITY_NORMAL        = 0
%THREAD_PRIORITY_ABOVE_NORMAL  = +1
%THREAD_PRIORITY_HIGHEST       = +2
%THREAD_PRIORITY_TIME_CRITICAL = +15
```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

```
%THREAD_PRIORITY_IDLE           = -15
%THREAD_PRIORITY_LOWEST         = -2
%THREAD_PRIORITY_BELOW_NORMAL  = -1
%THREAD_PRIORITY_NORMAL        = 0
%THREAD_PRIORITY_ABOVE_NORMAL  = +1
%THREAD_PRIORITY_HIGHEST       = +2
%THREAD_PRIORITY_TIME_CRITICAL = +15
```

METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the THREAD METHOD is retrieved and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the [OBJRESULT](#) is set to %S_OK (0). If the thread has not ended, the value zero (0) is returned, and the OBJRESULT is set to %S_FALSE (1).

METHOD RESUME() AS Long <11>

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running at that time.

PROPERTY GET STACKSIZE() AS Long <13>

Retrieves the size of the [stack](#) for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

PROPERTY SET STACKSIZE(Long) <13>

Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

METHOD SUSPEND() AS Long <14>

Suspends execution of the thread. The suspend count of the thread is incremented. If the suspend was successful, the suspend count is returned; otherwise, -1 is returned.

If SUSPEND is executed prior to LAUNCH of the thread, the suspend count is incremented, and the subsequent LAUNCH is treated as a suspended launch. That is, all the necessary setup tasks are performed, but the thread is suspended just before execution of your THREAD METHOD begins. You can continue execution with RESUME.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running while suspended.

METHOD TIMECREATE() AS Quad <16>

Retrieves the date and time-of-day of the thread creation, and returns it as a [Quad](#) Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format of Month/Day/Year/Time.

METHOD TIMEEXIT() AS Quad <17>

Retrieves the date and time-of-day of the thread exit, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time. If the thread has not yet exited, the return value is undefined.

METHOD TIMEKERNEL() AS Quad <18>

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

METHOD TIMEUSER() AS Quad <19>

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime object](#) to convert it to a human readable format.

Restrictions

Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed when you reference one particular thread.

See also

[PowerTime](#), [THREAD Code Group](#)

Example

```

CLASS MyClass
  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD

  INTERFACE MyFace
    INHERIT IPOWERTHREAD

    METHOD abc
      END METHOD
  END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
      METHOD = 77
    END METHOD
  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"

  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION

```

IPowerThread.Join method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object **New!**

Purpose

A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level.

THREAD [objects](#) offer a collection of [methods](#) which allow you to easily create and maintain additional threads of execution in your programs.

A thread can be completely encapsulated (contained) within a thread object.

Encapsulation makes an object the perfect vehicle to host a thread. With thread objects, you'll have easy access to multiple thread parameters, private methods, and thread local storage of data. In short, a complete program-within-a-program which can be executed with ease.

We liken this to the concept that "Threads are Alive". When a thread object is created and launched, it takes on a life of its own. It lives (and executes) until its lifetime is over and the thread ends. The life of the thread parallels the life of the object which makes it quite easy to manage.

PowerBASIC provides a pre-defined [interface](#) named "IPowerThread", which is a DUAL interface ([Dispatch](#) and [direct](#) access). When you create a thread object, you first [inherit](#) IPowerThread, giving you immediate access to all of its member methods. Next, you add a THREAD METHOD, a special form of private [CLASS METHOD](#), which is automatically executed when the thread is launched.

It's important to remember that the THREAD METHOD you create contains the code which will be executed in the thread. When you start the thread (by calling the [LAUNCH](#) method), it executes your THREAD METHOD. When you reach the end of the THREAD METHOD, the thread ends, and its lifetime is over. The THREAD METHOD acts just like the [MAIN](#) (or [PBMAIN](#)) function in your executable.

You may give the THREAD METHOD any name you wish. However, it is recommended you name it MAIN or PBMAIN. This bit of self-documentation will be a simple reminder of the functionality when you review the code a year from now! Generally speaking, most thread objects consist primarily of CLASS METHODS which are called from the THREAD METHOD. If there are any Member Methods (visible from outside the class), they are not usually called from within the thread. Instead, they are typically called from other threads to monitor the status and progress.

There must be exactly one THREAD METHOD per Class. No more. No less. The THREAD METHOD is executed automatically; it may never be called from within your program.

[Instance](#) variables are declared just as in any other class. Unique parameters are passed

to each object when it is launched. Finally, public methods and properties may be added to monitor and manipulate the life of your thread.

Here's a synopsis of THREAD OBJECT usage:

1. Create a class with an interface which inherits IPowerThread.
2. Create a THREAD METHOD, best named MAIN or PBMAIN.
3. Create an INSTANCE variable named THREADPARAM which will hold the parameter(s) you choose to pass to the thread when it begins execution. This is usually another [object variable](#).
4. Create CLASS METHODS as needed, which will be called from the THREAD METHOD for support of that code.
5. From the main thread, create an object variable of the thread class and interface.
6. Call the LAUNCH method, passing the appropriate parameter to be used as THREADPARAM. Your thread is now running and alive.

Syntax

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

With the advent of multi-core CPU's and multi-CPU computers, it's clearly desirable to encapsulate all of the information about a particular thread in a single component. We recommend that all new code use THREAD OBJECTS exclusively, rather than the [Thread Code Group](#). Thread objects provide much greater control, and much better thread parameter handling for the programmer.

IPowerThread Methods

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

METHOD CLOSE() <2>

Releases the thread handle of this thread. Note that it does not stop a thread if it is still running; it simply releases the thread handle (i.e., the resources used to track the thread).

Thread handles should not be released until there is no further need to use other thread methods or properties. If a thread does not need to be monitored, its handle can be released immediately. The thread resources will be freed automatically when the thread terminates naturally.

THREADCOUNT continues to report a thread tally that will include threads whose handle has already been released. A thread ID value may not be used interchangeably with a thread handle value.

METHOD EQUALS(ObjectVar AS InterfaceName) AS Long <3>

Compares the parameter *ObjectVar* to determine if it references the same object as this object. If they both reference the same object, [true](#) (-1) is returned; if not, [false](#) (0) is returned.

METHOD HANDLE() AS Long <4>

Retrieves the handle of the thread for use with Windows API functions.

METHOD ID() AS Long <5>

Retrieves the ID of the thread for use with Windows API functions.

METHOD ISALIVE() AS Long <6>

Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value true (-1) is returned; if not, the value false (0) is returned.

METHOD JOIN(ThreadObjectVar AS InterfaceName, TimeOutVal AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeOutVal* specifies the maximum length of time to wait, in Milliseconds. If *TimeOutVal* is zero (0), the time to wait is infinite.

METHOD LAUNCH(ByRef Param as UDT) <8>

LAUNCH begins execution of the thread, passing parameter data to it. Since the thread is hosted by an object, it is only fitting that the parameter data be contained in the most robust form, another object.

THREADPARAM is a mandatory Instance variable which you must define in each thread class. It is normally declared as the interface name of your choice:

```
INSTANCE ThreadParam as MyInterface
```

When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is normally the best choice, as it allows virtually any number of data items to be contained.

In simpler cases, you may choose to declare THREADPARAM as a [Long Integer](#), or [Dword](#). In that case, you must pass the launch parameter using a [pointer](#) option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
```

```
...
```

```
MyThread.Launch(ByVal MyNumber&)
```

Of course, the Pointer parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a user-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER
```

```
THREAD METHOD MyMethod() AS LONG
```

```
xyz# = ThreadParam.member1
```

```
... other code
```

```
END METHOD
```

```
...
```

```
MyThread.Launch(ByVal VARPTR(MyType))
```

PROPERTY GET PRIORITY() AS Long <9>

Retrieves the priority value for this thread. The thread priority value is one of the following:

```
%THREAD_PRIORITY_IDLE           = -15
%THREAD_PRIORITY_LOWEST          = -2
%THREAD_PRIORITY_BELOW_NORMAL   = -1
%THREAD_PRIORITY_NORMAL          = 0
%THREAD_PRIORITY_ABOVE_NORMAL   = +1
%THREAD_PRIORITY_HIGHEST         = +2
%THREAD_PRIORITY_TIME_CRITICAL = +15
```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

```
%THREAD_PRIORITY_IDLE           = -15
%THREAD_PRIORITY_LOWEST          = -2
%THREAD_PRIORITY_BELOW_NORMAL   = -1
%THREAD_PRIORITY_NORMAL          = 0
%THREAD_PRIORITY_ABOVE_NORMAL   = +1
%THREAD_PRIORITY_HIGHEST         = +2
%THREAD_PRIORITY_TIME_CRITICAL = +15
```

METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the THREAD METHOD is retrieved and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the [OBJRESULT](#) is set to %S_OK (0). If the thread has not ended, the value zero (0) is returned, and the OBJRESULT is set to %S_FALSE

(1).

METHOD RESUME() AS Long <11>

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running at that time.

PROPERTY GET STACKSIZE() AS Long <13>

Retrieves the size of the [stack](#) for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

PROPERTY SET STACKSIZE(Long) <13>

Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

METHOD SUSPEND() AS Long <14>

Suspends execution of the thread. The suspend count of the thread is incremented. If the suspend was successful, the suspend count is returned; otherwise, -1 is returned.

If SUSPEND is executed prior to LAUNCH of the thread, the suspend count is incremented, and the subsequent LAUNCH is treated as a suspended launch. That is, all the necessary setup tasks are performed, but the thread is suspended just before execution of your THREAD METHOD begins. You can continue execution with RESUME.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running while suspended.

METHOD TIMECREATE() AS Quad <16>

Retrieves the date and time-of-day of the thread creation, and returns it as a [Quad](#) Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format of Month/Day/Year/Time.

METHOD TIMEEXIT() AS Quad <17>

Retrieves the date and time-of-day of the thread exit, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format of Month/Day/Year/Time. If the thread has not yet exited, the return value is undefined.

METHOD TIMEKERNEL() AS Quad <18>

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format.

METHOD TIMEUSER() AS Quad <19>

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime object](#) to convert it to a human readable format.

Restrictions

Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed when you reference one particular thread.

See also

[PowerTime](#), [THREAD Code Group](#)

Example

```
CLASS MyClass
  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD
```

```

INTERFACE MyFace
  INHERIT IPOWERTHREAD

  METHOD abc
    END METHOD
  END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
    METHOD = 77
  END METHOD

  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"

  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION

```

IPowerThreadLaunch method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object New!

Purpose A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level. THREAD [objects](#) offer a collection of [methods](#) which allow you to easily create and maintain additional threads of execution in your programs.

A thread can be completely encapsulated (contained) within a thread object.

Encapsulation makes an object the perfect vehicle to host a thread. With thread objects, you'll have easy access to multiple thread parameters, private methods, and thread local storage of data. In short, a complete program-within-a-program which can be executed

with ease.

We liken this to the concept that "Threads are Alive". When a thread object is created and launched, it takes on a life of its own. It lives (and executes) until its lifetime is over and the thread ends. The life of the thread parallels the life of the object which makes it quite easy to manage.

PowerBASIC provides a pre-defined [interface](#) named "IPowerThread", which is a DUAL interface ([Dispatch](#) and [direct](#) access). When you create a thread object, you first [inherit](#) IPowerThread, giving you immediate access to all of its member methods. Next, you add a THREAD METHOD, a special form of private [CLASS METHOD](#), which is automatically executed when the thread is launched.

It's important to remember that the THREAD METHOD you create contains the code which will be executed in the thread. When you start the thread (by calling the [LAUNCH](#) method), it executes your THREAD METHOD. When you reach the end of the THREAD METHOD, the thread ends, and its lifetime is over. The THREAD METHOD acts just like the [MAIN](#) (or [PBMAIN](#)) function in your executable.

You may give the THREAD METHOD any name you wish. However, it is recommended you name it MAIN or PBMAIN. This bit of self-documentation will be a simple reminder of the functionality when you review the code a year from now! Generally speaking, most thread objects consist primarily of CLASS METHODS which are called from the THREAD METHOD. If there are any Member Methods (visible from outside the class), they are not usually called from within the thread. Instead, they are typically called from other threads to monitor the status and progress.

There must be exactly one THREAD METHOD per Class. No more. No less. The THREAD METHOD is executed automatically; it may never be called from within your program.

[Instance](#) variables are declared just as in any other class. Unique parameters are passed to each object when it is launched. Finally, public methods and properties may be added to monitor and manipulate the life of your thread.

Here's a synopsis of THREAD OBJECT usage:

1. Create a class with an interface which inherits IPowerThread.
2. Create a THREAD METHOD, best named MAIN or PBMAIN.
3. Create an INSTANCE variable named THREADPARAM which will hold the parameter(s) you choose to pass to the thread when it begins execution. This is usually another [object variable](#).
4. Create CLASS METHODS as needed, which will be called from the THREAD METHOD for support of that code.
5. From the main thread, create an object variable of the thread class and interface.
6. Call the LAUNCH method, passing the appropriate parameter to be used as THREADPARAM. Your thread is now running and alive.

Syntax

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

With the advent of multi-core CPU's and multi-CPU computers, it's clearly desirable to encapsulate all of the information about a particular thread in a single component. We recommend that all new code use THREAD OBJECTS exclusively, rather than the [Thread Code Group](#). Thread objects provide much greater control, and much better thread parameter handling for the programmer.

IPowerThread Methods

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

METHOD CLOSE() <2>

Releases the thread handle of this thread. Note that it does not stop a thread if it is still running; it simply releases the thread handle (i.e., the resources used to track the

thread).

Thread handles should not be released until there is no further need to use other thread methods or properties. If a thread does not need to be monitored, its handle can be released immediately. The thread resources will be freed automatically when the thread terminates naturally.

THREADCOUNT continues to report a thread tally that will include threads whose handle has already been released. A thread ID value may not be used interchangeably with a thread handle value.

METHOD EQUALS(*ObjectVar* AS *InterfaceName*) AS Long <3>

Compares the parameter *ObjectVar* to determine if it references the same object as this object. If they both reference the same object, [true](#) (-1) is returned; if not, [false](#) (0) is returned.

METHOD HANDLE() AS Long <4>

Retrieves the handle of the thread for use with Windows API functions.

METHOD ID() AS Long <5>

Retrieves the ID of the thread for use with Windows API functions.

METHOD ISALIVE() AS Long <6>

Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value [true](#) (-1) is returned; if not, the value [false](#) (0) is returned.

METHOD JOIN(*ThreadObjectVar* AS *InterfaceName*, *TimeOutVal* AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeOutVal* specifies the maximum length of time to wait, in MilliSeconds. If *TimeOutVal* is zero (0), the time to wait is infinite.

METHOD LAUNCH(*ByRef Param* as *UDT*) <8>

LAUNCH begins execution of the thread, passing parameter data to it. Since the thread is hosted by an object, it is only fitting that the parameter data be contained in the most robust form, another object.

THREADPARAM is a mandatory Instance variable which you must define in each thread class. It is normally declared as the interface name of your choice:

```
INSTANCE ThreadParam as MyInterface
```

When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is the normally the best choice, as it allows virtually any number of data items to be contained.

In simpler cases, you may choose to declare THREADPARAM as a [Long Integer](#), or [Dword](#). In that case, you must pass the launch parameter using a option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
...
MyThread.Launch(ByVal MyNumber&)
```

Of course, the Pointer parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a used-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER

THREAD METHOD MyMethod() AS LONG
  xyz# = ThreadParam.member1
  ... other code
END METHOD
...
```

```
MyThread.Launch(ByVal VARPTR(MyType))
```

PROPERTY GET PRIORITY() AS Long <9>

Retrieves the priority value for this thread. The thread priority value is one of the following:

```
%THREAD_PRIORITY_IDLE           = -15
%THREAD_PRIORITY_LOWEST         = -2
%THREAD_PRIORITY_BELOW_NORMAL  = -1
%THREAD_PRIORITY_NORMAL        = 0
%THREAD_PRIORITY_ABOVE_NORMAL  = +1
%THREAD_PRIORITY_HIGHEST       = +2
%THREAD_PRIORITY_TIME_CRITICAL = +15
```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

```
%THREAD_PRIORITY_IDLE           = -15
%THREAD_PRIORITY_LOWEST         = -2
%THREAD_PRIORITY_BELOW_NORMAL  = -1
%THREAD_PRIORITY_NORMAL        = 0
%THREAD_PRIORITY_ABOVE_NORMAL  = +1
%THREAD_PRIORITY_HIGHEST       = +2
%THREAD_PRIORITY_TIME_CRITICAL = +15
```

METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the THREAD METHOD is retrieved and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the [OBJRESULT](#) is set to %S_OK (0). If the thread has not ended, the value zero (0) is returned, and the OBJRESULT is set to %S_FALSE (1).

METHOD RESUME() AS Long <11>

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running at that time.

PROPERTY GET STACKSIZE() AS Long <13>

Retrieves the size of the [stack](#) for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

PROPERTY SET STACKSIZE(Long) <13>

Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

METHOD SUSPEND() AS Long <14>

Suspends execution of the thread. The suspend count of the thread is incremented. If the suspend was successful, the suspend count is returned; otherwise, -1 is returned.

If SUSPEND is executed prior to LAUNCH of the thread, the suspend count is incremented, and the subsequent LAUNCH is treated as a suspended launch. That is, all the necessary setup tasks are performed, but the thread is suspended just before execution of your THREAD METHOD begins. You can continue execution with RESUME.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running while suspended.

METHOD TIMECREATE() AS Quad <16>

Retrieves the date and time-of-day of the thread creation, and returns it as a [Quad](#) Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format of Month/Day/Year/Time.

METHOD TIMEEXIT() AS Quad <17>

Retrieves the date and time-of-day of the thread exit, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time. If the thread has not yet exited, the return value is undefined.

METHOD TIMEKERNEL() AS Quad <18>

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

METHOD TIMEUSER() AS Quad <19>

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime object](#) to convert it to a human readable format.

Restrictions

Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed when you reference one particular thread.

See also

[PowerTime](#), [THREAD Code Group](#)

Example

```

CLASS MyClass
  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD

  INTERFACE MyFace
    INHERIT IPOWERTHREAD

    METHOD abc
      END METHOD
  END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
      METHOD = 77
    END METHOD
  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"

  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION

```

IPowerThread.Priority property get

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object **New!**

Purpose

A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level.

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You may give the THREAD METHOD any name you wish. However, it is recommended you name it MAIN or PBMAIN. This bit of self-documentation will be a simple reminder of the functionality when you review the code a year from now! Generally speaking, most thread objects consist primarily of CLASS METHODS which are called from the THREAD METHOD. If there are any Member Methods (visible from outside the class), they are not usually called from within the thread. Instead, they are typically called from other threads to monitor the status and progress.

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5. From the main thread, create an object variable of the thread class and interface.
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Syntax

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
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Thread handles should not be released until there is no further need to use other thread methods or properties. If a thread does not need to be monitored, its handle can be released immediately. The thread resources will be freed automatically when the thread terminates naturally.

THREADCOUNT continues to report a thread tally that will include threads whose handle has already been released. A thread ID value may not be used interchangeably with a thread handle value.

METHOD EQUALS(ObjectVar AS InterfaceName) AS Long <3>

Compares the parameter *ObjectVar* to determine if it references the same object as this object. If they both reference the same object, [true](#) (-1) is returned; if not, [false](#) (0) is returned.

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Retrieves the handle of the thread for use with Windows API functions.

METHOD ID() AS Long <5>

Retrieves the ID of the thread for use with Windows API functions.

METHOD ISALIVE() AS Long <6>

Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value true (-1) is returned; if not, the value false (0) is returned.

METHOD JOIN(ThreadObjectVar AS InterfaceName, TimeOutVal AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeOutVal* specifies the maximum length of time to wait, in Milliseconds. If *TimeOutVal* is zero (0), the time to wait is infinite.

METHOD LAUNCH(ByRef Param as UDT) <8>

LAUNCH begins execution of the thread, passing parameter data to it. Since the thread is hosted by an object, it is only fitting that the parameter data be contained in the most robust form, another object.

THREADPARAM is a mandatory Instance variable which you must define in each thread class. It is normally declared as the interface name of your choice:

```
INSTANCE ThreadParam as MyInterface
```

When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is normally the best choice, as it allows virtually any number of data items to be contained.

In simpler cases, you may choose to declare THREADPARAM as a [Long Integer](#), or [Dword](#). In that case, you must pass the launch parameter using a `POINTER` option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
```

```
...
```

```
MyThread.Launch(ByVal MyNumber&)
```

Of course, the `POINTER` parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a user-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER
```

```
THREAD METHOD MyMethod() AS LONG
```

```
xyz# = ThreadParam.member1
```

```
... other code
```

```
END METHOD
```

```
...
```

```
MyThread.Launch(ByVal VARPTR(MyType))
```

PROPERTY GET PRIORITY() AS Long <9>

Retrieves the priority value for this thread. The thread priority value is one of the following:

```
%THREAD_PRIORITY_IDLE           = -15
%THREAD_PRIORITY_LOWEST          = -2
%THREAD_PRIORITY_BELOW_NORMAL    = -1
%THREAD_PRIORITY_NORMAL          = 0
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%THREAD_PRIORITY_TIME_CRITICAL   = +15
```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

```
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METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the THREAD METHOD is retrieved and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the [OBJRESULT](#) is set to %S_OK (0). If the thread has not ended, the value zero (0) is returned, and the OBJRESULT is set to %S_FALSE

(1).

METHOD RESUME() AS Long <11>

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running at that time.

PROPERTY GET STACKSIZE() AS Long <13>

Retrieves the size of the [stack](#) for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

PROPERTY SET STACKSIZE(Long) <13>

Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

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METHOD TIMECREATE() AS Quad <16>

Retrieves the date and time-of-day of the thread creation, and returns it as a [Quad](#) Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format of Month/Day/Year/Time.

METHOD TIMEEXIT() AS Quad <17>

Retrieves the date and time-of-day of the thread exit, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format of Month/Day/Year/Time. If the thread has not yet exited, the return value is undefined.

METHOD TIMEKERNEL() AS Quad <18>

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format.

METHOD TIMEUSER() AS Quad <19>

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime object](#) to convert it to a human readable format.

Restrictions

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See also

[PowerTime](#), [THREAD Code Group](#)

Example

```
CLASS MyClass
  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD
```

```

INTERFACE MyFace
  INHERIT IPOWERTHREAD

  METHOD abc
    END METHOD
  END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
      METHOD = 77
    END METHOD

  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"

  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION

```

IPowerThread.Priority property set

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object New!

Purpose A

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Syntax

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
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thread).

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THREADCOUNT continues to report a thread tally that will include threads whose handle has already been released. A thread ID value may not be used interchangeably with a thread handle value.

METHOD EQUALS(*ObjectVar* AS *InterfaceName*) AS Long <3>

Compares the parameter *ObjectVar* to determine if it references the same object as this object. If they both reference the same object, [true](#) (-1) is returned; if not, [false](#) (0) is returned.

METHOD HANDLE() AS Long <4>

Retrieves the handle of the thread for use with Windows API functions.

METHOD ID() AS Long <5>

Retrieves the ID of the thread for use with Windows API functions.

METHOD ISALIVE() AS Long <6>

Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value [true](#) (-1) is returned; if not, the value [false](#) (0) is returned.

METHOD JOIN(*ThreadObjectVar* AS *InterfaceName*, *TimeOutVal* AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeOutVal* specifies the maximum length of time to wait, in *Milliseconds*. If *TimeOutVal* is zero (0), the time to wait is infinite.

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LAUNCH begins execution of the thread, passing parameter data to it. Since the thread is hosted by an object, it is only fitting that the parameter data be contained in the most robust form, another object.

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INSTANCE ThreadParam as MyInterface
```

When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is the normally the best choice, as it allows virtually any number of data items to be contained.

In simpler cases, you may choose to declare THREADPARAM as a [Long Integer](#), or [Dword](#). In that case, you must pass the launch parameter using a [pointer](#) option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
...
MyThread.Launch(ByVal MyNumber&)
```

Of course, the [Pointer](#) parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a user-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER

THREAD METHOD MyMethod() AS LONG
  xyz# = ThreadParam.member1
  ... other code
END METHOD
...
```

```
MyThread.Launch(ByVal VARPTR(MyType))
```

PROPERTY GET PRIORITY() AS Long <9>

Retrieves the priority value for this thread. The thread priority value is one of the following:

```
%THREAD_PRIORITY_IDLE           = -15
%THREAD_PRIORITY_LOWEST          = -2
%THREAD_PRIORITY_BELOW_NORMAL   = -1
%THREAD_PRIORITY_NORMAL         = 0
%THREAD_PRIORITY_ABOVE_NORMAL   = +1
%THREAD_PRIORITY_HIGHEST        = +2
%THREAD_PRIORITY_TIME_CRITICAL  = +15
```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

```
%THREAD_PRIORITY_IDLE           = -15
%THREAD_PRIORITY_LOWEST          = -2
%THREAD_PRIORITY_BELOW_NORMAL   = -1
%THREAD_PRIORITY_NORMAL         = 0
%THREAD_PRIORITY_ABOVE_NORMAL   = +1
%THREAD_PRIORITY_HIGHEST        = +2
%THREAD_PRIORITY_TIME_CRITICAL  = +15
```

METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the THREAD METHOD is retrieved and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the [OBJRESULT](#) is set to %S_OK (0). If the thread has not ended, the value zero (0) is returned, and the OBJRESULT is set to %S_FALSE (1).

METHOD RESUME() AS Long <11>

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running at that time.

PROPERTY GET STACKSIZE() AS Long <13>

Retrieves the size of the [stack](#) for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

PROPERTY SET STACKSIZE(Long) <13>

Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

METHOD SUSPEND() AS Long <14>

Suspends execution of the thread. The suspend count of the thread is incremented. If the suspend was successful, the suspend count is returned; otherwise, -1 is returned.

If SUSPEND is executed prior to LAUNCH of the thread, the suspend count is incremented, and the subsequent LAUNCH is treated as a suspended launch. That is, all the necessary setup tasks are performed, but the thread is suspended just before execution of your THREAD METHOD begins. You can continue execution with RESUME.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running while suspended.

METHOD TIMECREATE() AS Quad <16>

Retrieves the date and time-of-day of the thread creation, and returns it as a [Quad](#) Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format of Month/Day/Year/Time.

METHOD TIMEEXIT() AS Quad <17>

Retrieves the date and time-of-day of the thread exit, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time. If the thread has not yet exited, the return value is undefined.

METHOD TIMEKERNEL() AS Quad <18>

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

METHOD TIMEUSER() AS Quad <19>

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime object](#) to convert it to a human readable format.

Restrictions

Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed when you reference one particular thread.

See also

[PowerTime](#), [THREAD Code Group](#)

Example

```

CLASS MyClass
  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD

  INTERFACE MyFace
    INHERIT IPOWERTHREAD

    METHOD abc
      END METHOD
  END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
      METHOD = 77
    END METHOD
  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"

  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION

```

IPowerThread.Result method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object **New!**

Purpose

A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level.

THREAD [objects](#) offer a collection of [methods](#) which allow you to easily create and maintain additional threads of execution in your programs.

A thread can be completely encapsulated (contained) within a thread object.

Encapsulation makes an object the perfect vehicle to host a thread. With thread objects, you'll have easy access to multiple thread parameters, private methods, and thread local storage of data. In short, a complete program-within-a-program which can be executed with ease.

We liken this to the concept that "Threads are Alive". When a thread object is created and launched, it takes on a life of its own. It lives (and executes) until its lifetime is over and the thread ends. The life of the thread parallels the life of the object which makes it quite easy to manage.

PowerBASIC provides a pre-defined [interface](#) named "IPowerThread", which is a DUAL interface ([Dispatch](#) and [direct](#) access). When you create a thread object, you first [inherit](#) IPowerThread, giving you immediate access to all of its member methods. Next, you add a THREAD METHOD, a special form of private [CLASS METHOD](#), which is automatically executed when the thread is launched.

It's important to remember that the THREAD METHOD you create contains the code which will be executed in the thread. When you start the thread (by calling the [LAUNCH](#) method), it executes your THREAD METHOD. When you reach the end of the THREAD METHOD, the thread ends, and its lifetime is over. The THREAD METHOD acts just like the [MAIN](#) (or [PBMAIN](#)) function in your executable.

You may give the THREAD METHOD any name you wish. However, it is recommended you name it MAIN or PBMAIN. This bit of self-documentation will be a simple reminder of the functionality when you review the code a year from now! Generally speaking, most thread objects consist primarily of CLASS METHODS which are called from the THREAD METHOD. If there are any Member Methods (visible from outside the class), they are not usually called from within the thread. Instead, they are typically called from other threads to monitor the status and progress.

There must be exactly one THREAD METHOD per Class. No more. No less. The THREAD METHOD is executed automatically; it may never be called from within your program.

[Instance](#) variables are declared just as in any other class. Unique parameters are passed

to each object when it is launched. Finally, public methods and properties may be added to monitor and manipulate the life of your thread.

Here's a synopsis of THREAD OBJECT usage:

1. Create a class with an interface which inherits IPowerThread.
2. Create a THREAD METHOD, best named MAIN or PBMAIN.
3. Create an INSTANCE variable named THREADPARAM which will hold the parameter(s) you choose to pass to the thread when it begins execution. This is usually another [object variable](#).
4. Create CLASS METHODS as needed, which will be called from the THREAD METHOD for support of that code.
5. From the main thread, create an object variable of the thread class and interface.
6. Call the LAUNCH method, passing the appropriate parameter to be used as THREADPARAM. Your thread is now running and alive.

Syntax

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

With the advent of multi-core CPU's and multi-CPU computers, it's clearly desirable to encapsulate all of the information about a particular thread in a single component. We recommend that all new code use THREAD OBJECTS exclusively, rather than the [Thread Code Group](#). Thread objects provide much greater control, and much better thread parameter handling for the programmer.

IPowerThread Methods

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

METHOD CLOSE() <2>

Releases the thread handle of this thread. Note that it does not stop a thread if it is still running; it simply releases the thread handle (i.e., the resources used to track the thread).

Thread handles should not be released until there is no further need to use other thread methods or properties. If a thread does not need to be monitored, its handle can be released immediately. The thread resources will be freed automatically when the thread terminates naturally.

THREADCOUNT continues to report a thread tally that will include threads whose handle has already been released. A thread ID value may not be used interchangeably with a thread handle value.

METHOD EQUALS(ObjectVar AS InterfaceName) AS Long <3>

Compares the parameter *ObjectVar* to determine if it references the same object as this object. If they both reference the same object, [true](#) (-1) is returned; if not, [false](#) (0) is returned.

METHOD HANDLE() AS Long <4>

Retrieves the handle of the thread for use with Windows API functions.

METHOD ID() AS Long <5>

Retrieves the ID of the thread for use with Windows API functions.

METHOD ISALIVE() AS Long <6>

Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value true (-1) is returned; if not, the value false (0) is returned.

METHOD JOIN(ThreadObjectVar AS InterfaceName, TimeoutVal AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeoutVal* specifies the maximum length of time to wait, in Milliseconds. If *TimeoutVal* is zero (0), the time to wait is infinite.

METHOD LAUNCH(ByRef Param as UDT) <8>

LAUNCH begins execution of the thread, passing parameter data to it. Since the thread is hosted by an object, it is only fitting that the parameter data be contained in the most robust form, another object.

THREADPARAM is a mandatory Instance variable which you must define in each thread class. It is normally declared as the interface name of your choice:

```
INSTANCE ThreadParam as MyInterface
```

When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is normally the best choice, as it allows virtually any number of data items to be contained.

In simpler cases, you may choose to declare THREADPARAM as a [Long Integer](#), or [Dword](#). In that case, you must pass the launch parameter using a `POINTER` option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
```

```
...
```

```
MyThread.Launch(ByVal MyNumber&)
```

Of course, the Pointer parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a user-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER
```

```
THREAD METHOD MyMethod() AS LONG
```

```
xyz# = ThreadParam.member1
```

```
... other code
```

```
END METHOD
```

```
...
```

```
MyThread.Launch(ByVal VARPTR(MyType))
```

PROPERTY GET PRIORITY() AS Long <9>

Retrieves the priority value for this thread. The thread priority value is one of the following:

```
%THREAD_PRIORITY_IDLE           = -15
%THREAD_PRIORITY_LOWEST         = -2
%THREAD_PRIORITY_BELOW_NORMAL  = -1
%THREAD_PRIORITY_NORMAL        = 0
%THREAD_PRIORITY_ABOVE_NORMAL  = +1
%THREAD_PRIORITY_HIGHEST       = +2
%THREAD_PRIORITY_TIME_CRITICAL = +15
```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

```
%THREAD_PRIORITY_IDLE           = -15
%THREAD_PRIORITY_LOWEST         = -2
%THREAD_PRIORITY_BELOW_NORMAL  = -1
%THREAD_PRIORITY_NORMAL        = 0
%THREAD_PRIORITY_ABOVE_NORMAL  = +1
%THREAD_PRIORITY_HIGHEST       = +2
%THREAD_PRIORITY_TIME_CRITICAL = +15
```

METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the THREAD METHOD is retrieved and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the [OBJRESULT](#) is set to %S_OK (0). If the thread has not ended, the value zero (0) is returned, and the OBJRESULT is set to %S_FALSE

(1).

METHOD RESUME() AS Long <11>

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running at that time.

PROPERTY GET STACKSIZE() AS Long <13>

Retrieves the size of the [stack](#) for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

PROPERTY SET STACKSIZE(Long) <13>

Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

METHOD SUSPEND() AS Long <14>

Suspends execution of the thread. The suspend count of the thread is incremented. If the suspend was successful, the suspend count is returned; otherwise, -1 is returned.

If SUSPEND is executed prior to LAUNCH of the thread, the suspend count is incremented, and the subsequent LAUNCH is treated as a suspended launch. That is, all the necessary setup tasks are performed, but the thread is suspended just before execution of your THREAD METHOD begins. You can continue execution with RESUME.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running while suspended.

METHOD TIMECREATE() AS Quad <16>

Retrieves the date and time-of-day of the thread creation, and returns it as a [Quad](#) Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format of Month/Day/Year/Time.

METHOD TIMEEXIT() AS Quad <17>

Retrieves the date and time-of-day of the thread exit, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format of Month/Day/Year/Time. If the thread has not yet exited, the return value is undefined.

METHOD TIMEKERNEL() AS Quad <18>

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format.

METHOD TIMEUSER() AS Quad <19>

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime object](#) to convert it to a human readable format.

Restrictions

Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed when you reference one particular thread.

See also

[PowerTime](#), [THREAD Code Group](#)

Example

```
CLASS MyClass
  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD
```

```

INTERFACE MyFace
  INHERIT IPOWERTHREAD

  METHOD abc
    END METHOD
  END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
    METHOD = 77
  END METHOD

  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"

  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION

```

IPowerThread.Resume method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object New!

Purpose A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level. THREAD [objects](#) offer a collection of [methods](#) which allow you to easily create and maintain additional threads of execution in your programs.

A thread can be completely encapsulated (contained) within a thread object.

Encapsulation makes an object the perfect vehicle to host a thread. With thread objects, you'll have easy access to multiple thread parameters, private methods, and thread local storage of data. In short, a complete program-within-a-program which can be executed

with ease.

We liken this to the concept that "Threads are Alive". When a thread object is created and launched, it takes on a life of its own. It lives (and executes) until its lifetime is over and the thread ends. The life of the thread parallels the life of the object which makes it quite easy to manage.

PowerBASIC provides a pre-defined [interface](#) named "IPowerThread", which is a DUAL interface ([Dispatch](#) and [direct](#) access). When you create a thread object, you first [inherit](#) IPowerThread, giving you immediate access to all of its member methods. Next, you add a THREAD METHOD, a special form of private [CLASS METHOD](#), which is automatically executed when the thread is launched.

It's important to remember that the THREAD METHOD you create contains the code which will be executed in the thread. When you start the thread (by calling the [LAUNCH](#) method), it executes your THREAD METHOD. When you reach the end of the THREAD METHOD, the thread ends, and its lifetime is over. The THREAD METHOD acts just like the [MAIN](#) (or [PBMAIN](#)) function in your executable.

You may give the THREAD METHOD any name you wish. However, it is recommended you name it MAIN or PBMAIN. This bit of self-documentation will be a simple reminder of the functionality when you review the code a year from now! Generally speaking, most thread objects consist primarily of CLASS METHODS which are called from the THREAD METHOD. If there are any Member Methods (visible from outside the class), they are not usually called from within the thread. Instead, they are typically called from other threads to monitor the status and progress.

There must be exactly one THREAD METHOD per Class. No more. No less. The THREAD METHOD is executed automatically; it may never be called from within your program.

[Instance](#) variables are declared just as in any other class. Unique parameters are passed to each object when it is launched. Finally, public methods and properties may be added to monitor and manipulate the life of your thread.

Here's a synopsis of THREAD OBJECT usage:

1. Create a class with an interface which inherits IPowerThread.
2. Create a THREAD METHOD, best named MAIN or PBMAIN.
3. Create an INSTANCE variable named THREADPARAM which will hold the parameter(s) you choose to pass to the thread when it begins execution. This is usually another [object variable](#).
4. Create CLASS METHODS as needed, which will be called from the THREAD METHOD for support of that code.
5. From the main thread, create an object variable of the thread class and interface.
6. Call the LAUNCH method, passing the appropriate parameter to be used as THREADPARAM. Your thread is now running and alive.

Syntax

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

With the advent of multi-core CPU's and multi-CPU computers, it's clearly desirable to encapsulate all of the information about a particular thread in a single component. We recommend that all new code use THREAD OBJECTS exclusively, rather than the [Thread Code Group](#). Thread objects provide much greater control, and much better thread parameter handling for the programmer.

IPowerThread Methods

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

METHOD CLOSE() <2>

Releases the thread handle of this thread. Note that it does not stop a thread if it is still running; it simply releases the thread handle (i.e., the resources used to track the

thread).

Thread handles should not be released until there is no further need to use other thread methods or properties. If a thread does not need to be monitored, its handle can be released immediately. The thread resources will be freed automatically when the thread terminates naturally.

THREADCOUNT continues to report a thread tally that will include threads whose handle has already been released. A thread ID value may not be used interchangeably with a thread handle value.

METHOD EQUALS(*ObjectVar* AS *InterfaceName*) AS Long <3>

Compares the parameter *ObjectVar* to determine if it references the same object as this object. If they both reference the same object, [true](#) (-1) is returned; if not, [false](#) (0) is returned.

METHOD HANDLE() AS Long <4>

Retrieves the handle of the thread for use with Windows API functions.

METHOD ID() AS Long <5>

Retrieves the ID of the thread for use with Windows API functions.

METHOD ISALIVE() AS Long <6>

Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value [true](#) (-1) is returned; if not, the value [false](#) (0) is returned.

METHOD JOIN(*ThreadObjectVar* AS *InterfaceName*, *TimeOutVal* AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeOutVal* specifies the maximum length of time to wait, in *Milliseconds*. If *TimeOutVal* is zero (0), the time to wait is infinite.

METHOD LAUNCH(*ByRef Param* as *UDT*) <8>

LAUNCH begins execution of the thread, passing parameter data to it. Since the thread is hosted by an object, it is only fitting that the parameter data be contained in the most robust form, another object.

THREADPARAM is a mandatory Instance variable which you must define in each thread class. It is normally declared as the interface name of your choice:

```
INSTANCE ThreadParam as MyInterface
```

When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is normally the best choice, as it allows virtually any number of data items to be contained.

In simpler cases, you may choose to declare THREADPARAM as a [Long Integer](#), or [Dword](#). In that case, you must pass the launch parameter using a [pointer](#) option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
```

```
...
```

```
MyThread.Launch(ByVal MyNumber&)
```

Of course, the [Pointer](#) parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a user-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER
```

```
THREAD METHOD MyMethod() AS LONG
```

```
xyz# = ThreadParam.member1
```

```
... other code
```

```
END METHOD
```

```
...
```

```
MyThread.Launch(ByVal VARPTR(MyType))
```

PROPERTY GET PRIORITY() AS Long <9>

Retrieves the priority value for this thread. The thread priority value is one of the following:

```
%THREAD_PRIORITY_IDLE           = -15
%THREAD_PRIORITY_LOWEST          = -2
%THREAD_PRIORITY_BELOW_NORMAL   = -1
%THREAD_PRIORITY_NORMAL         = 0
%THREAD_PRIORITY_ABOVE_NORMAL   = +1
%THREAD_PRIORITY_HIGHEST        = +2
%THREAD_PRIORITY_TIME_CRITICAL  = +15
```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

```
%THREAD_PRIORITY_IDLE           = -15
%THREAD_PRIORITY_LOWEST          = -2
%THREAD_PRIORITY_BELOW_NORMAL   = -1
%THREAD_PRIORITY_NORMAL         = 0
%THREAD_PRIORITY_ABOVE_NORMAL   = +1
%THREAD_PRIORITY_HIGHEST        = +2
%THREAD_PRIORITY_TIME_CRITICAL  = +15
```

METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the THREAD METHOD is retrieved and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the [OBJRESULT](#) is set to %S_OK (0). If the thread has not ended, the value zero (0) is returned, and the OBJRESULT is set to %S_FALSE (1).

METHOD RESUME() AS Long <11>

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running at that time.

PROPERTY GET STACKSIZE() AS Long <13>

Retrieves the size of the [stack](#) for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

PROPERTY SET STACKSIZE(Long) <13>

Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

METHOD SUSPEND() AS Long <14>

Suspends execution of the thread. The suspend count of the thread is incremented. If the suspend was successful, the suspend count is returned; otherwise, -1 is returned.

If SUSPEND is executed prior to LAUNCH of the thread, the suspend count is incremented, and the subsequent LAUNCH is treated as a suspended launch. That is, all the necessary setup tasks are performed, but the thread is suspended just before execution of your THREAD METHOD begins. You can continue execution with RESUME.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running while suspended.

METHOD TIMECREATE() AS Quad <16>

Retrieves the date and time-of-day of the thread creation, and returns it as a [Quad](#) Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format of Month/Day/Year/Time.

METHOD TIMEEXIT() AS Quad <17>

Retrieves the date and time-of-day of the thread exit, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time. If the thread has not yet exited, the return value is undefined.

METHOD TIMEKERNEL() AS Quad <18>

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

METHOD TIMEUSER() AS Quad <19>

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime object](#) to convert it to a human readable format.

Restrictions

Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed when you reference one particular thread.

See also

[PowerTime](#), [THREAD Code Group](#)

Example

```

CLASS MyClass
  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD

  INTERFACE MyFace
    INHERIT IPOWERTHREAD

    METHOD abc
      END METHOD
  END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
      METHOD = 77
    END METHOD
  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"

  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION

```

IPowerThread.StackSize property get

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object **New!**

Purpose

A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level.

THREAD [objects](#) offer a collection of [methods](#) which allow you to easily create and maintain additional threads of execution in your programs.

A thread can be completely encapsulated (contained) within a thread object.

Encapsulation makes an object the perfect vehicle to host a thread. With thread objects, you'll have easy access to multiple thread parameters, private methods, and thread local storage of data. In short, a complete program-within-a-program which can be executed with ease.

We liken this to the concept that "Threads are Alive". When a thread object is created and launched, it takes on a life of its own. It lives (and executes) until its lifetime is over and the thread ends. The life of the thread parallels the life of the object which makes it quite easy to manage.

PowerBASIC provides a pre-defined [interface](#) named "IPowerThread", which is a DUAL interface ([Dispatch](#) and [direct](#) access). When you create a thread object, you first [inherit](#) IPowerThread, giving you immediate access to all of its member methods. Next, you add a THREAD METHOD, a special form of private [CLASS METHOD](#), which is automatically executed when the thread is launched.

It's important to remember that the THREAD METHOD you create contains the code which will be executed in the thread. When you start the thread (by calling the [LAUNCH](#) method), it executes your THREAD METHOD. When you reach the end of the THREAD METHOD, the thread ends, and its lifetime is over. The THREAD METHOD acts just like the [MAIN](#) (or [PBMAIN](#)) function in your executable.

You may give the THREAD METHOD any name you wish. However, it is recommended you name it MAIN or PBMAIN. This bit of self-documentation will be a simple reminder of the functionality when you review the code a year from now! Generally speaking, most thread objects consist primarily of CLASS METHODS which are called from the THREAD METHOD. If there are any Member Methods (visible from outside the class), they are not usually called from within the thread. Instead, they are typically called from other threads to monitor the status and progress.

There must be exactly one THREAD METHOD per Class. No more. No less. The THREAD METHOD is executed automatically; it may never be called from within your program.

[Instance](#) variables are declared just as in any other class. Unique parameters are passed

to each object when it is launched. Finally, public methods and properties may be added to monitor and manipulate the life of your thread.

Here's a synopsis of THREAD OBJECT usage:

1. Create a class with an interface which inherits IPowerThread.
2. Create a THREAD METHOD, best named MAIN or PBMAIN.
3. Create an INSTANCE variable named THREADPARAM which will hold the parameter(s) you choose to pass to the thread when it begins execution. This is usually another [object variable](#).
4. Create CLASS METHODS as needed, which will be called from the THREAD METHOD for support of that code.
5. From the main thread, create an object variable of the thread class and interface.
6. Call the LAUNCH method, passing the appropriate parameter to be used as THREADPARAM. Your thread is now running and alive.

Syntax

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

With the advent of multi-core CPU's and multi-CPU computers, it's clearly desirable to encapsulate all of the information about a particular thread in a single component. We recommend that all new code use THREAD OBJECTS exclusively, rather than the [Thread Code Group](#). Thread objects provide much greater control, and much better thread parameter handling for the programmer.

IPowerThread Methods

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

METHOD CLOSE() <2>

Releases the thread handle of this thread. Note that it does not stop a thread if it is still running; it simply releases the thread handle (i.e., the resources used to track the thread).

Thread handles should not be released until there is no further need to use other thread methods or properties. If a thread does not need to be monitored, its handle can be released immediately. The thread resources will be freed automatically when the thread terminates naturally.

THREADCOUNT continues to report a thread tally that will include threads whose handle has already been released. A thread ID value may not be used interchangeably with a thread handle value.

METHOD EQUALS(ObjectVar AS InterfaceName) AS Long <3>

Compares the parameter *ObjectVar* to determine if it references the same object as this object. If they both reference the same object, [true](#) (-1) is returned; if not, [false](#) (0) is returned.

METHOD HANDLE() AS Long <4>

Retrieves the handle of the thread for use with Windows API functions.

METHOD ID() AS Long <5>

Retrieves the ID of the thread for use with Windows API functions.

METHOD ISALIVE() AS Long <6>

Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value true (-1) is returned; if not, the value false (0) is returned.

METHOD JOIN(ThreadObjectVar AS InterfaceName, TimeoutVal AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeoutVal* specifies the maximum length of time to wait, in Milliseconds. If *TimeoutVal* is zero (0), the time to wait is infinite.

METHOD LAUNCH(ByRef Param as UDT) <8>

LAUNCH begins execution of the thread, passing parameter data to it. Since the thread is hosted by an object, it is only fitting that the parameter data be contained in the most robust form, another object.

THREADPARAM is a mandatory Instance variable which you must define in each thread class. It is normally declared as the interface name of your choice:

```
INSTANCE ThreadParam as MyInterface
```

When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is normally the best choice, as it allows virtually any number of data items to be contained.

In simpler cases, you may choose to declare THREADPARAM as a [Long Integer](#), or [Dword](#). In that case, you must pass the launch parameter using a [pointer](#) option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
```

```
...
```

```
MyThread.Launch(ByVal MyNumber&)
```

Of course, the Pointer parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a user-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER
```

```
THREAD METHOD MyMethod() AS LONG
```

```
xyz# = ThreadParam.member1
```

```
... other code
```

```
END METHOD
```

```
...
```

```
MyThread.Launch(ByVal VARPTR(MyType))
```

PROPERTY GET PRIORITY() AS Long <9>

Retrieves the priority value for this thread. The thread priority value is one of the following:

```
%THREAD_PRIORITY_IDLE           = -15
%THREAD_PRIORITY_LOWEST          = -2
%THREAD_PRIORITY_BELOW_NORMAL   = -1
%THREAD_PRIORITY_NORMAL          = 0
%THREAD_PRIORITY_ABOVE_NORMAL   = +1
%THREAD_PRIORITY_HIGHEST         = +2
%THREAD_PRIORITY_TIME_CRITICAL = +15
```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

```
%THREAD_PRIORITY_IDLE           = -15
%THREAD_PRIORITY_LOWEST          = -2
%THREAD_PRIORITY_BELOW_NORMAL   = -1
%THREAD_PRIORITY_NORMAL          = 0
%THREAD_PRIORITY_ABOVE_NORMAL   = +1
%THREAD_PRIORITY_HIGHEST         = +2
%THREAD_PRIORITY_TIME_CRITICAL = +15
```

METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the THREAD METHOD is retrieved and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the [OBJRESULT](#) is set to %S_OK (0). If the thread has not ended, the value zero (0) is returned, and the OBJRESULT is set to %S_FALSE

(1).

METHOD RESUME() AS Long <11>

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running at that time.

PROPERTY GET STACKSIZE() AS Long <13>

Retrieves the size of the [stack](#) for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

PROPERTY SET STACKSIZE(Long) <13>

Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

METHOD SUSPEND() AS Long <14>

Suspends execution of the thread. The suspend count of the thread is incremented. If the suspend was successful, the suspend count is returned; otherwise, -1 is returned.

If SUSPEND is executed prior to LAUNCH of the thread, the suspend count is incremented, and the subsequent LAUNCH is treated as a suspended launch. That is, all the necessary setup tasks are performed, but the thread is suspended just before execution of your THREAD METHOD begins. You can continue execution with RESUME.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running while suspended.

METHOD TIMECREATE() AS Quad <16>

Retrieves the date and time-of-day of the thread creation, and returns it as a [Quad](#) Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format of Month/Day/Year/Time.

METHOD TIMEEXIT() AS Quad <17>

Retrieves the date and time-of-day of the thread exit, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format of Month/Day/Year/Time. If the thread has not yet exited, the return value is undefined.

METHOD TIMEKERNEL() AS Quad <18>

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format.

METHOD TIMEUSER() AS Quad <19>

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime object](#) to convert it to a human readable format.

Restrictions

Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed when you reference one particular thread.

See also

[PowerTime](#), [THREAD Code Group](#)

Example

```
CLASS MyClass
  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD
```

```

INTERFACE MyFace
  INHERIT IPOWERTHREAD

  METHOD abc
    END METHOD
  END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
    METHOD = 77
  END METHOD

  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"

  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION

```

IPowerThread.StackSize property set

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object New!

Purpose A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level. THREAD [objects](#) offer a collection of [methods](#) which allow you to easily create and maintain additional threads of execution in your programs.

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with ease.

We liken this to the concept that "Threads are Alive". When a thread object is created and launched, it takes on a life of its own. It lives (and executes) until its lifetime is over and the thread ends. The life of the thread parallels the life of the object which makes it quite easy to manage.

PowerBASIC provides a pre-defined [interface](#) named "IPowerThread", which is a DUAL interface ([Dispatch](#) and [direct](#) access). When you create a thread object, you first [inherit](#) IPowerThread, giving you immediate access to all of its member methods. Next, you add a THREAD METHOD, a special form of private [CLASS METHOD](#), which is automatically executed when the thread is launched.

It's important to remember that the THREAD METHOD you create contains the code which will be executed in the thread. When you start the thread (by calling the [LAUNCH](#) method), it executes your THREAD METHOD. When you reach the end of the THREAD METHOD, the thread ends, and its lifetime is over. The THREAD METHOD acts just like the [MAIN](#) (or [PBMAIN](#)) function in your executable.

You may give the THREAD METHOD any name you wish. However, it is recommended you name it MAIN or PBMAIN. This bit of self-documentation will be a simple reminder of the functionality when you review the code a year from now! Generally speaking, most thread objects consist primarily of CLASS METHODS which are called from the THREAD METHOD. If there are any Member Methods (visible from outside the class), they are not usually called from within the thread. Instead, they are typically called from other threads to monitor the status and progress.

There must be exactly one THREAD METHOD per Class. No more. No less. The THREAD METHOD is executed automatically; it may never be called from within your program.

[Instance](#) variables are declared just as in any other class. Unique parameters are passed to each object when it is launched. Finally, public methods and properties may be added to monitor and manipulate the life of your thread.

Here's a synopsis of THREAD OBJECT usage:

1. Create a class with an interface which inherits IPowerThread.
2. Create a THREAD METHOD, best named MAIN or PBMAIN.
3. Create an INSTANCE variable named THREADPARAM which will hold the parameter(s) you choose to pass to the thread when it begins execution. This is usually another [object variable](#).
4. Create CLASS METHODS as needed, which will be called from the THREAD METHOD for support of that code.
5. From the main thread, create an object variable of the thread class and interface.
6. Call the LAUNCH method, passing the appropriate parameter to be used as THREADPARAM. Your thread is now running and alive.

Syntax

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

With the advent of multi-core CPU's and multi-CPU computers, it's clearly desirable to encapsulate all of the information about a particular thread in a single component. We recommend that all new code use THREAD OBJECTS exclusively, rather than the [Thread Code Group](#). Thread objects provide much greater control, and much better thread parameter handling for the programmer.

IPowerThread Methods

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

METHOD CLOSE() <2>

Releases the thread handle of this thread. Note that it does not stop a thread if it is still running; it simply releases the thread handle (i.e., the resources used to track the

thread).

Thread handles should not be released until there is no further need to use other thread methods or properties. If a thread does not need to be monitored, its handle can be released immediately. The thread resources will be freed automatically when the thread terminates naturally.

THREADCOUNT continues to report a thread tally that will include threads whose handle has already been released. A thread ID value may not be used interchangeably with a thread handle value.

METHOD EQUALS(*ObjectVar* AS *InterfaceName*) AS Long <3>

Compares the parameter *ObjectVar* to determine if it references the same object as this object. If they both reference the same object, [true](#) (-1) is returned; if not, [false](#) (0) is returned.

METHOD HANDLE() AS Long <4>

Retrieves the handle of the thread for use with Windows API functions.

METHOD ID() AS Long <5>

Retrieves the ID of the thread for use with Windows API functions.

METHOD ISALIVE() AS Long <6>

Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value [true](#) (-1) is returned; if not, the value [false](#) (0) is returned.

METHOD JOIN(*ThreadObjectVar* AS *InterfaceName*, *TimeOutVal* AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeOutVal* specifies the maximum length of time to wait, in *Milliseconds*. If *TimeOutVal* is zero (0), the time to wait is infinite.

METHOD LAUNCH(*ByRef Param* as *UDT*) <8>

LAUNCH begins execution of the thread, passing parameter data to it. Since the thread is hosted by an object, it is only fitting that the parameter data be contained in the most robust form, another object.

THREADPARAM is a mandatory Instance variable which you must define in each thread class. It is normally declared as the interface name of your choice:

```
INSTANCE ThreadParam as MyInterface
```

When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is the normally the best choice, as it allows virtually any number of data items to be contained.

In simpler cases, you may choose to declare THREADPARAM as a [Long Integer](#), or [Dword](#). In that case, you must pass the launch parameter using a [pointer](#) option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
```

```
...
```

```
MyThread.Launch(ByVal MyNumber&)
```

Of course, the [Pointer](#) parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a user-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER
```

```
THREAD METHOD MyMethod() AS LONG
```

```
xyz# = ThreadParam.member1
```

```
... other code
```

```
END METHOD
```

```
...
```

```
MyThread.Launch(ByVal VARPTR(MyType))
```

PROPERTY GET PRIORITY() AS Long <9>

Retrieves the priority value for this thread. The thread priority value is one of the following:

```
%THREAD_PRIORITY_IDLE           = -15
%THREAD_PRIORITY_LOWEST         = -2
%THREAD_PRIORITY_BELOW_NORMAL  = -1
%THREAD_PRIORITY_NORMAL        = 0
%THREAD_PRIORITY_ABOVE_NORMAL  = +1
%THREAD_PRIORITY_HIGHEST       = +2
%THREAD_PRIORITY_TIME_CRITICAL = +15
```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

```
%THREAD_PRIORITY_IDLE           = -15
%THREAD_PRIORITY_LOWEST         = -2
%THREAD_PRIORITY_BELOW_NORMAL  = -1
%THREAD_PRIORITY_NORMAL        = 0
%THREAD_PRIORITY_ABOVE_NORMAL  = +1
%THREAD_PRIORITY_HIGHEST       = +2
%THREAD_PRIORITY_TIME_CRITICAL = +15
```

METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the THREAD METHOD is retrieved and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the [OBJRESULT](#) is set to %S_OK (0). If the thread has not ended, the value zero (0) is returned, and the OBJRESULT is set to %S_FALSE (1).

METHOD RESUME() AS Long <11>

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running at that time.

PROPERTY GET STACKSIZE() AS Long <13>

Retrieves the size of the [stack](#) for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

PROPERTY SET STACKSIZE(Long) <13>

Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

METHOD SUSPEND() AS Long <14>

Suspends execution of the thread. The suspend count of the thread is incremented. If the suspend was successful, the suspend count is returned; otherwise, -1 is returned.

If SUSPEND is executed prior to LAUNCH of the thread, the suspend count is incremented, and the subsequent LAUNCH is treated as a suspended launch. That is, all the necessary setup tasks are performed, but the thread is suspended just before execution of your THREAD METHOD begins. You can continue execution with RESUME.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running while suspended.

METHOD TIMECREATE() AS Quad <16>

Retrieves the date and time-of-day of the thread creation, and returns it as a [Quad](#) Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format of Month/Day/Year/Time.

METHOD TIMEEXIT() AS Quad <17>

Retrieves the date and time-of-day of the thread exit, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time. If the thread has not yet exited, the return value is undefined.

METHOD TIMEKERNEL() AS Quad <18>

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

METHOD TIMEUSER() AS Quad <19>

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime object](#) to convert it to a human readable format.

Restrictions

Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed when you reference one particular thread.

See also

[PowerTime](#), [THREAD Code Group](#)

Example

```

CLASS MyClass
  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD

  INTERFACE MyFace
    INHERIT IPOWERTHREAD

    METHOD abc
      END METHOD
  END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
      METHOD = 77
    END METHOD
  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"

  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION

```

IPowerThread.Suspend method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object **New!**

Purpose

A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level.

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It's important to remember that the THREAD METHOD you create contains the code which will be executed in the thread. When you start the thread (by calling the [LAUNCH](#) method), it executes your THREAD METHOD. When you reach the end of the THREAD METHOD, the thread ends, and its lifetime is over. The THREAD METHOD acts just like the [MAIN](#) (or [PBMAIN](#)) function in your executable.

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[Instance](#) variables are declared just as in any other class. Unique parameters are passed

to each object when it is launched. Finally, public methods and properties may be added to monitor and manipulate the life of your thread.

Here's a synopsis of THREAD OBJECT usage:

1. Create a class with an interface which inherits IPowerThread.
2. Create a THREAD METHOD, best named MAIN or PBMAIN.
3. Create an INSTANCE variable named THREADPARAM which will hold the parameter(s) you choose to pass to the thread when it begins execution. This is usually another [object variable](#).
4. Create CLASS METHODS as needed, which will be called from the THREAD METHOD for support of that code.
5. From the main thread, create an object variable of the thread class and interface.
6. Call the LAUNCH method, passing the appropriate parameter to be used as THREADPARAM. Your thread is now running and alive.

Syntax

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

With the advent of multi-core CPU's and multi-CPU computers, it's clearly desirable to encapsulate all of the information about a particular thread in a single component. We recommend that all new code use THREAD OBJECTS exclusively, rather than the [Thread Code Group](#). Thread objects provide much greater control, and much better thread parameter handling for the programmer.

IPowerThread Methods

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

METHOD CLOSE() <2>

Releases the thread handle of this thread. Note that it does not stop a thread if it is still running; it simply releases the thread handle (i.e., the resources used to track the thread).

Thread handles should not be released until there is no further need to use other thread methods or properties. If a thread does not need to be monitored, its handle can be released immediately. The thread resources will be freed automatically when the thread terminates naturally.

THREADCOUNT continues to report a thread tally that will include threads whose handle has already been released. A thread ID value may not be used interchangeably with a thread handle value.

METHOD EQUALS(ObjectVar AS InterfaceName) AS Long <3>

Compares the parameter *ObjectVar* to determine if it references the same object as this object. If they both reference the same object, [true](#) (-1) is returned; if not, [false](#) (0) is returned.

METHOD HANDLE() AS Long <4>

Retrieves the handle of the thread for use with Windows API functions.

METHOD ID() AS Long <5>

Retrieves the ID of the thread for use with Windows API functions.

METHOD ISALIVE() AS Long <6>

Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value true (-1) is returned; if not, the value false (0) is returned.

METHOD JOIN(ThreadObjectVar AS InterfaceName, TimeOutVal AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeOutVal* specifies the maximum length of time to wait, in Milliseconds. If *TimeOutVal* is zero (0), the time to wait is infinite.

METHOD LAUNCH(ByRef Param as UDT) <8>

LAUNCH begins execution of the thread, passing parameter data to it. Since the thread is hosted by an object, it is only fitting that the parameter data be contained in the most robust form, another object.

THREADPARAM is a mandatory Instance variable which you must define in each thread class. It is normally declared as the interface name of your choice:

```
INSTANCE ThreadParam as MyInterface
```

When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is normally the best choice, as it allows virtually any number of data items to be contained.

In simpler cases, you may choose to declare THREADPARAM as a [Long Integer](#), or [Dword](#). In that case, you must pass the launch parameter using a `POINTER` option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
```

```
...
```

```
MyThread.Launch(ByVal MyNumber&)
```

Of course, the Pointer parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a user-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER
```

```
THREAD METHOD MyMethod() AS LONG
```

```
xyz# = ThreadParam.member1
```

```
... other code
```

```
END METHOD
```

```
...
```

```
MyThread.Launch(ByVal VARPTR(MyType))
```

PROPERTY GET PRIORITY() AS Long <9>

Retrieves the priority value for this thread. The thread priority value is one of the following:

```
%THREAD_PRIORITY_IDLE           = -15
%THREAD_PRIORITY_LOWEST          = -2
%THREAD_PRIORITY_BELOW_NORMAL   = -1
%THREAD_PRIORITY_NORMAL         = 0
%THREAD_PRIORITY_ABOVE_NORMAL   = +1
%THREAD_PRIORITY_HIGHEST        = +2
%THREAD_PRIORITY_TIME_CRITICAL  = +15
```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

```
%THREAD_PRIORITY_IDLE           = -15
%THREAD_PRIORITY_LOWEST          = -2
%THREAD_PRIORITY_BELOW_NORMAL   = -1
%THREAD_PRIORITY_NORMAL         = 0
%THREAD_PRIORITY_ABOVE_NORMAL   = +1
%THREAD_PRIORITY_HIGHEST        = +2
%THREAD_PRIORITY_TIME_CRITICAL  = +15
```

METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the THREAD METHOD is retrieved and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the [OBJRESULT](#) is set to %S_OK (0). If the thread has not ended, the value zero (0) is returned, and the OBJRESULT is set to %S_FALSE

(1).

METHOD RESUME() AS Long <11>

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running at that time.

PROPERTY GET STACKSIZE() AS Long <13>

Retrieves the size of the [stack](#) for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

PROPERTY SET STACKSIZE(Long) <13>

Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

METHOD SUSPEND() AS Long <14>

Suspends execution of the thread. The suspend count of the thread is incremented. If the suspend was successful, the suspend count is returned; otherwise, -1 is returned.

If SUSPEND is executed prior to LAUNCH of the thread, the suspend count is incremented, and the subsequent LAUNCH is treated as a suspended launch. That is, all the necessary setup tasks are performed, but the thread is suspended just before execution of your THREAD METHOD begins. You can continue execution with RESUME.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running while suspended.

METHOD TIMECREATE() AS Quad <16>

Retrieves the date and time-of-day of the thread creation, and returns it as a [Quad](#) Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format of Month/Day/Year/Time.

METHOD TIMEEXIT() AS Quad <17>

Retrieves the date and time-of-day of the thread exit, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format of Month/Day/Year/Time. If the thread has not yet exited, the return value is undefined.

METHOD TIMEKERNEL() AS Quad <18>

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format.

METHOD TIMEUSER() AS Quad <19>

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime object](#) to convert it to a human readable format.

Restrictions

Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed when you reference one particular thread.

See also

[PowerTime](#), [THREAD Code Group](#)

Example

```
CLASS MyClass
  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD
```

```

INTERFACE MyFace
  INHERIT IPOWERTHREAD

  METHOD abc
    END METHOD
  END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
    METHOD = 77
  END METHOD

  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"

  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION

```

IPowerThread.TimeCreate method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object New!

Purpose

A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level. THREAD [objects](#) offer a collection of [methods](#) which allow you to easily create and maintain additional threads of execution in your programs.

A thread can be completely encapsulated (contained) within a thread object.

Encapsulation makes an object the perfect vehicle to host a thread. With thread objects, you'll have easy access to multiple thread parameters, private methods, and thread local storage of data. In short, a complete program-within-a-program which can be executed

with ease.

We liken this to the concept that "Threads are Alive". When a thread object is created and launched, it takes on a life of its own. It lives (and executes) until its lifetime is over and the thread ends. The life of the thread parallels the life of the object which makes it quite easy to manage.

PowerBASIC provides a pre-defined [interface](#) named "IPowerThread", which is a DUAL interface ([Dispatch](#) and [direct](#) access). When you create a thread object, you first [inherit](#) IPowerThread, giving you immediate access to all of its member methods. Next, you add a THREAD METHOD, a special form of private [CLASS METHOD](#), which is automatically executed when the thread is launched.

It's important to remember that the THREAD METHOD you create contains the code which will be executed in the thread. When you start the thread (by calling the [LAUNCH](#) method), it executes your THREAD METHOD. When you reach the end of the THREAD METHOD, the thread ends, and its lifetime is over. The THREAD METHOD acts just like the [MAIN](#) (or [PBMAIN](#)) function in your executable.

You may give the THREAD METHOD any name you wish. However, it is recommended you name it MAIN or PBMAIN. This bit of self-documentation will be a simple reminder of the functionality when you review the code a year from now! Generally speaking, most thread objects consist primarily of CLASS METHODS which are called from the THREAD METHOD. If there are any Member Methods (visible from outside the class), they are not usually called from within the thread. Instead, they are typically called from other threads to monitor the status and progress.

There must be exactly one THREAD METHOD per Class. No more. No less. The THREAD METHOD is executed automatically; it may never be called from within your program.

[Instance](#) variables are declared just as in any other class. Unique parameters are passed to each object when it is launched. Finally, public methods and properties may be added to monitor and manipulate the life of your thread.

Here's a synopsis of THREAD OBJECT usage:

1. Create a class with an interface which inherits IPowerThread.
2. Create a THREAD METHOD, best named MAIN or PBMAIN.
3. Create an INSTANCE variable named THREADPARAM which will hold the parameter(s) you choose to pass to the thread when it begins execution. This is usually another [object variable](#).
4. Create CLASS METHODS as needed, which will be called from the THREAD METHOD for support of that code.
5. From the main thread, create an object variable of the thread class and interface.
6. Call the LAUNCH method, passing the appropriate parameter to be used as THREADPARAM. Your thread is now running and alive.

Syntax

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

With the advent of multi-core CPU's and multi-CPU computers, it's clearly desirable to encapsulate all of the information about a particular thread in a single component. We recommend that all new code use THREAD OBJECTS exclusively, rather than the [Thread Code Group](#). Thread objects provide much greater control, and much better thread parameter handling for the programmer.

IPowerThread Methods

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

METHOD CLOSE() <2>

Releases the thread handle of this thread. Note that it does not stop a thread if it is still running; it simply releases the thread handle (i.e., the resources used to track the

thread).

Thread handles should not be released until there is no further need to use other thread methods or properties. If a thread does not need to be monitored, its handle can be released immediately. The thread resources will be freed automatically when the thread terminates naturally.

THREADCOUNT continues to report a thread tally that will include threads whose handle has already been released. A thread ID value may not be used interchangeably with a thread handle value.

METHOD EQUALS(*ObjectVar* AS *InterfaceName*) AS Long <3>

Compares the parameter *ObjectVar* to determine if it references the same object as this object. If they both reference the same object, [true](#) (-1) is returned; if not, [false](#) (0) is returned.

METHOD HANDLE() AS Long <4>

Retrieves the handle of the thread for use with Windows API functions.

METHOD ID() AS Long <5>

Retrieves the ID of the thread for use with Windows API functions.

METHOD ISALIVE() AS Long <6>

Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value [true](#) (-1) is returned; if not, the value [false](#) (0) is returned.

METHOD JOIN(*ThreadObjectVar* AS *InterfaceName*, *TimeOutVal* AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeOutVal* specifies the maximum length of time to wait, in *Milliseconds*. If *TimeOutVal* is zero (0), the time to wait is infinite.

METHOD LAUNCH(*ByRef Param* as *UDT*) <8>

LAUNCH begins execution of the thread, passing parameter data to it. Since the thread is hosted by an object, it is only fitting that the parameter data be contained in the most robust form, another object.

THREADPARAM is a mandatory Instance variable which you must define in each thread class. It is normally declared as the interface name of your choice:

```
INSTANCE ThreadParam as MyInterface
```

When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is the normally the best choice, as it allows virtually any number of data items to be contained.

In simpler cases, you may choose to declare THREADPARAM as a [Long Integer](#), or [Dword](#). In that case, you must pass the launch parameter using a [pointer](#) option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
```

```
...
```

```
MyThread.Launch(ByVal MyNumber&)
```

Of course, the [Pointer](#) parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a user-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER
```

```
THREAD METHOD MyMethod() AS LONG
```

```
xyz# = ThreadParam.member1
```

```
... other code
```

```
END METHOD
```

```
...
```

```
MyThread.Launch(ByVal VARPTR(MyType))
```

PROPERTY GET PRIORITY() AS Long <9>

Retrieves the priority value for this thread. The thread priority value is one of the following:

```
%THREAD_PRIORITY_IDLE           = -15
%THREAD_PRIORITY_LOWEST         = -2
%THREAD_PRIORITY_BELOW_NORMAL  = -1
%THREAD_PRIORITY_NORMAL        = 0
%THREAD_PRIORITY_ABOVE_NORMAL  = +1
%THREAD_PRIORITY_HIGHEST       = +2
%THREAD_PRIORITY_TIME_CRITICAL = +15
```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

```
%THREAD_PRIORITY_IDLE           = -15
%THREAD_PRIORITY_LOWEST         = -2
%THREAD_PRIORITY_BELOW_NORMAL  = -1
%THREAD_PRIORITY_NORMAL        = 0
%THREAD_PRIORITY_ABOVE_NORMAL  = +1
%THREAD_PRIORITY_HIGHEST       = +2
%THREAD_PRIORITY_TIME_CRITICAL = +15
```

METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the THREAD METHOD is retrieved and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the [OBJRESULT](#) is set to %S_OK (0). If the thread has not ended, the value zero (0) is returned, and the OBJRESULT is set to %S_FALSE (1).

METHOD RESUME() AS Long <11>

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running at that time.

PROPERTY GET STACKSIZE() AS Long <13>

Retrieves the size of the [stack](#) for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

PROPERTY SET STACKSIZE(Long) <13>

Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

METHOD SUSPEND() AS Long <14>

Suspends execution of the thread. The suspend count of the thread is incremented. If the suspend was successful, the suspend count is returned; otherwise, -1 is returned.

If SUSPEND is executed prior to LAUNCH of the thread, the suspend count is incremented, and the subsequent LAUNCH is treated as a suspended launch. That is, all the necessary setup tasks are performed, but the thread is suspended just before execution of your THREAD METHOD begins. You can continue execution with RESUME.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running while suspended.

METHOD TIMECREATE() AS Quad <16>

Retrieves the date and time-of-day of the thread creation, and returns it as a [Quad](#) Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format of Month/Day/Year/Time.

METHOD TIMEEXIT() AS Quad <17>

Retrieves the date and time-of-day of the thread exit, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time. If the thread has not yet exited, the return value is undefined.

METHOD TIMEKERNEL() AS Quad <18>

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

METHOD TIMEUSER() AS Quad <19>

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime object](#) to convert it to a human readable format.

Restrictions

Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed when you reference one particular thread.

See also

[PowerTime](#), [THREAD Code Group](#)

Example

```

CLASS MyClass
  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD

  INTERFACE MyFace
    INHERIT IPOWERTHREAD

    METHOD abc
      END METHOD
  END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
      METHOD = 77
    END METHOD
  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"

  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION

```

IPowerThread.TimeExit method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object **New!**

Purpose

A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level.

THREAD [objects](#) offer a collection of [methods](#) which allow you to easily create and maintain additional threads of execution in your programs.

A thread can be completely encapsulated (contained) within a thread object.

Encapsulation makes an object the perfect vehicle to host a thread. With thread objects, you'll have easy access to multiple thread parameters, private methods, and thread local storage of data. In short, a complete program-within-a-program which can be executed with ease.

We liken this to the concept that "Threads are Alive". When a thread object is created and launched, it takes on a life of its own. It lives (and executes) until its lifetime is over and the thread ends. The life of the thread parallels the life of the object which makes it quite easy to manage.

PowerBASIC provides a pre-defined [interface](#) named "IPowerThread", which is a DUAL interface ([Dispatch](#) and [direct](#) access). When you create a thread object, you first [inherit](#) IPowerThread, giving you immediate access to all of its member methods. Next, you add a THREAD METHOD, a special form of private [CLASS METHOD](#), which is automatically executed when the thread is launched.

It's important to remember that the THREAD METHOD you create contains the code which will be executed in the thread. When you start the thread (by calling the [LAUNCH](#) method), it executes your THREAD METHOD. When you reach the end of the THREAD METHOD, the thread ends, and its lifetime is over. The THREAD METHOD acts just like the [MAIN](#) (or [PBMAIN](#)) function in your executable.

You may give the THREAD METHOD any name you wish. However, it is recommended you name it MAIN or PBMAIN. This bit of self-documentation will be a simple reminder of the functionality when you review the code a year from now! Generally speaking, most thread objects consist primarily of CLASS METHODS which are called from the THREAD METHOD. If there are any Member Methods (visible from outside the class), they are not usually called from within the thread. Instead, they are typically called from other threads to monitor the status and progress.

There must be exactly one THREAD METHOD per Class. No more. No less. The THREAD METHOD is executed automatically; it may never be called from within your program.

[Instance](#) variables are declared just as in any other class. Unique parameters are passed

to each object when it is launched. Finally, public methods and properties may be added to monitor and manipulate the life of your thread.

Here's a synopsis of THREAD OBJECT usage:

1. Create a class with an interface which inherits IPowerThread.
2. Create a THREAD METHOD, best named MAIN or PBMAIN.
3. Create an INSTANCE variable named THREADPARAM which will hold the parameter(s) you choose to pass to the thread when it begins execution. This is usually another [object variable](#).
4. Create CLASS METHODS as needed, which will be called from the THREAD METHOD for support of that code.
5. From the main thread, create an object variable of the thread class and interface.
6. Call the LAUNCH method, passing the appropriate parameter to be used as THREADPARAM. Your thread is now running and alive.

Syntax

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

With the advent of multi-core CPU's and multi-CPU computers, it's clearly desirable to encapsulate all of the information about a particular thread in a single component. We recommend that all new code use THREAD OBJECTS exclusively, rather than the [Thread Code Group](#). Thread objects provide much greater control, and much better thread parameter handling for the programmer.

IPowerThread Methods

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

METHOD CLOSE() <2>

Releases the thread handle of this thread. Note that it does not stop a thread if it is still running; it simply releases the thread handle (i.e., the resources used to track the thread).

Thread handles should not be released until there is no further need to use other thread methods or properties. If a thread does not need to be monitored, its handle can be released immediately. The thread resources will be freed automatically when the thread terminates naturally.

THREADCOUNT continues to report a thread tally that will include threads whose handle has already been released. A thread ID value may not be used interchangeably with a thread handle value.

METHOD EQUALS(ObjectVar AS InterfaceName) AS Long <3>

Compares the parameter *ObjectVar* to determine if it references the same object as this object. If they both reference the same object, [true](#) (-1) is returned; if not, [false](#) (0) is returned.

METHOD HANDLE() AS Long <4>

Retrieves the handle of the thread for use with Windows API functions.

METHOD ID() AS Long <5>

Retrieves the ID of the thread for use with Windows API functions.

METHOD ISALIVE() AS Long <6>

Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value true (-1) is returned; if not, the value false (0) is returned.

METHOD JOIN(ThreadObjectVar AS InterfaceName, TimeOutVal AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeOutVal* specifies the maximum length of time to wait, in Milliseconds. If *TimeOutVal* is zero (0), the time to wait is infinite.

METHOD LAUNCH(ByRef Param as UDT) <8>

LAUNCH begins execution of the thread, passing parameter data to it. Since the thread is hosted by an object, it is only fitting that the parameter data be contained in the most robust form, another object.

THREADPARAM is a mandatory Instance variable which you must define in each thread class. It is normally declared as the interface name of your choice:

```
INSTANCE ThreadParam as MyInterface
```

When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is normally the best choice, as it allows virtually any number of data items to be contained.

In simpler cases, you may choose to declare THREADPARAM as a [Long Integer](#), or [Dword](#). In that case, you must pass the launch parameter using a `POINTER` option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
```

```
...
```

```
MyThread.Launch(ByVal MyNumber&)
```

Of course, the `POINTER` parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a user-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER
```

```
THREAD METHOD MyMethod() AS LONG
```

```
xyz# = ThreadParam.member1
```

```
... other code
```

```
END METHOD
```

```
...
```

```
MyThread.Launch(ByVal VARPTR(MyType))
```

PROPERTY GET PRIORITY() AS Long <9>

Retrieves the priority value for this thread. The thread priority value is one of the following:

```
%THREAD_PRIORITY_IDLE           = -15
%THREAD_PRIORITY_LOWEST         = -2
%THREAD_PRIORITY_BELOW_NORMAL  = -1
%THREAD_PRIORITY_NORMAL         = 0
%THREAD_PRIORITY_ABOVE_NORMAL  = +1
%THREAD_PRIORITY_HIGHEST       = +2
%THREAD_PRIORITY_TIME_CRITICAL = +15
```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

```
%THREAD_PRIORITY_IDLE           = -15
%THREAD_PRIORITY_LOWEST         = -2
%THREAD_PRIORITY_BELOW_NORMAL  = -1
%THREAD_PRIORITY_NORMAL         = 0
%THREAD_PRIORITY_ABOVE_NORMAL  = +1
%THREAD_PRIORITY_HIGHEST       = +2
%THREAD_PRIORITY_TIME_CRITICAL = +15
```

METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the `THREAD METHOD` is retrieved and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the `OBJRESULT` is set to `%S_OK` (0). If the thread has not ended, the value zero (0) is returned, and the `OBJRESULT` is set to `%S_FALSE`.

(1).

METHOD RESUME() AS Long <11>

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running at that time.

PROPERTY GET STACKSIZE() AS Long <13>

Retrieves the size of the [stack](#) for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

PROPERTY SET STACKSIZE(Long) <13>

Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

METHOD SUSPEND() AS Long <14>

Suspends execution of the thread. The suspend count of the thread is incremented. If the suspend was successful, the suspend count is returned; otherwise, -1 is returned.

If SUSPEND is executed prior to LAUNCH of the thread, the suspend count is incremented, and the subsequent LAUNCH is treated as a suspended launch. That is, all the necessary setup tasks are performed, but the thread is suspended just before execution of your THREAD METHOD begins. You can continue execution with RESUME.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running while suspended.

METHOD TIMECREATE() AS Quad <16>

Retrieves the date and time-of-day of the thread creation, and returns it as a [Quad](#) Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format of Month/Day/Year/Time.

METHOD TIMEEXIT() AS Quad <17>

Retrieves the date and time-of-day of the thread exit, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format of Month/Day/Year/Time. If the thread has not yet exited, the return value is undefined.

METHOD TIMEKERNEL() AS Quad <18>

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format.

METHOD TIMEUSER() AS Quad <19>

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime object](#) to convert it to a human readable format.

Restrictions

Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed when you reference one particular thread.

See also

[PowerTime](#), [THREAD Code Group](#)

Example

```
CLASS MyClass
  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD
```

```

INTERFACE MyFace
  INHERIT IPOWERTHREAD

  METHOD abc
    END METHOD
  END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
      METHOD = 77
    END METHOD

  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"

  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION

```

IPowerThread.TimeKernel method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object New!

Purpose

A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level. THREAD [objects](#) offer a collection of [methods](#) which allow you to easily create and maintain additional threads of execution in your programs.

A thread can be completely encapsulated (contained) within a thread object.

Encapsulation makes an object the perfect vehicle to host a thread. With thread objects, you'll have easy access to multiple thread parameters, private methods, and thread local storage of data. In short, a complete program-within-a-program which can be executed

with ease.

We liken this to the concept that "Threads are Alive". When a thread object is created and launched, it takes on a life of its own. It lives (and executes) until its lifetime is over and the thread ends. The life of the thread parallels the life of the object which makes it quite easy to manage.

PowerBASIC provides a pre-defined [interface](#) named "IPowerThread", which is a DUAL interface ([Dispatch](#) and [direct](#) access). When you create a thread object, you first [inherit](#) IPowerThread, giving you immediate access to all of its member methods. Next, you add a THREAD METHOD, a special form of private [CLASS METHOD](#), which is automatically executed when the thread is launched.

It's important to remember that the THREAD METHOD you create contains the code which will be executed in the thread. When you start the thread (by calling the [LAUNCH](#) method), it executes your THREAD METHOD. When you reach the end of the THREAD METHOD, the thread ends, and its lifetime is over. The THREAD METHOD acts just like the [MAIN](#) (or [PBMAIN](#)) function in your executable.

You may give the THREAD METHOD any name you wish. However, it is recommended you name it MAIN or PBMAIN. This bit of self-documentation will be a simple reminder of the functionality when you review the code a year from now! Generally speaking, most thread objects consist primarily of CLASS METHODS which are called from the THREAD METHOD. If there are any Member Methods (visible from outside the class), they are not usually called from within the thread. Instead, they are typically called from other threads to monitor the status and progress.

There must be exactly one THREAD METHOD per Class. No more. No less. The THREAD METHOD is executed automatically; it may never be called from within your program.

[Instance](#) variables are declared just as in any other class. Unique parameters are passed to each object when it is launched. Finally, public methods and properties may be added to monitor and manipulate the life of your thread.

Here's a synopsis of THREAD OBJECT usage:

1. Create a class with an interface which inherits IPowerThread.
2. Create a THREAD METHOD, best named MAIN or PBMAIN.
3. Create an INSTANCE variable named THREADPARAM which will hold the parameter(s) you choose to pass to the thread when it begins execution. This is usually another [object variable](#).
4. Create CLASS METHODS as needed, which will be called from the THREAD METHOD for support of that code.
5. From the main thread, create an object variable of the thread class and interface.
6. Call the LAUNCH method, passing the appropriate parameter to be used as THREADPARAM. Your thread is now running and alive.

Syntax

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

With the advent of multi-core CPU's and multi-CPU computers, it's clearly desirable to encapsulate all of the information about a particular thread in a single component. We recommend that all new code use THREAD OBJECTS exclusively, rather than the [Thread Code Group](#). Thread objects provide much greater control, and much better thread parameter handling for the programmer.

IPowerThread Methods

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

METHOD CLOSE() <2>

Releases the thread handle of this thread. Note that it does not stop a thread if it is still running; it simply releases the thread handle (i.e., the resources used to track the

thread).

Thread handles should not be released until there is no further need to use other thread methods or properties. If a thread does not need to be monitored, its handle can be released immediately. The thread resources will be freed automatically when the thread terminates naturally.

THREADCOUNT continues to report a thread tally that will include threads whose handle has already been released. A thread ID value may not be used interchangeably with a thread handle value.

METHOD EQUALS(*ObjectVar* AS *InterfaceName*) AS Long <3>

Compares the parameter *ObjectVar* to determine if it references the same object as this object. If they both reference the same object, [true](#) (-1) is returned; if not, [false](#) (0) is returned.

METHOD HANDLE() AS Long <4>

Retrieves the handle of the thread for use with Windows API functions.

METHOD ID() AS Long <5>

Retrieves the ID of the thread for use with Windows API functions.

METHOD ISALIVE() AS Long <6>

Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value [true](#) (-1) is returned; if not, the value [false](#) (0) is returned.

METHOD JOIN(*ThreadObjectVar* AS *InterfaceName*, *TimeOutVal* AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeOutVal* specifies the maximum length of time to wait, in *Milliseconds*. If *TimeOutVal* is zero (0), the time to wait is infinite.

METHOD LAUNCH(*ByRef Param* as *UDT*) <8>

LAUNCH begins execution of the thread, passing parameter data to it. Since the thread is hosted by an object, it is only fitting that the parameter data be contained in the most robust form, another object.

THREADPARAM is a mandatory Instance variable which you must define in each thread class. It is normally declared as the interface name of your choice:

```
INSTANCE ThreadParam as MyInterface
```

When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is the normally the best choice, as it allows virtually any number of data items to be contained.

In simpler cases, you may choose to declare THREADPARAM as a [Long Integer](#), or [Dword](#). In that case, you must pass the launch parameter using a [pointer](#) option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
```

```
...
```

```
MyThread.Launch(ByVal MyNumber&)
```

Of course, the [Pointer](#) parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a user-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER
```

```
THREAD METHOD MyMethod() AS LONG
```

```
xyz# = ThreadParam.member1
```

```
... other code
```

```
END METHOD
```

```
...
```

```
MyThread.Launch(ByVal VARPTR(MyType))
```

PROPERTY GET PRIORITY() AS Long <9>

Retrieves the priority value for this thread. The thread priority value is one of the following:

```
%THREAD_PRIORITY_IDLE           = -15
%THREAD_PRIORITY_LOWEST         = -2
%THREAD_PRIORITY_BELOW_NORMAL  = -1
%THREAD_PRIORITY_NORMAL        = 0
%THREAD_PRIORITY_ABOVE_NORMAL  = +1
%THREAD_PRIORITY_HIGHEST       = +2
%THREAD_PRIORITY_TIME_CRITICAL = +15
```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

```
%THREAD_PRIORITY_IDLE           = -15
%THREAD_PRIORITY_LOWEST         = -2
%THREAD_PRIORITY_BELOW_NORMAL  = -1
%THREAD_PRIORITY_NORMAL        = 0
%THREAD_PRIORITY_ABOVE_NORMAL  = +1
%THREAD_PRIORITY_HIGHEST       = +2
%THREAD_PRIORITY_TIME_CRITICAL = +15
```

METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the THREAD METHOD is retrieved and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the [OBJRESULT](#) is set to %S_OK (0). If the thread has not ended, the value zero (0) is returned, and the OBJRESULT is set to %S_FALSE (1).

METHOD RESUME() AS Long <11>

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running at that time.

PROPERTY GET STACKSIZE() AS Long <13>

Retrieves the size of the [stack](#) for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

PROPERTY SET STACKSIZE(Long) <13>

Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

METHOD SUSPEND() AS Long <14>

Suspends execution of the thread. The suspend count of the thread is incremented. If the suspend was successful, the suspend count is returned; otherwise, -1 is returned.

If SUSPEND is executed prior to LAUNCH of the thread, the suspend count is incremented, and the subsequent LAUNCH is treated as a suspended launch. That is, all the necessary setup tasks are performed, but the thread is suspended just before execution of your THREAD METHOD begins. You can continue execution with RESUME.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running while suspended.

METHOD TIMECREATE() AS Quad <16>

Retrieves the date and time-of-day of the thread creation, and returns it as a [Quad](#) Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format of Month/Day/Year/Time.

METHOD TIMEEXIT() AS Quad <17>

Retrieves the date and time-of-day of the thread exit, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time. If the thread has not yet exited, the return value is undefined.

METHOD TIMEKERNEL() AS Quad <18>

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

METHOD TIMEUSER() AS Quad <19>

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime object](#) to convert it to a human readable format.

Restrictions

Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed when you reference one particular thread.

See also

[PowerTime](#), [THREAD Code Group](#)

Example

```

CLASS MyClass
  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD

  INTERFACE MyFace
    INHERIT IPOWERTHREAD

    METHOD abc
      END METHOD
  END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
      METHOD = 77
    END METHOD
  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"

  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION

```

IPowerThread.TimeUser method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object **New!**

Purpose

A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level.

THREAD [objects](#) offer a collection of [methods](#) which allow you to easily create and maintain additional threads of execution in your programs.

A thread can be completely encapsulated (contained) within a thread object.

Encapsulation makes an object the perfect vehicle to host a thread. With thread objects, you'll have easy access to multiple thread parameters, private methods, and thread local storage of data. In short, a complete program-within-a-program which can be executed with ease.

We liken this to the concept that "Threads are Alive". When a thread object is created and launched, it takes on a life of its own. It lives (and executes) until its lifetime is over and the thread ends. The life of the thread parallels the life of the object which makes it quite easy to manage.

PowerBASIC provides a pre-defined [interface](#) named "IPowerThread", which is a DUAL interface ([Dispatch](#) and [direct](#) access). When you create a thread object, you first [inherit](#) IPowerThread, giving you immediate access to all of its member methods. Next, you add a THREAD METHOD, a special form of private [CLASS METHOD](#), which is automatically executed when the thread is launched.

It's important to remember that the THREAD METHOD you create contains the code which will be executed in the thread. When you start the thread (by calling the [LAUNCH](#) method), it executes your THREAD METHOD. When you reach the end of the THREAD METHOD, the thread ends, and its lifetime is over. The THREAD METHOD acts just like the [MAIN](#) (or [PBMAIN](#)) function in your executable.

You may give the THREAD METHOD any name you wish. However, it is recommended you name it MAIN or PBMAIN. This bit of self-documentation will be a simple reminder of the functionality when you review the code a year from now! Generally speaking, most thread objects consist primarily of CLASS METHODS which are called from the THREAD METHOD. If there are any Member Methods (visible from outside the class), they are not usually called from within the thread. Instead, they are typically called from other threads to monitor the status and progress.

There must be exactly one THREAD METHOD per Class. No more. No less. The THREAD METHOD is executed automatically; it may never be called from within your program.

[Instance](#) variables are declared just as in any other class. Unique parameters are passed

to each object when it is launched. Finally, public methods and properties may be added to monitor and manipulate the life of your thread.

Here's a synopsis of THREAD OBJECT usage:

1. Create a class with an interface which inherits IPowerThread.
2. Create a THREAD METHOD, best named MAIN or PBMAIN.
3. Create an INSTANCE variable named THREADPARAM which will hold the parameter(s) you choose to pass to the thread when it begins execution. This is usually another [object variable](#).
4. Create CLASS METHODS as needed, which will be called from the THREAD METHOD for support of that code.
5. From the main thread, create an object variable of the thread class and interface.
6. Call the LAUNCH method, passing the appropriate parameter to be used as THREADPARAM. Your thread is now running and alive.

Syntax

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

With the advent of multi-core CPU's and multi-CPU computers, it's clearly desirable to encapsulate all of the information about a particular thread in a single component. We recommend that all new code use THREAD OBJECTS exclusively, rather than the [Thread Code Group](#). Thread objects provide much greater control, and much better thread parameter handling for the programmer.

IPowerThread Methods

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

METHOD CLOSE() <2>

Releases the thread handle of this thread. Note that it does not stop a thread if it is still running; it simply releases the thread handle (i.e., the resources used to track the thread).

Thread handles should not be released until there is no further need to use other thread methods or properties. If a thread does not need to be monitored, its handle can be released immediately. The thread resources will be freed automatically when the thread terminates naturally.

THREADCOUNT continues to report a thread tally that will include threads whose handle has already been released. A thread ID value may not be used interchangeably with a thread handle value.

METHOD EQUALS(ObjectVar AS InterfaceName) AS Long <3>

Compares the parameter *ObjectVar* to determine if it references the same object as this object. If they both reference the same object, [true](#) (-1) is returned; if not, [false](#) (0) is returned.

METHOD HANDLE() AS Long <4>

Retrieves the handle of the thread for use with Windows API functions.

METHOD ID() AS Long <5>

Retrieves the ID of the thread for use with Windows API functions.

METHOD ISALIVE() AS Long <6>

Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value true (-1) is returned; if not, the value false (0) is returned.

METHOD JOIN(ThreadObjectVar AS InterfaceName, TimeOutVal AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeOutVal* specifies the maximum length of time to wait, in Milliseconds. If *TimeOutVal* is zero (0), the time to wait is infinite.

METHOD LAUNCH(ByRef Param as UDT) <8>

LAUNCH begins execution of the thread, passing parameter data to it. Since the thread is hosted by an object, it is only fitting that the parameter data be contained in the most robust form, another object.

THREADPARAM is a mandatory Instance variable which you must define in each thread class. It is normally declared as the interface name of your choice:

```
INSTANCE ThreadParam as MyInterface
```

When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is normally the best choice, as it allows virtually any number of data items to be contained.

In simpler cases, you may choose to declare THREADPARAM as a [Long Integer](#), or [Dword](#). In that case, you must pass the launch parameter using a `POINTER` option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
```

```
...
```

```
MyThread.Launch(ByVal MyNumber&)
```

Of course, the Pointer parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a user-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER
```

```
THREAD METHOD MyMethod() AS LONG
```

```
xyz# = ThreadParam.member1
```

```
... other code
```

```
END METHOD
```

```
...
```

```
MyThread.Launch(ByVal VARPTR(MyType))
```

PROPERTY GET PRIORITY() AS Long <9>

Retrieves the priority value for this thread. The thread priority value is one of the following:

```
%THREAD_PRIORITY_IDLE           = -15
%THREAD_PRIORITY_LOWEST          = -2
%THREAD_PRIORITY_BELOW_NORMAL    = -1
%THREAD_PRIORITY_NORMAL          = 0
%THREAD_PRIORITY_ABOVE_NORMAL    = +1
%THREAD_PRIORITY_HIGHEST         = +2
%THREAD_PRIORITY_TIME_CRITICAL= +15
```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

```
%THREAD_PRIORITY_IDLE           = -15
%THREAD_PRIORITY_LOWEST          = -2
%THREAD_PRIORITY_BELOW_NORMAL    = -1
%THREAD_PRIORITY_NORMAL          = 0
%THREAD_PRIORITY_ABOVE_NORMAL    = +1
%THREAD_PRIORITY_HIGHEST         = +2
%THREAD_PRIORITY_TIME_CRITICAL= +15
```

METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the THREAD METHOD is retrieved and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the [OBJRESULT](#) is set to %S_OK (0). If the thread has not ended, the value zero (0) is returned, and the OBJRESULT is set to %S_FALSE

(1).

METHOD RESUME() AS Long <11>

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running at that time.

PROPERTY GET STACKSIZE() AS Long <13>

Retrieves the size of the [stack](#) for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

PROPERTY SET STACKSIZE(Long) <13>

Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

METHOD SUSPEND() AS Long <14>

Suspends execution of the thread. The suspend count of the thread is incremented. If the suspend was successful, the suspend count is returned; otherwise, -1 is returned.

If SUSPEND is executed prior to LAUNCH of the thread, the suspend count is incremented, and the subsequent LAUNCH is treated as a suspended launch. That is, all the necessary setup tasks are performed, but the thread is suspended just before execution of your THREAD METHOD begins. You can continue execution with RESUME.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running while suspended.

METHOD TIMECREATE() AS Quad <16>

Retrieves the date and time-of-day of the thread creation, and returns it as a [Quad](#) Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format of Month/Day/Year/Time.

METHOD TIMEEXIT() AS Quad <17>

Retrieves the date and time-of-day of the thread exit, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format of Month/Day/Year/Time. If the thread has not yet exited, the return value is undefined.

METHOD TIMEKERNEL() AS Quad <18>

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime](#) object to convert it to a human readable format.

METHOD TIMEUSER() AS Quad <19>

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime object](#) to convert it to a human readable format.

Restrictions

Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed when you reference one particular thread.

See also

[PowerTime](#), [THREAD Code Group](#)

Example

```
CLASS MyClass
  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD
```

```

INTERFACE MyFace
  INHERIT IPOWERTHREAD

  METHOD abc
    END METHOD
  END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
      METHOD = 77
    END METHOD

  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"

  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION

```

IPowerTime.AddDays method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose

A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a [quad-integer](#). This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other [objects](#), but using a predefined internal [class](#) and a predefined internal [interface](#).

```

LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"

```

Once you have created a PowerTime object, you can manipulate it using the member [methods](#). The IPowerTime interface is DUAL -- member methods may be referenced using either [Direct](#) or [Dispatch](#) form.

Remarks

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate [%PB_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX Built.DateString
MSGBOX Built.TimeString
```

POWERTIME Methods**AddDays <1> (ByVal Days&)**

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal Hours&)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal Minutes&)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal Months&)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal Milliseconds&)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal Seconds&)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal Ticks&)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal Years&)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

DateString <12> (OPT ByVal LCID&) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal LCID&) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal LCID&) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal FileTime&&)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns [true/false](#) (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal Year&, Opt ByVal Month&, Opt ByVal Day&)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal Hour&, Opt ByVal Min&, Opt ByVal Sec&, Opt ByVal MSec&, Opt ByVal Tick&)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (PowerTime, Sign&, Days&, OPT Hours&, OPT Minutes&, OPT Seconds&, OPT MSeconds&&, OPT Ticks&&)

The internal PowerTime object is compared to the specified external PowerTime object.

The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.AddHours method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object **New!**

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a [quad-integer](#). This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other [objects](#), but using a predefined internal [class](#) and a predefined internal [interface](#).

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member [methods](#). The IPowerTime interface is DUAL -- member methods may be referenced using either [Direct](#) or [Dispatch](#) form.

Remarks The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate [%PB_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX Built.DateString
MSGBOX Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal Days&)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal Hours&)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal Minutes&)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal Months&)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal Milliseconds&)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal Seconds&)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal Ticks&)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal Years&)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

DateString <12> (OPT ByVal LCID&) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal LCID&) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal LCID&) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal FileTime&&)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns [true/false](#) (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal Year&, Opt ByVal Month&, Opt ByVal

Day&)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal Hour&, Opt ByVal Min&, Opt ByVal Sec&, Opt ByVal MSec&, Opt ByVal Tick&)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (PowerTime, Sign&, Days&, OPT Hours&, OPT Minutes&, OPT Seconds&, OPT MSeconds&&, OPT Ticks&&)

The internal PowerTime object is compared to the specified external PowerTime object.

The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.AddMinutes method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a [quad-integer](#). This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other [objects](#), but using a predefined internal [class](#) and a predefined internal [interface](#).

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member [methods](#). The IPowerTime interface is DUAL -- member methods may be referenced using either [Direct](#) or [Dispatch](#) form.

Remarks The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate [%PB_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX Built.DateString
MSGBOX Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal Days&)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal Hours&)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal Minutes&)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal Months&)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal Milliseconds&)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal Seconds&)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal Ticks&)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal Years&)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

DateString <12> (OPT ByVal LCID&) AS String

Returns the Date component of the PowerTime object expressed as a . The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal LCID&) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal LCID&) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal FileTime&&)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns [true/false](#) (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal Year&, Opt ByVal Month&, Opt ByVal Day&)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal Hour&, Opt ByVal Min&, Opt ByVal Sec&, Opt ByVal MSec&, Opt ByVal Tick&)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (PowerTime, Sign&, Days&, OPT Hours&, OPT Minutes&, OPT Seconds&, OPT MSeconds&&, OPT Ticks&&)

The internal PowerTime object is compared to the specified external PowerTime object.

The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.AddMonths method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a [quad-integer](#). This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other [objects](#), but using a predefined internal [class](#) and a predefined internal [interface](#).

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member [methods](#). The IPowerTime interface is DUAL -- member methods may be referenced using either [Direct](#) or [Dispatch](#) form.

Remarks The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate [%PB_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX Built.DateString
MSGBOX Built.TimeString
```

POWERTIME Methods**AddDays <1> (ByVal Days&)**

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal Hours&)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal Minutes&)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal Months&)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal Milliseconds&)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal Seconds&)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal Ticks&)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal Years&)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

DateString <12> (OPT ByVal LCID&) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal LCID&) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal LCID&) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&*

parameter. If *LCID* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the *PowerTime* object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the *PowerTime* object as a *FileTime*.

PROPERTY SET FileTime <20> (ByVal FileTime&&)

The *FileTime* Quad-Integer value specified by the parameter is assigned as the *PowerTime* object value.

Hour <21> () as Long

Returns the Hour component of the *PowerTime* object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns *true/false* (-1/0) to tell if the *PowerTime* object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the *PowerTime* object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the *PowerTime* object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the *PowerTime* object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the *PowerTime* object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal Year&, Opt ByVal Month&, Opt ByVal Day&)

The date component of the *PowerTime* object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in *OBJRESULT*.

NewTime <28> (ByVal Hour&, Opt ByVal Min&, Opt ByVal Sec&, Opt ByVal MSec&, Opt ByVal Tick&)

The time component of the *PowerTime* object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in *OBJRESULT*.

Now <29> ()

The current local date and time on this computer is assigned to this *PowerTime* object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this *PowerTime* object.

Second <31> () as Long

Returns the Second component of the *PowerTime* object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the *PowerTime* object. This is a numeric value in the range of 0-999.

TimeDiff <33> (PowerTime, Sign&, Days&, OPT Hours&, OPT Minutes&, OPT Seconds&, OPT MSeconds&&, OPT Ticks&&)

The internal *PowerTime* object is compared to the specified external *PowerTime* object.

The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with `BYVAL 0` and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in `OBJRESULT`.

TimeString <34> () AS String

Returns the Time component of the `PowerTime` object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the `PowerTime` object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the `PowerTime` object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this `PowerTime` object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The `PowerTime` object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The `PowerTime` object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the `PowerTime` object as a numeric value.

See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.AddMSeconds method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose

A `PowerTime` Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a [quad-integer](#).

This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a `PowerTime` object the same way you create other [objects](#), but using a predefined internal [class](#) and a predefined internal [interface](#).

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member [methods](#). The IPowerTime interface is DUAL -- member methods may be referenced using either [Direct](#) or [Dispatch](#) form.

Remarks

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate [%PB_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX Built.DateString
MSGBOX Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal Days&)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal Hours&)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal Minutes&)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal Months&)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal Milliseconds&)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal Seconds&)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal Ticks&)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal Years&)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

DateString <12> (OPT ByVal LCID&) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal LCID&) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal LCID&) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal FileTime&&)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns [true/false](#) (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal Year&, Opt ByVal Month&, Opt ByVal Day&)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal Hour&, Opt ByVal Min&, Opt ByVal Sec&, Opt ByVal MSec&, Opt ByVal Tick&)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (PowerTime, Sign&, Days&, OPT Hours&, OPT Minutes&, OPT Seconds&, OPT MSeconds&&, OPT Ticks&&)

The internal PowerTime object is compared to the specified external PowerTime object.

The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.AddSeconds method

Keyword Template

Purpose

Syntax

Remarks**See also****Example**

PowerTime Object New!

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a [quad-integer](#). This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other [objects](#), but using a predefined internal [class](#) and a predefined internal [interface](#).

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member [methods](#). The IPowerTime interface is DUAL -- member methods may be referenced using either [Direct](#) or [Dispatch](#) form.

Remarks The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate [%PB_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX Built.DateString
MSGBOX Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal Days&)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal Hours&)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal Minutes&)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal Months&)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal Milliseconds&)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal Seconds&)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal Ticks&)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal Years&)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

DateString <12> (OPT ByVal LCID&) AS String

Returns the Date component of the PowerTime object expressed as a . The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal LCID&) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal LCID&) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal FileTime&&)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns [true/false](#) (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal Year&, Opt ByVal Month&, Opt ByVal Day&)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal Hour&, Opt ByVal Min&, Opt ByVal Sec&, Opt ByVal MSec&, Opt ByVal Tick&)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (PowerTime, Sign&, Days&, OPT Hours&, OPT Minutes&, OPT Seconds&, OPT MSeconds&&, OPT Ticks&&)

The internal PowerTime object is compared to the specified external PowerTime object.

The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.AddTicks method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a [quad-integer](#). This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other [objects](#), but using a predefined internal [class](#) and a predefined internal [interface](#).

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member [methods](#). The IPowerTime interface is DUAL -- member methods may be referenced using either [Direct](#) or [Dispatch](#) form.

Remarks The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate [%PB_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX Built.DateString
MSGBOX Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal Days&)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal Hours&)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal Minutes&)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal Months&)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal Milliseconds&)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal Seconds&)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal Ticks&)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal Years&)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

DateString <12> (OPT ByVal LCID&) AS String

Returns the Date component of the PowerTime object expressed as a . The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal LCID&) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal LCID&) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal FileTime&&)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range

of 0-23.

IsLeapYear <22> () as Long

Returns [true/false](#) (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal Year&, Opt ByVal Month&, Opt ByVal Day&)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal Hour&, Opt ByVal Min&, Opt ByVal Sec&, Opt ByVal MSec&, Opt ByVal Tick&)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (PowerTime, Sign&, Days&, OPT Hours&, OPT Minutes&, OPT Seconds&, OPT MSeconds&&, OPT Ticks&&)

The internal PowerTime object is compared to the specified external PowerTime object.

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```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
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In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.AddYears method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a [quad-integer](#). This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

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```
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```

Once you have created a PowerTime object, you can manipulate it using the member [methods](#). The IPowerTime interface is DUAL -- member methods may be referenced using either [Direct](#) or [Dispatch](#) form.

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An immediate use for the PowerTime Object is the built-in numeric equate [%PB_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
```

MSGBOX Built.DateString
MSGBOX Built.TimeString

POWERTIME Methods

AddDays <1> (ByVal Days&)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal Hours&)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal Minutes&)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal Months&)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal Milliseconds&)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal Seconds&)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal Ticks&)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal Years&)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

DateString <12> (OPT ByVal LCID&) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal LCID&) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal LCID&) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal FileTime&&)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns [true/false](#) (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal Year&, Opt ByVal Month&, Opt ByVal Day&)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal Hour&, Opt ByVal Min&, Opt ByVal Sec&, Opt ByVal MSec&, Opt ByVal Tick&)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (PowerTime, Sign&, Days&, OPT Hours&, OPT

Minutes&, OPT Seconds&, OPT MSeconds&&, OPT Ticks&&)

The internal PowerTime object is compared to the specified external PowerTime object.

The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.DateDiff method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose

A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a [quad-integer](#).

This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other [objects](#), but using a predefined internal [class](#) and a predefined internal [interface](#).

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member [methods](#). The IPowerTime interface is DUAL -- member methods may be referenced using either [Direct](#) or [Dispatch](#) form.

Remarks

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate [%PB_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX Built.DateString
MSGBOX Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal Days&)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal Hours&)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal Minutes&)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal Months&)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal Milliseconds&)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal Seconds&)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal Ticks&)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal Years&)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

DateString <12> (OPT ByVal LCID&) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns [true/false](#) (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal *Day&*)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

The time component of the PowerTime object is assigned a new value based upon the

specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (PowerTime, Sign&, Days&, OPT Hours&, OPT Minutes&, OPT Seconds&, OPT MSeconds&&, OPT Ticks&&)

The internal PowerTime object is compared to the specified external PowerTime object.

The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.DateString method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose

A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a [quad-integer](#). This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other [objects](#), but using a predefined internal [class](#) and a predefined internal [interface](#).

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member [methods](#). The IPowerTime interface is DUAL -- member methods may be referenced using either [Direct](#) or [Dispatch](#) form.

Remarks

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate [%PB_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX Built.DateString
MSGBOX Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal Days&)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal Hours&)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal Minutes&)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal Months&)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal Milliseconds&)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal Seconds&)

Adds the specified number of seconds to the value of this object. You can subtract

seconds by using a negative number.

AddTicks <7> (ByVal Ticks&)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal Years&)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

DateString <12> (OPT ByVal LCID&) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal LCID&) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal LCID&) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal FileTime&&)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns [true/false](#) (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the

range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal Year&, Opt ByVal Month&, Opt ByVal Day&)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal Hour&, Opt ByVal Min&, Opt ByVal Sec&, Opt ByVal MSec&, Opt ByVal Tick&)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (PowerTime, Sign&, Days&, OPT Hours&, OPT Minutes&, OPT Seconds&, OPT MSeconds&&, OPT Ticks&&)

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is

suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.DateStringLong method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a [quad-integer](#). This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other [objects](#), but using a predefined internal [class](#) and a predefined internal [interface](#).

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member [methods](#). The IPowerTime interface is DUAL -- member methods may be referenced using either [Direct](#) or [Dispatch](#) form.

Remarks The [Dispatch ID](#) (DisplID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate [%PB_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX Built.DateString
MSGBOX Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal Days&)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal Hours&)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal Minutes&)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal Months&)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal Milliseconds&)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal Seconds&)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal Ticks&)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal Years&)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

DateString <12> (OPT ByVal LCID&) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal LCID&) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal LCID&) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal FileTime&&)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns [true/false](#) (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal Year&, Opt ByVal Month&, Opt ByVal Day&)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal Hour&, Opt ByVal Min&, Opt ByVal Sec&, Opt ByVal MSec&, Opt ByVal Tick&)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (PowerTime, Sign&, Days&, OPT Hours&, OPT Minutes&, OPT Seconds&, OPT MSeconds&&, OPT Ticks&&)

The internal PowerTime object is compared to the specified external PowerTime object.

The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to

Minutes& (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.Day method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a [quad-integer](#). This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other [objects](#), but using a predefined internal [class](#) and a predefined internal [interface](#).

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member [methods](#). The IPowerTime interface is DUAL -- member methods may be referenced using either [Direct](#) or [Dispatch](#) form.

Remarks The [Dispatch_ID](#) (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate [%PB_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTime Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX Built.DateString
MSGBOX Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal Days&)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal Hours&)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal Minutes&)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal Months&)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal Milliseconds&)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal Seconds&)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal Ticks&)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal Years&)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

DateString <12> (OPT ByVal LCID&) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal LCID&) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal LCID&) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal FileTime&&)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns [true/false](#) (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal Year&, Opt ByVal Month&, Opt ByVal Day&)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal Hour&, Opt ByVal Min&, Opt ByVal Sec&, Opt ByVal MSec&, Opt ByVal Tick&)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (PowerTime, Sign&, Days&, OPT Hours&, OPT Minutes&, OPT Seconds&, OPT MSeconds&&, OPT Ticks&&)

The internal PowerTime object is compared to the specified external PowerTime object.

The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.DayOfWeek method

Keyword Template

Purpose

Syntax

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See also

Example

PowerTime Object **New!**

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a [quad-integer](#). This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other [objects](#), but using a predefined internal [class](#) and a predefined internal [interface](#).

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member [methods](#). The IPowerTime interface is DUAL -- member methods may be referenced using either [Direct](#) or [Dispatch](#) form.

Remarks The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate [%PB_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX Built.DateString
MSGBOX Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal Days&)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal Hours&)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal Minutes&)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal Months&)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal Milliseconds&)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal Seconds&)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal Ticks&)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal Years&)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)

The date part of the internal PowerTime object is compared to the date part of the

specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

DateString <12> (OPT ByVal LCID&) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal LCID&) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal LCID&) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal FileTime&&)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns [true/false](#) (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal Year&, Opt ByVal Month&, Opt ByVal Day&)

The date component of the `PowerTime` object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in `OBJRESULT`.

NewTime <28> (ByVal Hour&, Opt ByVal Min&, Opt ByVal Sec&, Opt ByVal MSec&, Opt ByVal Tick&)

The time component of the `PowerTime` object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in `OBJRESULT`.

Now <29> ()

The current local date and time on this computer is assigned to this `PowerTime` object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this `PowerTime` object.

Second <31> () as Long

Returns the `Second` component of the `PowerTime` object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the `Tick` component of the `PowerTime` object. This is a numeric value in the range of 0-999.

TimeDiff <33> (PowerTime, Sign&, Days&, OPT Hours&, OPT Minutes&, OPT Seconds&, OPT MSeconds&&, OPT Ticks&&)

The internal `PowerTime` object is compared to the specified external `PowerTime` object.

The difference is assigned to the parameter variables you provide. `Sign&` is -1 if the internal value is smaller. `Sign&` is 0 if the values are equal. `Sign` is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with `BYVAL 0` and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to `Minutes&` (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in `OBJRESULT`.

TimeString <34> () AS String

Returns the `Time` component of the `PowerTime` object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the `Time` component of the `PowerTime` object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the `Time` component of the `PowerTime` object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this `PowerTime` object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The `PowerTime` object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The `PowerTime` object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the `Year` component of the `PowerTime` object as a numeric value.

See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.DayOfWeekString method

Keyword Template

Purpose

Syntax

Remarks

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Example

PowerTime Object **New!**

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a [quad-integer](#). This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other [objects](#), but using a predefined internal [class](#) and a predefined internal [interface](#).

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member [methods](#). The IPowerTime interface is DUAL -- member methods may be referenced using either [Direct](#) or [Dispatch](#) form.

Remarks The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate [%PB_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX Built.DateString
MSGBOX Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal Days&)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal Hours&)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal Minutes&)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal Months&)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal Milliseconds&)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal Seconds&)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal Ticks&)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal Years&)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

DateString <12> (OPT ByVal LCID&) AS String

Returns the Date component of the PowerTime object expressed as a . The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal LCID&) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal LCID&) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal FileTime&&)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns [true/false](#) (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal Year&, Opt ByVal Month&, Opt ByVal Day&)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal Hour&, Opt ByVal Min&, Opt ByVal Sec&, Opt ByVal MSec&, Opt ByVal Tick&)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (PowerTime, Sign&, Days&, OPT Hours&, OPT Minutes&, OPT Seconds&, OPT MSeconds&&, OPT Ticks&&)

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

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Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

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Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

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ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.DaysInMonth method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

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MSGBOX Built.DateString
MSGBOX Built.TimeString
```

POWERTIME Methods

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Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal Hours&)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal Minutes&)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal Months&)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal Milliseconds&)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal Seconds&)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal Ticks&)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal Years&)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

DateString <12> (OPT ByVal LCID&) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal LCID&) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal LCID&) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal FileTime&&)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns [true/false](#) (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal Year&, Opt ByVal Month&, Opt ByVal Day&)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal Hour&, Opt ByVal Min&, Opt ByVal Sec&, Opt ByVal MSec&, Opt ByVal Tick&)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (PowerTime, Sign&, Days&, OPT Hours&, OPT Minutes&, OPT Seconds&, OPT MSeconds&&, OPT Ticks&&)

The internal PowerTime object is compared to the specified external PowerTime object.

The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign* is +1 if the internal value

is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.FileTime property get

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose

A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a [quad-integer](#).

This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other [objects](#), but using a predefined internal [class](#) and a predefined internal [interface](#).

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member [methods](#). The IPowerTime interface is DUAL -- member methods may be referenced using either [Direct](#) or [Dispatch](#) form.

Remarks

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate [%PB_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX Built.DateString
MSGBOX Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal Days&)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal Hours&)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal Minutes&)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal Months&)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal Milliseconds&)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal Seconds&)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal Ticks&)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal Years&)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

DateString <12> (OPT ByVal LCID&) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal LCID&) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal LCID&) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal FileTime&&)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns [true/false](#) (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal Year&, Opt ByVal Month&, Opt ByVal Day&)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal Hour&, Opt ByVal Min&, Opt ByVal Sec&, Opt ByVal MSec&, Opt ByVal Tick&)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (PowerTime, Sign&, Days&, OPT Hours&, OPT Minutes&, OPT Seconds&, OPT MSeconds&&, OPT Ticks&&)

The internal PowerTime object is compared to the specified external PowerTime object.

The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.FileTime property set

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object **New!**

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a [quad-integer](#). This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other [objects](#), but using a predefined internal [class](#) and a predefined internal [interface](#).

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member [methods](#). The IPowerTime interface is DUAL -- member methods may be referenced using either [Direct](#) or [Dispatch](#) form.

Remarks The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate [%PB_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX Built.DateString
MSGBOX Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal Days&)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal Hours&)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal Minutes&)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal Months&)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal Milliseconds&)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal Seconds&)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal Ticks&)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal Years&)

Adds the specified number of years to the value of this object. You can subtract years by

using a negative number.

DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

DateString <12> (OPT ByVal LCID&) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal LCID&) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal LCID&) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal FileTime&&)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns [true/false](#) (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in

the range of 0-999.

NewDate <27> (ByVal Year&, Opt ByVal Month&, Opt ByVal Day&)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal Hour&, Opt ByVal Min&, Opt ByVal Sec&, Opt ByVal MSec&, Opt ByVal Tick&)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (PowerTime, Sign&, Days&, OPT Hours&, OPT Minutes&, OPT Seconds&, OPT MSeconds&&, OPT Ticks&&)

The internal PowerTime object is compared to the specified external PowerTime object.

The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed

that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.Hour method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a [quad-integer](#). This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other [objects](#), but using a predefined internal [class](#) and a predefined internal [interface](#).

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member [methods](#). The IPowerTime interface is DUAL -- member methods may be referenced using either [Direct](#) or [Dispatch](#) form.

Remarks The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate [%PB_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX Built.DateString
MSGBOX Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal Days&)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal Hours&)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal Minutes&)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal Months&)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal Milliseconds&)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal Seconds&)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal Ticks&)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal Years&)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

DateString <12> (OPT ByVal LCID&) AS String

Returns the Date component of the PowerTime object expressed as a . . . The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal LCID&) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal LCID&) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal FileTime&&)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns [true/false](#) (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal Year&, Opt ByVal Month&, Opt ByVal Day&)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal Hour&, Opt ByVal Min&, Opt ByVal Sec&, Opt ByVal MSec&, Opt ByVal Tick&)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (PowerTime, Sign&, Days&, OPT Hours&, OPT Minutes&, OPT Seconds&, OPT MSeconds&&, OPT Ticks&&)

The internal PowerTime object is compared to the specified external PowerTime object.

The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.IsLeapYear method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a [quad-integer](#). This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other [objects](#), but using a predefined internal [class](#) and a predefined internal [interface](#).

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member [methods](#). The IPowerTime interface is DUAL -- member methods may be referenced using either [Direct](#) or [Dispatch](#) form.

Remarks The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate [%PB_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX Built.DateString
```

MSGBOX Built.TimeString

POWERTIME Methods**AddDays <1> (ByVal Days&)**

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal Hours&)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal Minutes&)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal Months&)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal Milliseconds&)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal Seconds&)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal Ticks&)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal Years&)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

DateString <12> (OPT ByVal LCID&) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal LCID&) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal LCID&) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday,

Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal FileTime&&)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns *true/false* (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal Year&, Opt ByVal Month&, Opt ByVal Day&)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal Hour&, Opt ByVal Min&, Opt ByVal Sec&, Opt ByVal MSec&, Opt ByVal Tick&)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (PowerTime, Sign&, Days&, OPT Hours&, OPT Minutes&, OPT Seconds&, OPT MSeconds&&, OPT Ticks&&)

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
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In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.Minute method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose

A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a [quad-integer](#).

This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other [objects](#), but using a

predefined internal [class](#) and a predefined internal [interface](#).

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
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Once you have created a PowerTime object, you can manipulate it using the member [methods](#). The IPowerTime interface is DUAL -- member methods may be referenced using either [Direct](#) or [Dispatch](#) form.

Remarks

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate [%PB_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX Built.DateString
MSGBOX Built.TimeString
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POWERTIME Methods

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Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

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DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)

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DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

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Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

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DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

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Returns [true/false](#) (-1/0) to tell if the PowerTime object year is a leap year.

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Returns the Month component of the PowerTime object, expressed as a string (January, February...).

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Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

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The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

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Year <42> () as Long

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See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.Month method

Keyword Template

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PowerTime Object **New!**

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Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

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Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal FileTime&&)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

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Returns [true/false](#) (-1/0) to tell if the PowerTime object year is a leap year.

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See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.MonthString method

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PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns [true/false](#) (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal Year&, Opt ByVal Month&, Opt ByVal Day&)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal Hour&, Opt ByVal Min&, Opt ByVal Sec&, Opt ByVal MSec&, Opt ByVal Tick&)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (PowerTime, Sign&, Days&, OPT Hours&, OPT Minutes&, OPT Seconds&, OPT MSeconds&&, OPT Ticks&&)

The internal PowerTime object is compared to the specified external PowerTime object.

The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.MSecond method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose

A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a [quad-integer](#). This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other [objects](#), but using a predefined internal [class](#) and a predefined internal [interface](#).

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member [methods](#). The IPowerTime interface is DUAL -- member methods may be referenced using either [Direct](#) or [Dispatch](#) form.

Remarks

The [Dispatch.ID](#) (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate [%](#) [PB_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the

PowerTIME Class to convert it to a text equivalent for use in your application.

```

LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX Built.DateString
MSGBOX Built.TimeString

```

POWERTIME Methods

AddDays <1> (ByVal Days&)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal Hours&)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal Minutes&)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal Months&)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal Milliseconds&)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal Seconds&)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal Ticks&)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal Years&)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

DateString <12> (OPT ByVal LCID&) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal LCID&) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal LCID&) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal FileTime&&)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns [true/false](#) (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal Year&, Opt ByVal Month&, Opt ByVal Day&)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal Hour&, Opt ByVal Min&, Opt ByVal Sec&, Opt ByVal MSec&, Opt ByVal Tick&)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (*PowerTime*, *Sign*&, *Days*&, *OPT Hours*&, *OPT Minutes*&, *OPT Seconds*&, *OPT MSeconds*&&, *OPT Ticks*&&)

The internal PowerTime object is compared to the specified external PowerTime object.

The difference is assigned to the parameter variables you provide. *Sign*& is -1 if the internal value is smaller. *Sign*& is 0 if the values are equal. *Sign* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes*& (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.NewDate method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The

internal representation emulates the Windows FILETIME structure as a [quad-integer](#). This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other [objects](#), but using a predefined internal [class](#) and a predefined internal [interface](#).

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member [methods](#). The IPowerTime interface is DUAL -- member methods may be referenced using either [Direct](#) or [Dispatch](#) form.

Remarks

The [Dispatch_ID](#) (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate [%PB_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX Built.DateString
MSGBOX Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal Days&)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal Hours&)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal Minutes&)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal Months&)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal Milliseconds&)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal Seconds&)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal Ticks&)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal Years&)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters

are invalid, an appropriate error code is returned in [OBJRESULT](#).

DateString <12> (OPT ByVal LCID&) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal LCID&) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal LCID&) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal FileTime&&)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns [true/false](#) (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal Year&, Opt ByVal Month&, Opt ByVal Day&)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

NewTime <28> (ByVal Hour&, Opt ByVal Min&, Opt ByVal

Sec&, Opt ByVal MSec&, Opt ByVal Tick&)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (PowerTime, Sign&, Days&, OPT Hours&, OPT Minutes&, OPT Seconds&, OPT MSeconds&&, OPT Ticks&&)

The internal PowerTime object is compared to the specified external PowerTime object.

The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also

[DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.NewTime method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object **New!**

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a [quad-integer](#). This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other [objects](#), but using a predefined internal [class](#) and a predefined internal [interface](#).

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member [methods](#). The IPowerTime interface is DUAL -- member methods may be referenced using either [Direct](#) or [Dispatch](#) form.

Remarks The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate [%PB_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX Built.DateString
MSGBOX Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal Days&)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal Hours&)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal Minutes&)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal Months&)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal Milliseconds&)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal Seconds&)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal Ticks&)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal Years&)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

DateString <12> (OPT ByVal LCID&) AS String

Returns the Date component of the PowerTime object expressed as a . The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal LCID&) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal LCID&) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal FileTime&&)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns [true/false](#) (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal Year&, Opt ByVal Month&, Opt ByVal Day&)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal Hour&, Opt ByVal Min&, Opt ByVal Sec&, Opt ByVal MSec&, Opt ByVal Tick&)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (PowerTime, Sign&, Days&, OPT Hours&, OPT Minutes&, OPT Seconds&, OPT MSeconds&&, OPT Ticks&&)

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
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In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.Now method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose

A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a [quad-integer](#). This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

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LOCAL MyTime AS IPowerTime
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```

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Remarks

The [Dispatch ID](#) (DisplID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate [%PB_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX Built.DateString
MSGBOX Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal Days&)

Adds the specified number of days to the value of this object. You can subtract days by

using a negative number.

AddHours <2> (ByVal Hours&)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal Minutes&)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal Months&)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal Milliseconds&)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal Seconds&)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal Ticks&)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal Years&)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

DateString <12> (OPT ByVal LCID&) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal LCID&) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal LCID&) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal FileTime&&)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns [true/false](#) (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal Year&, Opt ByVal Month&, Opt ByVal Day&)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal Hour&, Opt ByVal Min&, Opt ByVal Sec&, Opt ByVal MSec&, Opt ByVal Tick&)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (PowerTime, Sign&, Days&, OPT Hours&, OPT Minutes&, OPT Seconds&, OPT MSeconds&&, OPT Ticks&&)

The internal PowerTime object is compared to the specified external PowerTime object.

The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.NowUTC method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose

A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a [quad-integer](#).

This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other [objects](#), but using a predefined internal [class](#) and a predefined internal [interface](#).

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member [methods](#). The IPowerTime interface is DUAL -- member methods may be referenced using either [Direct](#) or [Dispatch](#) form.

Remarks

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate [%PB_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX Built.DateString
MSGBOX Built.TimeString
```

POWERTIME Methods**AddDays <1> (ByVal Days&)**

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal Hours&)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal Minutes&)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal Months&)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal Milliseconds&)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal Seconds&)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal Ticks&)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal Years&)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

DateString <12> (OPT ByVal LCID&) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal LCID&) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal LCID&) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal FileTime&&)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns [true/false](#) (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal Year&, Opt ByVal Month&, Opt ByVal Day&)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal Hour&, Opt ByVal Min&, Opt ByVal Sec&, Opt ByVal MSec&, Opt ByVal Tick&)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (PowerTime, Sign&, Days&, OPT Hours&, OPT Minutes&, OPT Seconds&, OPT MSeconds&&, OPT Ticks&&)

The internal PowerTime object is compared to the specified external PowerTime object.

The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.Second method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object **New!**

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a [quad-integer](#). This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other [objects](#), but using a predefined internal [class](#) and a predefined internal [interface](#).

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member [methods](#). The IPowerTime interface is DUAL -- member methods may be referenced using either [Direct](#) or [Dispatch](#) form.

Remarks The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate [%PB_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX Built.DateString
MSGBOX Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal Days&)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal Hours&)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal Minutes&)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal Months&)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal Milliseconds&)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal Seconds&)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal Ticks&)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal Years&)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

DateString <12> (OPT ByVal LCID&) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal LCID&) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal LCID&) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal FileTime&&)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns [true/false](#) (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal Year&, Opt ByVal Month&, Opt ByVal

Day&)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal Hour&, Opt ByVal Min&, Opt ByVal Sec&, Opt ByVal MSec&, Opt ByVal Tick&)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (PowerTime, Sign&, Days&, OPT Hours&, OPT Minutes&, OPT Seconds&, OPT MSeconds&&, OPT Ticks&&)

The internal PowerTime object is compared to the specified external PowerTime object.

The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

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ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.Tick method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a [quad-integer](#). This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other [objects](#), but using a predefined internal [class](#) and a predefined internal [interface](#).

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member [methods](#). The IPowerTime interface is DUAL -- member methods may be referenced using either [Direct](#) or [Dispatch](#) form.

Remarks The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate [%PB_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX Built.DateString
MSGBOX Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal Days&)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal Hours&)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal Minutes&)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal Months&)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal Milliseconds&)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal Seconds&)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal Ticks&)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal Years&)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

DateString <12> (OPT ByVal LCID&) AS String

Returns the Date component of the PowerTime object expressed as a . The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal LCID&) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal LCID&) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal FileTime&&)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns [true/false](#) (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal Year&, Opt ByVal Month&, Opt ByVal Day&)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal Hour&, Opt ByVal Min&, Opt ByVal Sec&, Opt ByVal MSec&, Opt ByVal Tick&)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (PowerTime, Sign&, Days&, OPT Hours&, OPT Minutes&, OPT Seconds&, OPT MSeconds&&, OPT Ticks&&)

The internal PowerTime object is compared to the specified external PowerTime object.

The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.TimeDiff method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a [quad-integer](#). This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other [objects](#), but using a predefined internal [class](#) and a predefined internal [interface](#).

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member [methods](#). The IPowerTime interface is DUAL -- member methods may be referenced using either [Direct](#) or [Dispatch](#) form.

Remarks The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate [%PB_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX Built.DateString
MSGBOX Built.TimeString
```

POWERTIME Methods**AddDays <1> (ByVal Days&)**

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal Hours&)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal Minutes&)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal Months&)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal Milliseconds&)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal Seconds&)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal Ticks&)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal Years&)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

DateString <12> (OPT ByVal LCID&) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal LCID&) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal LCID&) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&*

parameter. If *LCID* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the *PowerTime* object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the *PowerTime* object as a *FileTime*.

PROPERTY SET FileTime <20> (ByVal FileTime&&)

The *FileTime* Quad-Integer value specified by the parameter is assigned as the *PowerTime* object value.

Hour <21> () as Long

Returns the Hour component of the *PowerTime* object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns *true/false* (-1/0) to tell if the *PowerTime* object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the *PowerTime* object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the *PowerTime* object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the *PowerTime* object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the *PowerTime* object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal Year&, Opt ByVal Month&, Opt ByVal Day&)

The date component of the *PowerTime* object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in *OBJRESULT*.

NewTime <28> (ByVal Hour&, Opt ByVal Min&, Opt ByVal Sec&, Opt ByVal MSec&, Opt ByVal Tick&)

The time component of the *PowerTime* object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in *OBJRESULT*.

Now <29> ()

The current local date and time on this computer is assigned to this *PowerTime* object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this *PowerTime* object.

Second <31> () as Long

Returns the Second component of the *PowerTime* object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the *PowerTime* object. This is a numeric value in the range of 0-999.

TimeDiff <33> (PowerTime, Sign&, Days&, OPT Hours&, OPT Minutes&, OPT Seconds&, OPT MSeconds&&, OPT Ticks&&)

The internal *PowerTime* object is compared to the specified external *PowerTime* object.

The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with `BYVAL 0` and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in `OBJRESULT`.

TimeString <34> () AS String

Returns the Time component of the `PowerTime` object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the `PowerTime` object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the `PowerTime` object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this `PowerTime` object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The `PowerTime` object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The `PowerTime` object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the `PowerTime` object as a numeric value.

See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.TimeString method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose

A `PowerTime` Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a [quad-integer](#).

This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a `PowerTime` object the same way you create other [objects](#), but using a predefined internal [class](#) and a predefined internal [interface](#).

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member [methods](#). The IPowerTime interface is DUAL -- member methods may be referenced using either [Direct](#) or [Dispatch](#) form.

Remarks

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate [%PB_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX Built.DateString
MSGBOX Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal Days&)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal Hours&)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal Minutes&)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal Months&)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal Milliseconds&)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal Seconds&)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal Ticks&)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal Years&)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

DateString <12> (OPT ByVal LCID&) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal LCID&) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal LCID&) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal FileTime&&)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns [true/false](#) (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal Year&, Opt ByVal Month&, Opt ByVal Day&)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal Hour&, Opt ByVal Min&, Opt ByVal Sec&, Opt ByVal MSec&, Opt ByVal Tick&)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (PowerTime, Sign&, Days&, OPT Hours&, OPT Minutes&, OPT Seconds&, OPT MSeconds&&, OPT Ticks&&)

The internal PowerTime object is compared to the specified external PowerTime object.

The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.TimeString24 method

Keyword Template

Purpose

Syntax

Remarks**See also****Example**

PowerTime Object New!

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a [quad-integer](#). This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other [objects](#), but using a predefined internal [class](#) and a predefined internal [interface](#).

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member [methods](#). The IPowerTime interface is DUAL -- member methods may be referenced using either [Direct](#) or [Dispatch](#) form.

Remarks The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate [%PB_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX Built.DateString
MSGBOX Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal Days&)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal Hours&)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal Minutes&)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal Months&)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal Milliseconds&)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal Seconds&)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal Ticks&)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal Years&)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

DateString <12> (OPT ByVal LCID&) AS String

Returns the Date component of the PowerTime object expressed as a . The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal LCID&) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal LCID&) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal FileTime&&)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns [true/false](#) (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal Year&, Opt ByVal Month&, Opt ByVal Day&)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal Hour&, Opt ByVal Min&, Opt ByVal Sec&, Opt ByVal MSec&, Opt ByVal Tick&)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (PowerTime, Sign&, Days&, OPT Hours&, OPT Minutes&, OPT Seconds&, OPT MSeconds&&, OPT Ticks&&)

The internal PowerTime object is compared to the specified external PowerTime object.

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```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.TimeStringFull method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a [quad-integer](#). This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other [objects](#), but using a predefined internal [class](#) and a predefined internal [interface](#).

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member [methods](#). The IPowerTime interface is DUAL -- member methods may be referenced using either [Direct](#) or [Dispatch](#) form.

Remarks The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate [%PB_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX Built.DateString
MSGBOX Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal Days&)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal Hours&)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal Minutes&)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal Months&)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal Milliseconds&)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal Seconds&)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal Ticks&)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal Years&)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

DateString <12> (OPT ByVal LCID&) AS String

Returns the Date component of the PowerTime object expressed as a . The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal LCID&) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal LCID&) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal FileTime&&)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range

of 0-23.

IsLeapYear <22> () as Long

Returns [true/false](#) (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal Year&, Opt ByVal Month&, Opt ByVal Day&)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal Hour&, Opt ByVal Min&, Opt ByVal Sec&, Opt ByVal MSec&, Opt ByVal Tick&)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (PowerTime, Sign&, Days&, OPT Hours&, OPT Minutes&, OPT Seconds&, OPT MSeconds&&, OPT Ticks&&)

The internal PowerTime object is compared to the specified external PowerTime object.

The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.Today method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a [quad-integer](#). This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other [objects](#), but using a predefined internal [class](#) and a predefined internal [interface](#).

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member [methods](#). The IPowerTime interface is DUAL -- member methods may be referenced using either [Direct](#) or [Dispatch](#) form.

Remarks The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate [%PB_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
```

MSGBOX Built.DateString
MSGBOX Built.TimeString

POWERTIME Methods

AddDays <1> (ByVal Days&)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal Hours&)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal Minutes&)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal Months&)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal Milliseconds&)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal Seconds&)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal Ticks&)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal Years&)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

DateString <12> (OPT ByVal LCID&) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal LCID&) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal LCID&) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal FileTime&&)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns [true/false](#) (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal Year&, Opt ByVal Month&, Opt ByVal Day&)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal Hour&, Opt ByVal Min&, Opt ByVal Sec&, Opt ByVal MSec&, Opt ByVal Tick&)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (PowerTime, Sign&, Days&, OPT Hours&, OPT

Minutes&, OPT Seconds&, OPT MSeconds&&, OPT Ticks&&)

The internal PowerTime object is compared to the specified external PowerTime object.

The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.ToLocalTime method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose

A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a [quad-integer](#).

This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other [objects](#), but using a predefined internal [class](#) and a predefined internal [interface](#).

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member [methods](#). The IPowerTime interface is DUAL -- member methods may be referenced using either [Direct](#) or [Dispatch](#) form.

Remarks

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate [%PB_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX Built.DateString
MSGBOX Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal Days&)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal Hours&)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal Minutes&)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal Months&)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal Milliseconds&)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal Seconds&)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal Ticks&)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal Years&)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

DateString <12> (OPT ByVal LCID&) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns [true/false](#) (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal *Day&*)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

The time component of the PowerTime object is assigned a new value based upon the

specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (PowerTime, Sign&, Days&, OPT Hours&, OPT Minutes&, OPT Seconds&, OPT MSeconds&&, OPT Ticks&&)

The internal PowerTime object is compared to the specified external PowerTime object.

The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.ToUTC method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose

A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a [quad-integer](#). This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other [objects](#), but using a predefined internal [class](#) and a predefined internal [interface](#).

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member [methods](#). The IPowerTime interface is DUAL -- member methods may be referenced using either [Direct](#) or [Dispatch](#) form.

Remarks

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate [%PB_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX Built.DateString
MSGBOX Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal Days&)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal Hours&)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal Minutes&)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal Months&)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal Milliseconds&)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal Seconds&)

Adds the specified number of seconds to the value of this object. You can subtract

seconds by using a negative number.

AddTicks <7> (ByVal Ticks&)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal Years&)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

DateString <12> (OPT ByVal LCID&) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal LCID&) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal LCID&) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal FileTime&&)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns [true/false](#) (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the

range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal Year&, Opt ByVal Month&, Opt ByVal Day&)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal Hour&, Opt ByVal Min&, Opt ByVal Sec&, Opt ByVal MSec&, Opt ByVal Tick&)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (PowerTime, Sign&, Days&, OPT Hours&, OPT Minutes&, OPT Seconds&, OPT MSeconds&&, OPT Ticks&&)

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is

suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IPowerTime.Year method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a [quad-integer](#). This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other [objects](#), but using a predefined internal [class](#) and a predefined internal [interface](#).

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member [methods](#). The IPowerTime interface is DUAL -- member methods may be referenced using either [Direct](#) or [Dispatch](#) form.

Remarks The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate [%PB_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX Built.DateString
MSGBOX Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal Days&)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal Hours&)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal Minutes&)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal Months&)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal Milliseconds&)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal Seconds&)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal Ticks&)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal Years&)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

DateString <12> (OPT ByVal LCID&) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal LCID&) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal LCID&) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal FileTime&&)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns [true/false](#) (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal Year&, Opt ByVal Month&, Opt ByVal Day&)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal Hour&, Opt ByVal Min&, Opt ByVal Sec&, Opt ByVal MSec&, Opt ByVal Tick&)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (PowerTime, Sign&, Days&, OPT Hours&, OPT Minutes&, OPT Seconds&, OPT MSeconds&&, OPT Ticks&&)

The internal PowerTime object is compared to the specified external PowerTime object.

The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to

Minutes& (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also [DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

IQueueCollection.CLEAR method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (, string, [UDT](#), [object](#), etc.). Collection interfaces are [DUAL](#) -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VmntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
Collobj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of [bytes](#) (v_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a [variant](#), while the key is passed and stored as a [wide](#) (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
```

```
RetVal = <ObjectVar>.membername(params)
```

```
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HRESULT of S_OK (0) is returned. If it fails because of a duplicate key, an HRESULT of E_DUPLICATEKEY (&H800A01C9) is returned, and an [Object Error](#) (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (PowerKey AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as [true](#). If not found, the value [false](#) (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (Index AS Long, OUT PowerKey as WString, OUT

PowerItem as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified **OUT** parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the **OBJRESULT** will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (Index AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (PowerKey AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the **OBJRESULT** will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the **OBJRESULT** is set to %S_OK (0). When there are no more data items to retrieve, the **OBJRESULT** is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the **OBJRESULT** is set to %S_OK (0). When there are no more data items to retrieve, the **OBJRESULT** is set to %S_FALSE (1).

REMOVE <12> (PowerKey AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, **OBJRESULT** returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, **OBJRESULT** returns %S_FALSE (1) and no operation is performed.

SORT <14> (Flags AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter *Flags* is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

**LinkList
Collection**

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax *The CLASS is "LinkedListCollection". The INTERFACE is ILinkedListCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks Items in a LinkedListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkedList Collection Methods

ADD <3> (PowerItem AS Variant)

The *PowerItem* variant is added to the end of the LinkedListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkedListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkedListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkedListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (Index AS Long) AS Long

The current INDEX for the LinkedListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (Index AS Long, PowerItem AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (Index AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkedListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkedListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkedListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (Index AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection.

The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

| | |
|-------------------------|---|
| Stack Collection | A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods. |
| Syntax | <i>The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).</i> <pre><ObjectVar>.membername(params) RetVal = <ObjectVar>.membername(params) <ObjectVar>.membername(params) TO ReturnVariable</pre> |
| Remarks | The Dispatch ID (DispID) for each member method is displayed within angle brackets. |

Stack Collection Methods**CLEAR <1>**

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

| | |
|-------------------------|--|
| Queue Collection | A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods. |
| Syntax | <i>The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).</i> <pre><ObjectVar>.membername(params) RetVal = <ObjectVar>.membername(params) <ObjectVar>.membername(params) TO ReturnVariable</pre> |
| Remarks | The Dispatch ID (DispID) for each member method is displayed within angle brackets. |

Queue Collection Methods**CLEAR <1>**

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also [FOR EACH/NEXT](#)

IQueueCollection.COUNT method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, [UDT](#), [object](#), etc.). Collection interfaces are [DUAL](#) -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VvntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
Collobj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of [bytes](#) (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

**Power
Collection**

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a [variant](#), while the key is passed and stored as a [wide](#) (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

Power Collection Methods**ADD <3> (PowerKey AS WString, PowerItem AS Variant)**

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HRESULT of S_OK (0) is returned. If it fails because of a duplicate key, an HRESULT of E_DUPLICATEKEY (&H800A01C9) is returned, and an [Object Error](#) (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (PowerKey AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as [true](#). If not found, the value [false](#) (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (Index AS Long, OUT PowerKey as WString, OUT PowerItem as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified [OUT](#) parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (Index AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (PowerKey AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (PowerKey AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (Flags AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter *Flags* is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

**LinkList
Collection**

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
```

```
RetVal = <ObjectVar>.membername(params)
```

```
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods**ADD <3> (PowerItem AS Variant)**

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent

references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index AS Long*) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index AS Long, PowerItem AS Variant*)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index AS Long*) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index AS Long*)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (*Index AS Long, PowerItem AS Variant*)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

**Stack
Collection**

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine [stack](#) on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

*<ObjectVar>.membername(*params*)*

*RetVal = <ObjectVar>.membername(*params*)*

*<ObjectVar>.membername(*params*) TO ReturnVariable*

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods**CLEAR <1>**All *PowerItems* are removed from the StackCollection.**COUNT <2> AS Long**

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS VariantThe *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).**PUSH <4> (PowerItem AS Variant)**The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.**Queue Collection**

A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax*The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).**<ObjectVar>.membername(params)**RetVal = <ObjectVar>.membername(params)**<ObjectVar>.membername(params) TO ReturnVariable***Remarks**

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods**CLEAR <1>**All *PowerItems* are removed from the QueueCollection.**COUNT <2> AS Long**

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS VariantThe *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).**ENQUEUE <4> (PowerItem AS Variant)**The specified *PowerItem* is added to the QueueCollection at the "newest" position.**See Also**[FOR EACH/NEXT](#)**IQueueCollection.DEQUEUE method****Keyword Template**

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose

A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, [UDT](#), [object](#), etc.). Collection interfaces are [DUAL](#) -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VrintVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of [bytes](#) (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a [variant](#), while the key is passed and stored as a [wide](#) (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with

the *PowerKey* string for later retrieval. If the operation was successful, an HRESULT of S_OK (0) is returned. If it fails because of a duplicate key, an HRESULT of E_DUPLICATEKEY (&H800A01C9) is returned, and an [Object Error](#) (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the index number of this item (range of 1 - COUNT) is returned. This value will always evaluate as [true](#). If not found, the value [false](#) (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified [OUT](#) parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar*& = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar*&.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is

decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter *Flags* is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (Index AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine [stack](#) on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

The Dispatch ID (DisplD) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection

A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax

The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also [FOR EACH/NEXT](#)

IQueueCollection.ENQUEUE method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose

A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, [UDT](#), [object](#), etc.). Collection interfaces are [DUAL](#) -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do

so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VmntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
collobj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of [bytes](#) (v_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a [variant](#), while the key is passed and stored as a [wide](#) (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HRESULT of S_OK (0) is returned. If it fails because of a duplicate key, an HRESULT of E_DUPLICATEKEY (&H800A01C9) is returned, and an [Object Error](#) (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (PowerKey AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as [true](#). If not found, the value [false](#) (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (Index AS Long, OUT PowerKey as WString, OUT PowerItem as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified [OUT](#) parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (Index AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (PowerKey AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (PowerKey AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (Flags AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter *Flags* is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

**LinkList
Collection**

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

<ObjectVar>.membername(*params*)

RetVal = <ObjectVar>.membername(*params*)

<ObjectVar>.membername(*params*) TO ReturnVariable

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods**ADD <3> (PowerItem AS Variant)**

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (Index AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (Index AS Long, PowerItem AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (Index AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (Index AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection.

The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

| | |
|-------------------------|---|
| Stack Collection | A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods. |
| Syntax | <i>The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).</i> <pre><ObjectVar>.membername(params) RetVal = <ObjectVar>.membername(params) <ObjectVar>.membername(params) TO ReturnVariable</pre> |
| Remarks | The Dispatch ID (DispID) for each member method is displayed within angle brackets. |

Stack Collection Methods**CLEAR <1>**

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

| | |
|-------------------------|--|
| Queue Collection | A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods. |
| Syntax | <i>The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).</i> <pre><ObjectVar>.membername(params) RetVal = <ObjectVar>.membername(params) <ObjectVar>.membername(params) TO ReturnVariable</pre> |
| Remarks | The Dispatch ID (DispID) for each member method is displayed within angle brackets. |

Queue Collection Methods**CLEAR <1>**

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

| | |
|-----------------|-------------------------------|
| See Also | FOR EACH/NEXT |
|-----------------|-------------------------------|

IStackCollection.CLEAR method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose

A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, [UDT](#), [object](#), etc.). Collection interfaces are [DUAL](#) -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VmntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
Collobj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of [bytes](#) (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

**Power
Collection**

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a [variant](#), while the key is passed and stored as a [wide](#) (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL

interface).

```
<ObjectVar>.membername(params)
```

```
RetVal = <ObjectVar>.membername(params)
```

```
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HRESULT of S_OK (0) is returned. If it fails because of a duplicate key, an HRESULT of E_DUPLICATEKEY (&H800A01C9) is returned, and an [Object Error](#) (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (PowerKey AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as [true](#). If not found, the value [false](#) (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (Index AS Long, OUT PowerKey as WString, OUT PowerItem as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified [OUT](#) parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (Index AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (PowerKey AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (PowerKey AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (Flags AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter *Flags* is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

**LinkList
Collection**

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (PowerItem AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (Index AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is

not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index AS Long, PowerItem AS Variant*)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index AS Long*) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index AS Long*)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection.

The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (*Index AS Long, PowerItem AS Variant*)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine [stack](#) on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax *The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).*

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks The Dispatch ID (Dispid) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection

A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax

The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).

`<ObjectVar>.membername(params)`

`RetVal = <ObjectVar>.membername(params)`

`<ObjectVar>.membername(params) TO ReturnVariable`

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also

[FOR EACH/NEXT](#)

IStackCollection.COUNT method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose

A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined

internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, [UDT](#), [object](#), etc.). Collection interfaces are [DUAL](#) -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VrintVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
collobj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of [bytes](#) (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a [variant](#), while the key is passed and stored as a [wide](#) (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HRESULT of S_OK (0) is returned. If it fails because of a duplicate key, an HRESULT of E_DUPLICATEKEY (&H800A01C9) is returned, and an [Object Error](#) (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (PowerKey AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as [true](#). If not found, the value [false](#) (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (Index AS Long, OUT PowerKey as WString, OUT PowerItem as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified [OUT](#) parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (Index AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (PowerKey AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (PowerKey AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (Flags AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter *Flags* is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
```

```
RetVal = <ObjectVar>.membername(params)
```

```
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods**ADD <3> (PowerItem AS Variant)**

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (Index AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (Index AS Long, PowerItem AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (Index AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is

returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (Index AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection.

The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine [stack](#) on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax *The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also [FOR EACH/NEXT](#)

IStackCollection.POP method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose

A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, [UDT](#), [object](#), etc.). Collection interfaces are [DUAL](#) -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VmntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of [bytes](#) (v_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a [variant](#), while the key is passed and stored as a [wide](#) (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HRESULT of S_OK (0) is returned. If it fails because of a duplicate key, an HRESULT of E_DUPLICATEKEY (&H800A01C9) is returned, and an [Object Error](#) (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (PowerKey AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as [true](#). If not found, the value [false](#) (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (Index AS Long, OUT PowerKey as WString, OUT PowerItem as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified [OUT](#) parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (Index AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the

parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (*PowerKey AS WString*) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey AS WString*)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey AS WString, PowerItem AS Variant*)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags AS Long*)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter *Flags* is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem AS Variant*)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar*& = ObjectVar.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar*&.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection.

The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

**Stack
Collection**

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine [stack](#) on

your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax *The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also [FOR EACH/NEXT](#)

IStackCollection.PUSH method

Keyword Template

Purpose

Syntax
 Remarks
 See also
 Example

COLLECTION Object Group **New!**

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, [UDT](#), [object](#), etc.). Collection interfaces are [DUAL](#) -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VrintVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of [bytes](#) (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a [variant](#), while the key is passed and stored as a [wide](#) (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax *The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks Items in a PowerCollection may be retrieved by their key using the ITEM method. They

may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HRESULT of S_OK (0) is returned. If it fails because of a duplicate key, an HRESULT of E_DUPLICATEKEY (&H800A01C9) is returned, and an [Object Error](#) (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (PowerKey AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as [true](#). If not found, the value [false](#) (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (Index AS Long, OUT PowerKey as WString, OUT PowerItem as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified [OUT](#) parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (Index AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (PowerKey AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the [OBJRESULT](#) is set to %S_OK (0). When there are no more data items to retrieve, the [OBJRESULT](#) is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (PowerKey AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (Flags AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter *Flags* is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

**LinkList
Collection**

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods**ADD <3> (PowerItem AS Variant)**

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (Index AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (Index AS Long, PowerItem AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection.

The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

**Stack
Collection**

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine [stack](#) on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

The Dispatch ID (DisplID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
```

```
RetVal = <ObjectVar>.membername(params)
```

```
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DisplD) for each member method is displayed within angle brackets.

Queue Collection Methods**CLEAR <1>**

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also [FOR EACH/NEXT](#)

IStringBuilderA.Add method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

STRINGBUILDER Object **New!**

Purpose The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the [BUILD\\$Q](#) function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the StringBuilder Class also offers a few additional string operations to assist in building the string.

Remarks There are two forms of the StringBuilder object, one for [ANSI](#) strings, and one for [WIDE](#) (Unicode) strings. While they could have been combined into a single hybrid object, that would have added additional overhead not acceptable for PowerBASIC. To concatenate

ANSI strings, use the `StringBuilderA` class and the `IStringBuilderA` interface. To concatenate WIDE (Unicode) strings, use the `StringBuilderW` class and the `IStringBuilderW` interface. The methods and mode of operation are identical for both forms.

If you choose the ANSI form, parameter strings must be ANSI, and result strings will be ANSI. With the WIDE (Unicode) form, parameter strings must be wide, and result strings will be wide. Keep those requirements in mind when reviewing the following method definitions. The Dispatch ID ([DispID](#)) for each member method is displayed within angle brackets.

When you create a `StringBuilder` object, a dynamic string buffer is created to hold the target string. If you know the size of the result string (or even an approximation), it's usually prudent to use the `CAPACITY` method first, to establish a size at least as large as the final string. If it's not known, PowerBASIC will try to make appropriate decisions for you. Once the object is created, the `ADD` method is used to append string sections as many times as necessary. Finally, the `STRING` method is used to extract the combined items.

StringBuilder Methods/Properties

ADD (*PowerString*\$)

Method<1>

The *PowerString*\$ parameter is appended to the string held in the `StringBuilder` object. If the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an `HResult` of `E_OUTOFMEMORY` (&H8007000E) is returned, and an [Object Error](#) (99) is generated.

CAPACITY () AS Long

Get Property<2>

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

CAPACITY () = Long

Set Property<2>

The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed.

CHAR (*Index*&) AS Long

Get Property<3>

The numeric character code of the character at the position *Index*& is retrieved and returned to the caller. *Index*&=1 for the first character, 2 for the second, etc. If *Index*& is beyond the current length of the string, the value -1 is returned.

CHAR (*Index*&) = Long

Set Property<3>

The character at the position *Index*& is changed to that specified by the Long Integer character code. *Index*&=1 for the first character, 2 for the second, etc.

CLEAR

Method<4>

All data in the object is erased.

DELETE (*Index*&, *Count*&)

Method<5>

Count& characters are removed starting at the position given by *Index*&. *Index*&=1 for the first character, 2 for the second, etc.

INSERT (*PowerString*\$, *Index*&)

Method<6>

The *PowerString*\$ parameter is inserted in the string starting at the position given by *Index*&. *Index*&=1 for the first character, 2 for the second, etc. If *Index*& is beyond the current length of the string, no operation is performed.

LEN () AS Long

Method<7>

The number of characters currently stored in the object is returned as a long integer value.

STRING AS String

Method<8>

The string stored in the object is returned to the caller. This string will contain `LEN` characters.

See also

[BUILD\\$](#), [CHR\\$](#), [CSET](#), [CSET\\$](#), [JOIN\\$](#), [LSET](#), [LSET\\$](#), [REPEAT\\$](#), [RSET](#), [RSET\\$](#), [STRING\\$](#), [STRINSERT\\$](#), [WRAP\\$](#)

IStringBuilderA.Capacity Property Get

Keyword Template

Purpose

Syntax

Remarks

See also

Example

STRINGBUILDER Object New!

Purpose The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the [BUILD\\$\(\)](#) function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the StringBuilder Class also offers a few additional string operations to assist in building the string.

Remarks There are two forms of the StringBuilder object, one for [ANSI](#) strings, and one for [WIDE](#) (Unicode) strings. While they could have been combined into a single hybrid object, that would have added additional overhead not acceptable for PowerBASIC. To concatenate ANSI strings, use the StringBuilderA class and the IStringBuilderA interface. To concatenate WIDE (Unicode) strings, use the StringBuilderW class and the IStringBuilderW interface. The methods and mode of operation are identical for both forms.

If you choose the ANSI form, parameter strings must be ANSI, and result strings will be ANSI. With the WIDE (Unicode) form, parameter strings must be wide, and result strings will be wide. Keep those requirements in mind when reviewing the following method definitions. The Dispatch ID ([DisplID](#)) for each member method is displayed within angle brackets.

When you create a StringBuilder object, a dynamic string buffer is created to hold the target string. If you know the size of the result string (or even an approximation), it's usually prudent to use the CAPACITY method first, to establish a size at least as large as the final string. If it's not known, PowerBASIC will try to make appropriate decisions for you. Once the object is created, the ADD method is used to append string sections as many times as necessary. Finally, the STRING method is used to extract the combined items.

StringBuilder Methods/Properties

ADD (*PowerString\$*)

Method<1>

The *PowerString\$* parameter is appended to the string held in the StringBuilder object. If the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an HRESULT of E_OUTOFMEMORY (&H8007000E) is returned, and an [Object Error](#) (99) is generated.

CAPACITY () AS Long

Get Property<2>

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

CAPACITY () = Long

Set Property<2>

The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed.

CHAR (*Index*&) AS Long **Get Property<3>**

The numeric character code of the character at the position *Index*& is retrieved and returned to the caller. *Index*&=1 for the first character, 2 for the second, etc. If *Index*& is beyond the current length of the string, the value -1 is returned.

CHAR (*Index*&) = Long **Set Property<3>**

The character at the position *Index*& is changed to that specified by the Long Integer character code. *Index*&=1 for the first character, 2 for the second, etc.

CLEAR **Method<4>**

All data in the object is erased.

DELETE (*Index*&, *Count*&) **Method<5>**

Count& characters are removed starting at the position given by *Index*&. *Index*&=1 for the first character, 2 for the second, etc.

INSERT (*PowerString*\$, *Index*&) **Method<6>**

The *PowerString*\$ parameter is inserted in the string starting at the position given by *Index*&. *Index*&=1 for the first character, 2 for the second, etc. If *Index*& is beyond the current length of the string, no operation is performed.

LEN () AS Long **Method<7>**

The number of characters currently stored in the object is returned as a long integer value.

STRING AS String **Method<8>**

The string stored in the object is returned to the caller. This string will contain LEN characters.

See also [BUILD\\$](#), [CHR\\$](#), [CSET](#), [CSET\\$](#), [JOIN\\$](#), [LSET](#), [LSET\\$](#), [REPEAT\\$](#), [RSET](#), [RSET\\$](#), [STRING\\$](#), [STRINSERT\\$](#), [WRAP\\$](#)

IStringBuilderA.Capacity Property Set

Keyword Template

Purpose

Syntax

Remarks

See also

Example

STRINGBUILDER Object New!

Purpose The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the [BUILD\\$\(\)](#) function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the StringBuilder Class also offers a few additional string operations to assist in building the string.

Remarks There are two forms of the StringBuilder object, one for [ANSI](#) strings, and one for [WIDE](#) (Unicode) strings. While they could have been combined into a single hybrid object, that

would have added additional overhead not acceptable for PowerBASIC. To concatenate ANSI strings, use the `StringBuilderA` class and the `IStringBuilderA` interface. To concatenate WIDE (Unicode) strings, use the `StringBuilderW` class and the `IStringBuilderW` interface. The methods and mode of operation are identical for both forms.

If you choose the ANSI form, parameter strings must be ANSI, and result strings will be ANSI. With the WIDE (Unicode) form, parameter strings must be wide, and result strings will be wide. Keep those requirements in mind when reviewing the following method definitions. The Dispatch ID ([DisplD](#)) for each member method is displayed within angle brackets.

When you create a `StringBuilder` object, a dynamic string buffer is created to hold the target string. If you know the size of the result string (or even an approximation), it's usually prudent to use the `CAPACITY` method first, to establish a size at least as large as the final string. If it's not known, PowerBASIC will try to make appropriate decisions for you. Once the object is created, the `ADD` method is used to append string sections as many times as necessary. Finally, the `STRING` method is used to extract the combined items.

StringBuilder Methods/Properties

ADD (*PowerString\$*)

Method<1>

The *PowerString\$* parameter is appended to the string held in the `StringBuilder` object. If the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an `HResult` of `E_OUTOFMEMORY` (&H8007000E) is returned, and an [Object Error](#) (99) is generated.

CAPACITY () AS Long

Get Property<2>

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

CAPACITY () = Long

Set Property<2>

The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed.

CHAR (*Index&*) AS Long

Get Property<3>

The numeric character code of the character at the position *Index&* is retrieved and returned to the caller. *Index&*=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, the value -1 is returned.

CHAR (*Index&*) = Long

Set Property<3>

The character at the position *Index&* is changed to that specified by the Long Integer character code. *Index&*=1 for the first character, 2 for the second, etc.

CLEAR

Method<4>

All data in the object is erased.

DELETE (*Index&*, *Count&*)

Method<5>

Count& characters are removed starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc.

INSERT (*PowerString\$*, *Index&*)

Method<6>

The *PowerString\$* parameter is inserted in the string starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, no operation is performed.

LEN () AS Long

Method<7>

The number of characters currently stored in the object is returned as a long integer value.

STRING AS String

Method<8>

The string stored in the object is returned to the caller. This string will contain `LEN` characters.

See also

[BUILD\\$](#), [CHR\\$](#), [CSET](#), [CSETS\\$](#), [JOIN\\$](#), [LSET](#), [LSETS\\$](#), [REPEAT\\$](#), [RSET](#), [RSETS\\$](#),

[STRING\\$, STRINSERT\\$, WRAPS](#)

IStringBuilderA.Char Property Get

Keyword Template

Purpose

Syntax

Remarks

See also

Example

STRINGBUILDER Object **New!**

Purpose The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the [BUILD\\$\(\)](#) function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the StringBuilder Class also offers a few additional string operations to assist in building the string.

Remarks There are two forms of the StringBuilder object, one for [ANSI](#) strings, and one for [WIDE](#) (Unicode) strings. While they could have been combined into a single hybrid object, that would have added additional overhead not acceptable for PowerBASIC. To concatenate ANSI strings, use the StringBuilderA class and the IStringBuilderA interface. To concatenate WIDE (Unicode) strings, use the StringBuilderW class and the IStringBuilderW interface. The methods and mode of operation are identical for both forms.

If you choose the ANSI form, parameter strings must be ANSI, and result strings will be ANSI. With the WIDE (Unicode) form, parameter strings must be wide, and result strings will be wide. Keep those requirements in mind when reviewing the following method definitions. The Dispatch ID ([DisplD](#)) for each member method is displayed within angle brackets.

When you create a StringBuilder object, a dynamic string buffer is created to hold the target string. If you know the size of the result string (or even an approximation), it's usually prudent to use the CAPACITY method first, to establish a size at least as large as the final string. If it's not known, PowerBASIC will try to make appropriate decisions for you. Once the object is created, the ADD method is used to append string sections as many times as necessary. Finally, the STRING method is used to extract the combined items.

StringBuilder Methods/Properties

ADD (PowerString\$)

Method<1>

The *PowerString\$* parameter is appended to the string held in the StringBuilder object. If the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an HRESULT of E_OUTOFMEMORY (&H8007000E) is returned, and an [Object Error](#) (99) is generated.

CAPACITY () AS Long

Get Property<2>

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

| | |
|--|------------------------------|
| CAPACITY () = Long | Set Property<2> |
| The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed. | |
| CHAR (Index&) AS Long | Get Property<3> |
| The numeric character code of the character at the position <i>Index&</i> is retrieved and returned to the caller. <i>Index&</i> =1 for the first character, 2 for the second, etc. If <i>Index&</i> is beyond the current length of the string, the value -1 is returned. | |
| CHAR (Index&) = Long | Set Property<3> |
| The character at the position <i>Index&</i> is changed to that specified by the Long Integer character code. <i>Index&</i> =1 for the first character, 2 for the second, etc. | |
| CLEAR | Method<4> |
| All data in the object is erased. | |
| DELETE (Index&, Count&) | Method<5> |
| <i>Count&</i> characters are removed starting at the position given by <i>Index&</i> . <i>Index&</i> =1 for the first character, 2 for the second, etc. | |
| INSERT (PowerString\$, Index&) | Method<6> |
| The <i>PowerString\$</i> parameter is inserted in the string starting at the position given by <i>Index&</i> . <i>Index&</i> =1 for the first character, 2 for the second, etc. If <i>Index&</i> is beyond the current length of the string, no operation is performed. | |
| LEN () AS Long | Method<7> |
| The number of characters currently stored in the object is returned as a long integer value. | |
| STRING AS String | Method<8> |
| The string stored in the object is returned to the caller. This string will contain LEN characters. | |

See also [BUILD\\$](#), [CHR\\$](#), [CSET](#), [CSETS\\$](#), [JOIN\\$](#), [LSET](#), [LSETS\\$](#), [REPEAT\\$](#), [RSET](#), [RSETS\\$](#), [STRING\\$](#), [STRINSERT\\$](#), [WRAP\\$](#)

IStringBuilderA.Char Property Set

Keyword Template

Purpose

Syntax

Remarks

See also

Example

STRINGBUILDER Object **New!**

| | |
|----------------|---|
| Purpose | The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the BUILD\$() function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the StringBuilder Class also offers a few additional string operations to assist in building the string. |
| Remarks | There are two forms of the StringBuilder object, one for ANSI strings, and one for WIDE |

(Unicode) strings. While they could have been combined into a single hybrid object, that would have added additional overhead not acceptable for PowerBASIC. To concatenate ANSI strings, use the `StringBuilderA` class and the `IStringBuilderA` interface. To concatenate WIDE (Unicode) strings, use the `StringBuilderW` class and the `IStringBuilderW` interface. The methods and mode of operation are identical for both forms.

If you choose the ANSI form, parameter strings must be ANSI, and result strings will be ANSI. With the WIDE (Unicode) form, parameter strings must be wide, and result strings will be wide. Keep those requirements in mind when reviewing the following method definitions. The Dispatch ID ([DisplD](#)) for each member method is displayed within angle brackets.

When you create a `StringBuilder` object, a dynamic string buffer is created to hold the target string. If you know the size of the result string (or even an approximation), it's usually prudent to use the `CAPACITY` method first, to establish a size at least as large as the final string. If it's not known, PowerBASIC will try to make appropriate decisions for you. Once the object is created, the `ADD` method is used to append string sections as many times as necessary. Finally, the `STRING` method is used to extract the combined items.

StringBuilder Methods/Properties

ADD (*PowerString*\$)

Method<1>

The *PowerString*\$ parameter is appended to the string held in the `StringBuilder` object. If the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an `HResult` of `E_OUTOFMEMORY` (&H8007000E) is returned, and an [Object Error](#) (99) is generated.

CAPACITY () AS Long

Get Property<2>

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

CAPACITY () = Long

Set Property<2>

The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed.

CHAR (*Index*&) AS Long

Get Property<3>

The numeric character code of the character at the position *Index*& is retrieved and returned to the caller. *Index*&=1 for the first character, 2 for the second, etc. If *Index*& is beyond the current length of the string, the value -1 is returned.

CHAR (*Index*&) = Long

Set Property<3>

The character at the position *Index*& is changed to that specified by the Long Integer character code. *Index*&=1 for the first character, 2 for the second, etc.

CLEAR

Method<4>

All data in the object is erased.

DELETE (*Index*&, *Count*&)

Method<5>

Count& characters are removed starting at the position given by *Index*&. *Index*&=1 for the first character, 2 for the second, etc.

INSERT (*PowerString*\$, *Index*&)

Method<6>

The *PowerString*\$ parameter is inserted in the string starting at the position given by *Index*&. *Index*&=1 for the first character, 2 for the second, etc. If *Index*& is beyond the current length of the string, no operation is performed.

LEN () AS Long

Method<7>

The number of characters currently stored in the object is returned as a long integer value.

STRING AS String

Method<8>

The string stored in the object is returned to the caller. This string will contain `LEN` characters.

See also [BUILDS](#), [CHR](#), [CSET](#), [CSETS](#), [JOIN](#), [LSET](#), [LSETS](#), [REPEAT](#), [RSET](#), [RSETS](#), [STRING](#), [STRINSERT](#), [WRAP](#)

IStringBuilderA.Clear method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

STRINGBUILDER Object New!

Purpose The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the [BUILDS\(\)](#) function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the StringBuilder Class also offers a few additional string operations to assist in building the string.

Remarks There are two forms of the StringBuilder object, one for [ANSI](#) strings, and one for [WIDE](#) (Unicode) strings. While they could have been combined into a single hybrid object, that would have added additional overhead not acceptable for PowerBASIC. To concatenate ANSI strings, use the StringBuilderA class and the IStringBuilderA interface. To concatenate WIDE (Unicode) strings, use the StringBuilderW class and the IStringBuilderW interface. The methods and mode of operation are identical for both forms.

If you choose the ANSI form, parameter strings must be ANSI, and result strings will be ANSI. With the WIDE (Unicode) form, parameter strings must be wide, and result strings will be wide. Keep those requirements in mind when reviewing the following method definitions. The Dispatch ID ([DisplD](#)) for each member method is displayed within angle brackets.

When you create a StringBuilder object, a dynamic string buffer is created to hold the target string. If you know the size of the result string (or even an approximation), it's usually prudent to use the CAPACITY method first, to establish a size at least as large as the final string. If it's not known, PowerBASIC will try to make appropriate decisions for you. Once the object is created, the ADD method is used to append string sections as many times as necessary. Finally, the STRING method is used to extract the combined items.

StringBuilder Methods/Properties

ADD (*PowerString*)

Method<1>

The *PowerString* parameter is appended to the string held in the StringBuilder object. If the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an HRESULT of E_OUTOFMEMORY (&H8007000E) is returned, and an [Object Error](#) (99) is generated.

CAPACITY () AS Long

Get Property<2>

The size of the internal string buffer is retrieved and returned to the caller. The size is the

number of characters which can be stored without further expansion.

CAPACITY () = Long **Set Property<2>**

The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed.

CHAR (Index&) AS Long **Get Property<3>**

The numeric character code of the character at the position *Index&* is retrieved and returned to the caller. *Index&=1* for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, the value -1 is returned.

CHAR (Index&) = Long **Set Property<3>**

The character at the position *Index&* is changed to that specified by the Long Integer character code. *Index&=1* for the first character, 2 for the second, etc.

CLEAR **Method<4>**

All data in the object is erased.

DELETE (Index&, Count&) **Method<5>**

Count& characters are removed starting at the position given by *Index&*. *Index&=1* for the first character, 2 for the second, etc.

INSERT (PowerString\$, Index&) **Method<6>**

The *PowerString\$* parameter is inserted in the string starting at the position given by *Index&*. *Index&=1* for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, no operation is performed.

LEN () AS Long **Method<7>**

The number of characters currently stored in the object is returned as a long integer value.

STRING AS String **Method<8>**

The string stored in the object is returned to the caller. This string will contain LEN characters.

See also [BUILD\\$, CHR\\$, CSET, CSETS\\$, JOIN\\$, LSET, LSETS\\$, REPEAT\\$, RSET, RSETS\\$, STRING\\$, STRINSERT\\$, WRAP\\$](#)

IStringBuilderA.Delete method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

STRINGBUILDER Object New!

Purpose The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the [BUILD\\$\(\)](#) function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the StringBuilder Class also offers a few additional string operations to assist in building the string.

Remarks

There are two forms of the StringBuilder object, one for [ANSI](#) strings, and one for [WIDE](#) (Unicode) strings. While they could have been combined into a single hybrid object, that would have added additional overhead not acceptable for PowerBASIC. To concatenate ANSI strings, use the StringBuilderA class and the IStringBuilderA interface. To concatenate WIDE (Unicode) strings, use the StringBuilderW class and the IStringBuilderW interface. The methods and mode of operation are identical for both forms.

If you choose the ANSI form, parameter strings must be ANSI, and result strings will be ANSI. With the WIDE (Unicode) form, parameter strings must be wide, and result strings will be wide. Keep those requirements in mind when reviewing the following method definitions. The Dispatch ID ([DisplD](#)) for each member method is displayed within angle brackets.

When you create a StringBuilder object, a dynamic string buffer is created to hold the target string. If you know the size of the result string (or even an approximation), it's usually prudent to use the CAPACITY method first, to establish a size at least as large as the final string. If it's not known, PowerBASIC will try to make appropriate decisions for you. Once the object is created, the ADD method is used to append string sections as many times as necessary. Finally, the STRING method is used to extract the combined items.

StringBuilder Methods/Properties**ADD (PowerString\$)****Method<1>**

The *PowerString\$* parameter is appended to the string held in the StringBuilder object. If the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an HRESULT of E_OUTOFMEMORY (&H8007000E) is returned, and an [Object Error](#) (99) is generated.

CAPACITY () AS Long**Get Property<2>**

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

CAPACITY () = Long**Set Property<2>**

The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed.

CHAR (Index&) AS Long**Get Property<3>**

The numeric character code of the character at the position *Index&* is retrieved and returned to the caller. *Index&=1* for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, the value -1 is returned.

CHAR (Index&) = Long**Set Property<3>**

The character at the position *Index&* is changed to that specified by the Long Integer character code. *Index&=1* for the first character, 2 for the second, etc.

CLEAR**Method<4>**

All data in the object is erased.

DELETE (Index&, Count&)**Method<5>**

Count& characters are removed starting at the position given by *Index&*. *Index&=1* for the first character, 2 for the second, etc.

INSERT (PowerString\$, Index&)**Method<6>**

The *PowerString\$* parameter is inserted in the string starting at the position given by *Index&*. *Index&=1* for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, no operation is performed.

LEN () AS Long**Method<7>**

The number of characters currently stored in the object is returned as a long integer value.

STRING AS String**Method<8>**

The string stored in the object is returned to the caller. This string will contain LEN

characters.

See also [BUILD\\$, CHR\\$, CSET, CSETS\\$, JOIN\\$, LSET, LSETS\\$, REPEAT\\$, RSET, RSETS\\$, STRING\\$, STRINSERT\\$, WRAP\\$](#)

IStringBuilderA.Insert method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

STRINGBUILDER Object New!

Purpose The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the [BUILD\\$\(\)](#) function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the StringBuilder Class also offers a few additional string operations to assist in building the string.

Remarks There are two forms of the StringBuilder object, one for [ANSI](#) strings, and one for [WIDE](#) (Unicode) strings. While they could have been combined into a single hybrid object, that would have added additional overhead not acceptable for PowerBASIC. To concatenate ANSI strings, use the StringBuilderA class and the IStringBuilderA interface. To concatenate WIDE (Unicode) strings, use the StringBuilderW class and the IStringBuilderW interface. The methods and mode of operation are identical for both forms.

If you choose the ANSI form, parameter strings must be ANSI, and result strings will be ANSI. With the WIDE (Unicode) form, parameter strings must be wide, and result strings will be wide. Keep those requirements in mind when reviewing the following method definitions. The Dispatch ID ([DisplD](#)) for each member method is displayed within angle brackets.

When you create a StringBuilder object, a dynamic string buffer is created to hold the target string. If you know the size of the result string (or even an approximation), it's usually prudent to use the CAPACITY method first, to establish a size at least as large as the final string. If it's not known, PowerBASIC will try to make appropriate decisions for you. Once the object is created, the ADD method is used to append string sections as many times as necessary. Finally, the STRING method is used to extract the combined items.

StringBuilder Methods/Properties

ADD (PowerString\$)

Method<1>

The *PowerString\$* parameter is appended to the string held in the StringBuilder object. If the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an HRESULT of E_OUTOFMEMORY (&H8007000E) is returned, and an [Object Error](#) (99) is generated.

CAPACITY () AS Long

Get Property<2>

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

CAPACITY () = Long **Set Property<2>**

The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed.

CHAR (Index&) AS Long **Get Property<3>**

The numeric character code of the character at the position *Index&* is retrieved and returned to the caller. *Index&=1* for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, the value -1 is returned.

CHAR (Index&) = Long **Set Property<3>**

The character at the position *Index&* is changed to that specified by the Long Integer character code. *Index&=1* for the first character, 2 for the second, etc.

CLEAR **Method<4>**

All data in the object is erased.

DELETE (Index&, Count&) **Method<5>**

Count& characters are removed starting at the position given by *Index&*. *Index&=1* for the first character, 2 for the second, etc.

INSERT (PowerString\$, Index&) **Method<6>**

The *PowerString\$* parameter is inserted in the string starting at the position given by *Index&*. *Index&=1* for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, no operation is performed.

LEN () AS Long **Method<7>**

The number of characters currently stored in the object is returned as a long integer value.

STRING AS String **Method<8>**

The string stored in the object is returned to the caller. This string will contain LEN characters.

See also [BUILD\\$](#), [CHR\\$](#), [CSET](#), [CSETS\\$](#), [JOIN\\$](#), [LSET](#), [LSETS\\$](#), [REPEAT\\$](#), [RSET](#), [RSETS\\$](#), [STRING\\$](#), [STRINSERT\\$](#), [WRAP\\$](#)

IStringBuilderA.Len method

Keyword Template

Purpose

Syntax

Remarks

See also

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STRINGBUILDER Object New!

Purpose

The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the [BUILD\\$\(\)](#) function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the StringBuilder Class also offers a few additional string

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operations to assist in building the string.

There are two forms of the StringBuilder object, one for [ANSI](#) strings, and one for [WIDE](#) (Unicode) strings. While they could have been combined into a single hybrid object, that would have added additional overhead not acceptable for PowerBASIC. To concatenate ANSI strings, use the StringBuilderA class and the IStringBuilderA interface. To concatenate WIDE (Unicode) strings, use the StringBuilderW class and the IStringBuilderW interface. The methods and mode of operation are identical for both forms.

If you choose the ANSI form, parameter strings must be ANSI, and result strings will be ANSI. With the WIDE (Unicode) form, parameter strings must be wide, and result strings will be wide. Keep those requirements in mind when reviewing the following method definitions. The Dispatch ID ([DispID](#)) for each member method is displayed within angle brackets.

When you create a StringBuilder object, a dynamic string buffer is created to hold the target string. If you know the size of the result string (or even an approximation), it's usually prudent to use the CAPACITY method first, to establish a size at least as large as the final string. If it's not known, PowerBASIC will try to make appropriate decisions for you. Once the object is created, the ADD method is used to append string sections as many times as necessary. Finally, the STRING method is used to extract the combined items.

StringBuilder Methods/Properties

| | |
|---|------------------------------|
| ADD (PowerString\$) | Method<1> |
| The <i>PowerString\$</i> parameter is appended to the string held in the StringBuilder object. If the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an HRESULT of E_OUTOFMEMORY (&H8007000E) is returned, and an Object Error (99) is generated. | |
| CAPACITY () AS Long | Get Property<2> |
| The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion. | |
| CAPACITY () = Long | Set Property<2> |
| The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed. | |
| CHAR (Index&) AS Long | Get Property<3> |
| The numeric character code of the character at the position <i>Index&</i> is retrieved and returned to the caller. <i>Index&</i> =1 for the first character, 2 for the second, etc. If <i>Index&</i> is beyond the current length of the string, the value -1 is returned. | |
| CHAR (Index&) = Long | Set Property<3> |
| The character at the position <i>Index&</i> is changed to that specified by the Long Integer character code. <i>Index&</i> =1 for the first character, 2 for the second, etc. | |
| CLEAR | Method<4> |
| All data in the object is erased. | |
| DELETE (Index&, Count&) | Method<5> |
| <i>Count&</i> characters are removed starting at the position given by <i>Index&</i> . <i>Index&</i> =1 for the first character, 2 for the second, etc. | |
| INSERT (PowerString\$, Index&) | Method<6> |
| The <i>PowerString\$</i> parameter is inserted in the string starting at the position given by <i>Index&</i> . <i>Index&</i> =1 for the first character, 2 for the second, etc. If <i>Index&</i> is beyond the current length of the string, no operation is performed. | |
| LEN () AS Long | Method<7> |
| The number of characters currently stored in the object is returned as a long integer value. | |
| STRING AS String | Method<8> |

The string stored in the object is returned to the caller. This string will contain LEN characters.

See also [BUILD\\$, CHR\\$, CSET, CSETS\\$, JOIN\\$, LSET, LSETS\\$, REPEAT\\$, RSET, RSETS\\$, STRING\\$, STRINSERT\\$, WRAP\\$](#)

IStringBuilderA.String method

Keyword Template

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Syntax

Remarks

See also

Example

STRINGBUILDER Object New!

Purpose The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the [BUILD\\$\(\)](#) function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the StringBuilder Class also offers a few additional string operations to assist in building the string.

Remarks There are two forms of the StringBuilder object, one for [ANSI](#) strings, and one for [WIDE](#) (Unicode) strings. While they could have been combined into a single hybrid object, that would have added additional overhead not acceptable for PowerBASIC. To concatenate ANSI strings, use the StringBuilderA class and the IStringBuilderA interface. To concatenate WIDE (Unicode) strings, use the StringBuilderW class and the IStringBuilderW interface. The methods and mode of operation are identical for both forms.

If you choose the ANSI form, parameter strings must be ANSI, and result strings will be ANSI. With the WIDE (Unicode) form, parameter strings must be wide, and result strings will be wide. Keep those requirements in mind when reviewing the following method definitions. The Dispatch ID ([DispID](#)) for each member method is displayed within angle brackets.

When you create a StringBuilder object, a dynamic string buffer is created to hold the target string. If you know the size of the result string (or even an approximation), it's usually prudent to use the CAPACITY method first, to establish a size at least as large as the final string. If it's not known, PowerBASIC will try to make appropriate decisions for you. Once the object is created, the ADD method is used to append string sections as many times as necessary. Finally, the STRING method is used to extract the combined items.

StringBuilder Methods/Properties

ADD (*PowerString\$*)

Method<1>

The *PowerString\$* parameter is appended to the string held in the StringBuilder object. If the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an HRESULT of E_OUTOFMEMORY (&H8007000E) is returned, and an [Object Error](#) (99) is generated.

| | |
|---|------------------------------|
| CAPACITY () AS Long | Get Property<2> |
| The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion. | |
| CAPACITY () = Long | Set Property<2> |
| The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed. | |
| CHAR (Index&) AS Long | Get Property<3> |
| The numeric character code of the character at the position <i>Index&</i> is retrieved and returned to the caller. <i>Index&=1</i> for the first character, 2 for the second, etc. If <i>Index&</i> is beyond the current length of the string, the value -1 is returned. | |
| CHAR (Index&) = Long | Set Property<3> |
| The character at the position <i>Index&</i> is changed to that specified by the Long Integer character code. <i>Index&=1</i> for the first character, 2 for the second, etc. | |
| CLEAR | Method<4> |
| All data in the object is erased. | |
| DELETE (Index&, Count&) | Method<5> |
| <i>Count&</i> characters are removed starting at the position given by <i>Index&</i> . <i>Index&=1</i> for the first character, 2 for the second, etc. | |
| INSERT (PowerString\$, Index&) | Method<6> |
| The <i>PowerString\$</i> parameter is inserted in the string starting at the position given by <i>Index&</i> . <i>Index&=1</i> for the first character, 2 for the second, etc. If <i>Index&</i> is beyond the current length of the string, no operation is performed. | |
| LEN () AS Long | Method<7> |
| The number of characters currently stored in the object is returned as a long integer value. | |
| STRING AS String | Method<8> |
| The string stored in the object is returned to the caller. This string will contain LEN characters. | |

See also [BUILD\\$, CHR\\$, CSET, CSETS\\$, JOIN\\$, LSET, LSETS\\$, REPEAT\\$, RSET, RSETS\\$, STRING\\$, STRINSERT\\$, WRAP\\$](#)

IStringBuilderW.Add method

Keyword Template

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See also

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STRINGBUILDER Object **New!**

Purpose The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the [BUILD\\$\(Q\)](#) function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In

addition to concatenation, the `StringBuilder` Class also offers a few additional string operations to assist in building the string.

Remarks

There are two forms of the `StringBuilder` object, one for [ANSI](#) strings, and one for [WIDE](#) (Unicode) strings. While they could have been combined into a single hybrid object, that would have added additional overhead not acceptable for PowerBASIC. To concatenate ANSI strings, use the `StringBuilderA` class and the `IStringBuilderA` interface. To concatenate WIDE (Unicode) strings, use the `StringBuilderW` class and the `IStringBuilderW` interface. The methods and mode of operation are identical for both forms.

If you choose the ANSI form, parameter strings must be ANSI, and result strings will be ANSI. With the WIDE (Unicode) form, parameter strings must be wide, and result strings will be wide. Keep those requirements in mind when reviewing the following method definitions. The Dispatch ID ([DisplD](#)) for each member method is displayed within angle brackets.

When you create a `StringBuilder` object, a dynamic string buffer is created to hold the target string. If you know the size of the result string (or even an approximation), it's usually prudent to use the `CAPACITY` method first, to establish a size at least as large as the final string. If it's not known, PowerBASIC will try to make appropriate decisions for you. Once the object is created, the `ADD` method is used to append string sections as many times as necessary. Finally, the `STRING` method is used to extract the combined items.

StringBuilder Methods/Properties

ADD (*PowerString*\$)

Method<1>

The *PowerString*\$ parameter is appended to the string held in the `StringBuilder` object. If the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an `HResult` of `E_OUTOFMEMORY` (&H8007000E) is returned, and an [Object Error](#) (99) is generated.

CAPACITY () AS Long

Get Property<2>

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

CAPACITY () = Long

Set Property<2>

The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed.

CHAR (*Index*&) AS Long

Get Property<3>

The numeric character code of the character at the position *Index*& is retrieved and returned to the caller. *Index*&=1 for the first character, 2 for the second, etc. If *Index*& is beyond the current length of the string, the value -1 is returned.

CHAR (*Index*&) = Long

Set Property<3>

The character at the position *Index*& is changed to that specified by the Long Integer character code. *Index*&=1 for the first character, 2 for the second, etc.

CLEAR

Method<4>

All data in the object is erased.

DELETE (*Index*&, *Count*&)

Method<5>

Count& characters are removed starting at the position given by *Index*&. *Index*&=1 for the first character, 2 for the second, etc.

INSERT (*PowerString*\$, *Index*&)

Method<6>

The *PowerString*\$ parameter is inserted in the string starting at the position given by *Index*&. *Index*&=1 for the first character, 2 for the second, etc. If *Index*& is beyond the current length of the string, no operation is performed.

LEN () AS Long

Method<7>

The number of characters currently stored in the object is returned as a long integer value.

STRING AS String**Method<8>**

The string stored in the object is returned to the caller. This string will contain LEN characters.

See also

[BUILD\\$](#), [CHR\\$](#), [CSET](#), [CSETS\\$](#), [JOIN\\$](#), [LSET](#), [LSETS\\$](#), [REPEAT\\$](#), [RSET](#), [RSETS\\$](#), [STRING\\$](#), [STRINSERT\\$](#), [WRAP\\$](#)

IStringBuilderW.Capacity Property Get

Keyword Template

Purpose**Syntax****Remarks****See also****Example**

STRINGBUILDER Object New!

Purpose

The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the [BUILD\\$\(\)](#) function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the StringBuilder Class also offers a few additional string operations to assist in building the string.

Remarks

There are two forms of the StringBuilder object, one for [ANSI](#) strings, and one for [WIDE](#) (Unicode) strings. While they could have been combined into a single hybrid object, that would have added additional overhead not acceptable for PowerBASIC. To concatenate ANSI strings, use the StringBuilderA class and the IStringBuilderA interface. To concatenate WIDE (Unicode) strings, use the StringBuilderW class and the IStringBuilderW interface. The methods and mode of operation are identical for both forms.

If you choose the ANSI form, parameter strings must be ANSI, and result strings will be ANSI. With the WIDE (Unicode) form, parameter strings must be wide, and result strings will be wide. Keep those requirements in mind when reviewing the following method definitions. The Dispatch ID ([DispID](#)) for each member method is displayed within angle brackets.

When you create a StringBuilder object, a dynamic string buffer is created to hold the target string. If you know the size of the result string (or even an approximation), it's usually prudent to use the CAPACITY method first, to establish a size at least as large as the final string. If it's not known, PowerBASIC will try to make appropriate decisions for you. Once the object is created, the ADD method is used to append string sections as many times as necessary. Finally, the STRING method is used to extract the combined items.

StringBuilder Methods/Properties

ADD (PowerString\$)**Method<1>**

The *PowerString\$* parameter is appended to the string held in the StringBuilder object. If the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an HRESULT of E_OUTOFMEMORY

(&H8007000E) is returned, and an [Object Error](#) (99) is generated.

CAPACITY () AS Long **Get Property<2>**

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

CAPACITY () = Long **Set Property<2>**

The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed.

CHAR (Index&) AS Long **Get Property<3>**

The numeric character code of the character at the position *Index&* is retrieved and returned to the caller. *Index&=1* for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, the value -1 is returned.

CHAR (Index&) = Long **Set Property<3>**

The character at the position *Index&* is changed to that specified by the Long Integer character code. *Index&=1* for the first character, 2 for the second, etc.

CLEAR **Method<4>**

All data in the object is erased.

DELETE (Index&, Count&) **Method<5>**

Count& characters are removed starting at the position given by *Index&*. *Index&=1* for the first character, 2 for the second, etc.

INSERT (PowerString\$, Index&) **Method<6>**

The *PowerString\$* parameter is inserted in the string starting at the position given by *Index&*. *Index&=1* for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, no operation is performed.

LEN () AS Long **Method<7>**

The number of characters currently stored in the object is returned as a long integer value.

STRING AS String **Method<8>**

The string stored in the object is returned to the caller. This string will contain LEN characters.

See also [BUILD\\$](#), [CHR\\$](#), [CSET](#), [CSETS\\$](#), [JOIN\\$](#), [LSET](#), [LSETS\\$](#), [REPEAT\\$](#), [RSET](#), [RSETS\\$](#), [STRING\\$](#), [STRINSERT\\$](#), [WRAP\\$](#)

IStringBuilderW.Capacity Property Set

Keyword Template

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STRINGBUILDER Object New!

Purpose

The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the [BUILD\\$\(\)](#) function could be a better choice. However, both options offer a very

large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the `StringBuilder` Class also offers a few additional string operations to assist in building the string.

Remarks

There are two forms of the `StringBuilder` object, one for [ANSI](#) strings, and one for [WIDE](#) (Unicode) strings. While they could have been combined into a single hybrid object, that would have added additional overhead not acceptable for PowerBASIC. To concatenate ANSI strings, use the `StringBuilderA` class and the `IStringBuilderA` interface. To concatenate WIDE (Unicode) strings, use the `StringBuilderW` class and the `IStringBuilderW` interface. The methods and mode of operation are identical for both forms.

If you choose the ANSI form, parameter strings must be ANSI, and result strings will be ANSI. With the WIDE (Unicode) form, parameter strings must be wide, and result strings will be wide. Keep those requirements in mind when reviewing the following method definitions. The Dispatch ID ([DispID](#)) for each member method is displayed within angle brackets.

When you create a `StringBuilder` object, a dynamic string buffer is created to hold the target string. If you know the size of the result string (or even an approximation), it's usually prudent to use the `CAPACITY` method first, to establish a size at least as large as the final string. If it's not known, PowerBASIC will try to make appropriate decisions for you. Once the object is created, the `ADD` method is used to append string sections as many times as necessary. Finally, the `STRING` method is used to extract the combined items.

StringBuilder Methods/Properties

ADD (*PowerString*\$)

Method<1>

The *PowerString*\$ parameter is appended to the string held in the `StringBuilder` object. If the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an HRESULT of `E_OUTOFMEMORY` (&H8007000E) is returned, and an [Object Error](#) (99) is generated.

CAPACITY () AS Long

Get Property<2>

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

CAPACITY () = Long

Set Property<2>

The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed.

CHAR (*Index*&) AS Long

Get Property<3>

The numeric character code of the character at the position *Index*& is retrieved and returned to the caller. *Index*&=1 for the first character, 2 for the second, etc. If *Index*& is beyond the current length of the string, the value -1 is returned.

CHAR (*Index*&) = Long

Set Property<3>

The character at the position *Index*& is changed to that specified by the Long Integer character code. *Index*&=1 for the first character, 2 for the second, etc.

CLEAR

Method<4>

All data in the object is erased.

DELETE (*Index*&, *Count*&)

Method<5>

Count& characters are removed starting at the position given by *Index*&. *Index*&=1 for the first character, 2 for the second, etc.

INSERT (*PowerString*\$, *Index*&)

Method<6>

The *PowerString*\$ parameter is inserted in the string starting at the position given by *Index*&. *Index*&=1 for the first character, 2 for the second, etc. If *Index*& is beyond the current length of the string, no operation is performed.

LEN () AS Long

Method<7>

The number of characters currently stored in the object is returned as a long integer value.

STRING AS String

Method<8>

The string stored in the object is returned to the caller. This string will contain LEN characters.

See also [BUILDS](#), [CHR](#), [CSET](#), [CSETS](#), [JOIN](#), [LSET](#), [LSETS](#), [REPEATS](#), [RSET](#), [RSETS](#), [STRING\\$](#), [STRINSERT](#), [WRAPS](#)

IStringBuilderW.Char Property Get

Keyword Template

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Remarks

See also

Example

STRINGBUILDER Object New!

Purpose

The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the [BUILDS\(\)](#) function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the StringBuilder Class also offers a few additional string operations to assist in building the string.

Remarks

There are two forms of the StringBuilder object, one for [ANSI](#) strings, and one for [WIDE](#) (Unicode) strings. While they could have been combined into a single hybrid object, that would have added additional overhead not acceptable for PowerBASIC. To concatenate ANSI strings, use the StringBuilderA class and the IStringBuilderA interface. To concatenate WIDE (Unicode) strings, use the StringBuilderW class and the IStringBuilderW interface. The methods and mode of operation are identical for both forms.

If you choose the ANSI form, parameter strings must be ANSI, and result strings will be ANSI. With the WIDE (Unicode) form, parameter strings must be wide, and result strings will be wide. Keep those requirements in mind when reviewing the following method definitions. The Dispatch ID ([DispID](#)) for each member method is displayed within angle brackets.

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StringBuilder Methods/Properties

ADD (PowerString\$)

Method<1>

The *PowerString\$* parameter is appended to the string held in the StringBuilder object. If

the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an HRESULT of E_OUTOFMEMORY (&H8007000E) is returned, and an [Object Error](#) (99) is generated.

CAPACITY () AS Long **Get Property<2>**

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

CAPACITY () = Long **Set Property<2>**

The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed.

CHAR (Index&) AS Long **Get Property<3>**

The numeric character code of the character at the position *Index&* is retrieved and returned to the caller. *Index&*=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, the value -1 is returned.

CHAR (Index&) = Long **Set Property<3>**

The character at the position *Index&* is changed to that specified by the Long Integer character code. *Index&*=1 for the first character, 2 for the second, etc.

CLEAR **Method<4>**

All data in the object is erased.

DELETE (Index&, Count&) **Method<5>**

Count& characters are removed starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc.

INSERT (PowerString\$, Index&) **Method<6>**

The *PowerString\$* parameter is inserted in the string starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, no operation is performed.

LEN () AS Long **Method<7>**

The number of characters currently stored in the object is returned as a long integer value.

STRING AS String **Method<8>**

The string stored in the object is returned to the caller. This string will contain LEN characters.

See also [BUILD\\$](#), [CHR\\$](#), [CSET](#), [CSETS\\$](#), [JOIN\\$](#), [LSET](#), [LSETS\\$](#), [REPEAT\\$](#), [RSET](#), [RSETS\\$](#), [STRING\\$](#), [STRINSERT\\$](#), [WRAP\\$](#)

IStringBuilderW.Char Property Set

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STRINGBUILDER Object New!

Purpose The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a

period of time. If all of the string sections are known and available at once, the use of the [BUILD\\$\(\)](#) function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the `StringBuilder` Class also offers a few additional string operations to assist in building the string.

Remarks

There are two forms of the `StringBuilder` object, one for [ANSI](#) strings, and one for [WIDE](#) (Unicode) strings. While they could have been combined into a single hybrid object, that would have added additional overhead not acceptable for PowerBASIC. To concatenate ANSI strings, use the `StringBuilderA` class and the `IStringBuilderA` interface. To concatenate WIDE (Unicode) strings, use the `StringBuilderW` class and the `IStringBuilderW` interface. The methods and mode of operation are identical for both forms.

If you choose the ANSI form, parameter strings must be ANSI, and result strings will be ANSI. With the WIDE (Unicode) form, parameter strings must be wide, and result strings will be wide. Keep those requirements in mind when reviewing the following method definitions. The Dispatch ID ([DisplD](#)) for each member method is displayed within angle brackets.

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StringBuilder Methods/Properties

ADD (*PowerString\$*)

Method<1>

The *PowerString\$* parameter is appended to the string held in the `StringBuilder` object. If the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an `HResult` of `E_OUTOFMEMORY` (&H8007000E) is returned, and an [Object Error](#) (99) is generated.

CAPACITY () AS Long

Get Property<2>

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

CAPACITY () = Long

Set Property<2>

The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed.

CHAR (*Index&*) AS Long

Get Property<3>

The numeric character code of the character at the position *Index&* is retrieved and returned to the caller. *Index&*=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, the value -1 is returned.

CHAR (*Index&*) = Long

Set Property<3>

The character at the position *Index&* is changed to that specified by the Long Integer character code. *Index&*=1 for the first character, 2 for the second, etc.

CLEAR

Method<4>

All data in the object is erased.

DELETE (*Index&*, *Count&*)

Method<5>

Count& characters are removed starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc.

INSERT (*PowerString\$*, *Index&*)

Method<6>

The *PowerString\$* parameter is inserted in the string starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc. If *Index&* is beyond the

current length of the string, no operation is performed.

LEN () AS Long

Method<7>

The number of characters currently stored in the object is returned as a long integer value.

STRING AS String

Method<8>

The string stored in the object is returned to the caller. This string will contain LEN characters.

See also

[BUILD\\$, CHR\\$, CSET, CSETS\\$, JOIN\\$, LSET, LSETS\\$, REPEAT\\$, RSET, RSETS\\$, STRING\\$, STRINSERT\\$, WRAP\\$](#)

IStringBuilderW.Clear method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

STRINGBUILDER Object New!

Purpose

The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the [BUILD\\$\(\)](#) function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the StringBuilder Class also offers a few additional string operations to assist in building the string.

Remarks

There are two forms of the StringBuilder object, one for [ANSI](#) strings, and one for [WIDE](#) (Unicode) strings. While they could have been combined into a single hybrid object, that would have added additional overhead not acceptable for PowerBASIC. To concatenate ANSI strings, use the StringBuilderA class and the IStringBuilderA interface. To concatenate WIDE (Unicode) strings, use the StringBuilderW class and the IStringBuilderW interface. The methods and mode of operation are identical for both forms.

If you choose the ANSI form, parameter strings must be ANSI, and result strings will be ANSI. With the WIDE (Unicode) form, parameter strings must be wide, and result strings will be wide. Keep those requirements in mind when reviewing the following method definitions. The Dispatch ID ([DispID](#)) for each member method is displayed within angle brackets.

When you create a StringBuilder object, a dynamic string buffer is created to hold the target string. If you know the size of the result string (or even an approximation), it's usually prudent to use the CAPACITY method first, to establish a size at least as large as the final string. If it's not known, PowerBASIC will try to make appropriate decisions for you. Once the object is created, the ADD method is used to append string sections as many times as necessary. Finally, the STRING method is used to extract the combined items.

[StringBuilder Methods/Properties](#)

| | |
|---|------------------------------|
| ADD (<i>PowerString\$</i>) | Method<1> |
| The <i>PowerString\$</i> parameter is appended to the string held in the StringBuilder object. If the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an HRESULT of E_OUTOFMEMORY (&H8007000E) is returned, and an Object Error (99) is generated. | |
| CAPACITY () AS Long | Get Property<2> |
| The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion. | |
| CAPACITY () = Long | Set Property<2> |
| The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed. | |
| CHAR (<i>Index&</i>) AS Long | Get Property<3> |
| The numeric character code of the character at the position <i>Index&</i> is retrieved and returned to the caller. <i>Index&</i> =1 for the first character, 2 for the second, etc. If <i>Index&</i> is beyond the current length of the string, the value -1 is returned. | |
| CHAR (<i>Index&</i>) = Long | Set Property<3> |
| The character at the position <i>Index&</i> is changed to that specified by the Long Integer character code. <i>Index&</i> =1 for the first character, 2 for the second, etc. | |
| CLEAR | Method<4> |
| All data in the object is erased. | |
| DELETE (<i>Index&</i> , <i>Count&</i>) | Method<5> |
| <i>Count&</i> characters are removed starting at the position given by <i>Index&</i> . <i>Index&</i> =1 for the first character, 2 for the second, etc. | |
| INSERT (<i>PowerString\$</i> , <i>Index&</i>) | Method<6> |
| The <i>PowerString\$</i> parameter is inserted in the string starting at the position given by <i>Index&</i> . <i>Index&</i> =1 for the first character, 2 for the second, etc. If <i>Index&</i> is beyond the current length of the string, no operation is performed. | |
| LEN () AS Long | Method<7> |
| The number of characters currently stored in the object is returned as a long integer value. | |
| STRING AS String | Method<8> |
| The string stored in the object is returned to the caller. This string will contain LEN characters. | |

See also [BUILD\\$](#), [CHR\\$](#), [CSET](#), [CSET\\$](#), [JOIN\\$](#), [LSET](#), [LSET\\$](#), [REPEAT\\$](#), [RSET](#), [RSET\\$](#), [STRING\\$](#), [STRINSERT\\$](#), [WRAP\\$](#)

IStringBuilderW.Delete method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

STRINGBUILDER Object **New!**

Purpose The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly

noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the [BUILDS\(\)](#) function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the `StringBuilder` Class also offers a few additional string operations to assist in building the string.

Remarks

There are two forms of the `StringBuilder` object, one for [ANSI](#) strings, and one for [WIDE](#) (Unicode) strings. While they could have been combined into a single hybrid object, that would have added additional overhead not acceptable for PowerBASIC. To concatenate ANSI strings, use the `StringBuilderA` class and the `IStringBuilderA` interface. To concatenate WIDE (Unicode) strings, use the `StringBuilderW` class and the `IStringBuilderW` interface. The methods and mode of operation are identical for both forms.

If you choose the ANSI form, parameter strings must be ANSI, and result strings will be ANSI. With the WIDE (Unicode) form, parameter strings must be wide, and result strings will be wide. Keep those requirements in mind when reviewing the following method definitions. The Dispatch ID ([DispID](#)) for each member method is displayed within angle brackets.

When you create a `StringBuilder` object, a dynamic string buffer is created to hold the target string. If you know the size of the result string (or even an approximation), it's usually prudent to use the `CAPACITY` method first, to establish a size at least as large as the final string. If it's not known, PowerBASIC will try to make appropriate decisions for you. Once the object is created, the `ADD` method is used to append string sections as many times as necessary. Finally, the `STRING` method is used to extract the combined items.

StringBuilder Methods/Properties

ADD (*PowerString\$*)

Method<1>

The *PowerString\$* parameter is appended to the string held in the `StringBuilder` object. If the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an `HResult` of `E_OUTOFMEMORY` (&H8007000E) is returned, and an [Object Error](#) (99) is generated.

CAPACITY () AS Long

Get Property<2>

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

CAPACITY () = Long

Set Property<2>

The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed.

CHAR (*Index&*) AS Long

Get Property<3>

The numeric character code of the character at the position *Index&* is retrieved and returned to the caller. *Index&*=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, the value -1 is returned.

CHAR (*Index&*) = Long

Set Property<3>

The character at the position *Index&* is changed to that specified by the Long Integer character code. *Index&*=1 for the first character, 2 for the second, etc.

CLEAR

Method<4>

All data in the object is erased.

DELETE (*Index&*, *Count&*)

Method<5>

Count& characters are removed starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc.

INSERT (*PowerString\$*, *Index&*)

Method<6>

The *PowerString\$* parameter is inserted in the string starting at the position given by

Index&. *Index&*=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, no operation is performed.

LEN () AS Long **Method<7>**

The number of characters currently stored in the object is returned as a long integer value.

STRING AS String **Method<8>**

The string stored in the object is returned to the caller. This string will contain LEN characters.

See also [BUILDS\\$, CHR\\$, CSET, CSETS\\$, JOIN\\$, LSET, LSETS\\$, REPEAT\\$, RSET, RSETS\\$, STRING\\$, STRINSERT\\$, WRAPS\\$](#)

IStringBuilderW.Insert method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

STRINGBUILDER Object New!

Purpose The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the [BUILDS\(\)](#) function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the StringBuilder Class also offers a few additional string operations to assist in building the string.

Remarks There are two forms of the StringBuilder object, one for [ANSI](#) strings, and one for [WIDE](#) (Unicode) strings. While they could have been combined into a single hybrid object, that would have added additional overhead not acceptable for PowerBASIC. To concatenate ANSI strings, use the StringBuilderA class and the IStringBuilderA interface. To concatenate WIDE (Unicode) strings, use the StringBuilderW class and the IStringBuilderW interface. The methods and mode of operation are identical for both forms.

If you choose the ANSI form, parameter strings must be ANSI, and result strings will be ANSI. With the WIDE (Unicode) form, parameter strings must be wide, and result strings will be wide. Keep those requirements in mind when reviewing the following method definitions. The Dispatch ID ([DisplD](#)) for each member method is displayed within angle brackets.

When you create a StringBuilder object, a dynamic string buffer is created to hold the target string. If you know the size of the result string (or even an approximation), it's usually prudent to use the CAPACITY method first, to establish a size at least as large as the final string. If it's not known, PowerBASIC will try to make appropriate decisions for you. Once the object is created, the ADD method is used to append string sections as many times as necessary. Finally, the STRING method is used to extract the combined items.

StringBuilder Methods/Properties**ADD (PowerString\$)****Method<1>**

The *PowerString\$* parameter is appended to the string held in the StringBuilder object. If the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an HRESULT of E_OUTOFMEMORY (&H8007000E) is returned, and an [Object Error](#) (99) is generated.

CAPACITY () AS Long**Get Property<2>**

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

CAPACITY () = Long**Set Property<2>**

The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed.

CHAR (Index&) AS Long**Get Property<3>**

The numeric character code of the character at the position *Index&* is retrieved and returned to the caller. *Index&*=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, the value -1 is returned.

CHAR (Index&) = Long**Set Property<3>**

The character at the position *Index&* is changed to that specified by the Long Integer character code. *Index&*=1 for the first character, 2 for the second, etc.

CLEAR**Method<4>**

All data in the object is erased.

DELETE (Index&, Count&)**Method<5>**

Count& characters are removed starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc.

INSERT (PowerString\$, Index&)**Method<6>**

The *PowerString\$* parameter is inserted in the string starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, no operation is performed.

LEN () AS Long**Method<7>**

The number of characters currently stored in the object is returned as a long integer value.

STRING AS String**Method<8>**

The string stored in the object is returned to the caller. This string will contain LEN characters.

See also

[BUILD\\$](#), [CHR\\$](#), [CSET](#), [CSET\\$](#), [JOIN\\$](#), [LSET](#), [LSET\\$](#), [REPEAT\\$](#), [RSET](#), [RSET\\$](#), [STRING\\$](#), [STRINSERT\\$](#), [WRAP\\$](#)

IStringBuilderW.Len method**Keyword Template****Purpose****Syntax****Remarks****See also****Example****STRINGBUILDER Object New!**

Purpose The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the [BUILDS\(\)](#) function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the StringBuilder Class also offers a few additional string operations to assist in building the string.

Remarks There are two forms of the StringBuilder object, one for [ANSI](#) strings, and one for [WIDE](#) (Unicode) strings. While they could have been combined into a single hybrid object, that would have added additional overhead not acceptable for PowerBASIC. To concatenate ANSI strings, use the StringBuilderA class and the IStringBuilderA interface. To concatenate WIDE (Unicode) strings, use the StringBuilderW class and the IStringBuilderW interface. The methods and mode of operation are identical for both forms.

If you choose the ANSI form, parameter strings must be ANSI, and result strings will be ANSI. With the WIDE (Unicode) form, parameter strings must be wide, and result strings will be wide. Keep those requirements in mind when reviewing the following method definitions. The Dispatch ID ([DisplD](#)) for each member method is displayed within angle brackets.

When you create a StringBuilder object, a dynamic string buffer is created to hold the target string. If you know the size of the result string (or even an approximation), it's usually prudent to use the CAPACITY method first, to establish a size at least as large as the final string. If it's not known, PowerBASIC will try to make appropriate decisions for you. Once the object is created, the ADD method is used to append string sections as many times as necessary. Finally, the STRING method is used to extract the combined items.

StringBuilder Methods/Properties

ADD (*PowerString*\$)

Method<1>

The *PowerString*\$ parameter is appended to the string held in the StringBuilder object. If the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an HRESULT of E_OUTOFMEMORY (&H8007000E) is returned, and an [Object Error](#) (99) is generated.

CAPACITY () AS Long

Get Property<2>

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

CAPACITY () = Long

Set Property<2>

The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed.

CHAR (*Index*&) AS Long

Get Property<3>

The numeric character code of the character at the position *Index*& is retrieved and returned to the caller. *Index*&=1 for the first character, 2 for the second, etc. If *Index*& is beyond the current length of the string, the value -1 is returned.

CHAR (*Index*&) = Long

Set Property<3>

The character at the position *Index*& is changed to that specified by the Long Integer character code. *Index*&=1 for the first character, 2 for the second, etc.

CLEAR

Method<4>

All data in the object is erased.

DELETE (*Index*&, *Count*&)

Method<5>

Count& characters are removed starting at the position given by *Index*&. *Index*&=1 for the first character, 2 for the second, etc.

INSERT (*PowerString\$, Index&*) **Method<6>**

The *PowerString\$* parameter is inserted in the string starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, no operation is performed.

LEN () AS Long **Method<7>**

The number of characters currently stored in the object is returned as a long integer value.

STRING AS String **Method<8>**

The string stored in the object is returned to the caller. This string will contain LEN characters.

See also [BUILD\\$, CHR\\$, CSET, CSETS\\$, JOIN\\$, LSET, LSETS\\$, REPEAT\\$, RSET, RSETS\\$, STRING\\$, STRINSERT\\$, WRAP\\$](#)

IStringBuilderW.String method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

STRINGBUILDER Object New!

Purpose The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the [BUILD\\$\(\)](#) function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the StringBuilder Class also offers a few additional string operations to assist in building the string.

Remarks There are two forms of the StringBuilder object, one for [ANSI](#) strings, and one for [WIDE](#) (Unicode) strings. While they could have been combined into a single hybrid object, that would have added additional overhead not acceptable for PowerBASIC. To concatenate ANSI strings, use the StringBuilderA class and the IStringBuilderA interface. To concatenate WIDE (Unicode) strings, use the StringBuilderW class and the IStringBuilderW interface. The methods and mode of operation are identical for both forms.

If you choose the ANSI form, parameter strings must be ANSI, and result strings will be ANSI. With the WIDE (Unicode) form, parameter strings must be wide, and result strings will be wide. Keep those requirements in mind when reviewing the following method definitions. The Dispatch ID ([DispID](#)) for each member method is displayed within angle brackets.

When you create a StringBuilder object, a dynamic string buffer is created to hold the target string. If you know the size of the result string (or even an approximation), it's usually prudent to use the CAPACITY method first, to establish a size at least as large as the final string. If it's not known, PowerBASIC will try to make appropriate decisions for you. Once the object is created, the ADD method is used to append string sections as many times as necessary. Finally, the STRING method is used to extract the combined items.

StringBuilder Methods/Properties**ADD (PowerString\$)****Method<1>**

The *PowerString\$* parameter is appended to the string held in the StringBuilder object. If the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an HRESULT of E_OUTOFMEMORY (&H8007000E) is returned, and an [Object Error](#) (99) is generated.

CAPACITY () AS Long**Get Property<2>**

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

CAPACITY () = Long**Set Property<2>**

The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed.

CHAR (Index&) AS Long**Get Property<3>**

The numeric character code of the character at the position *Index&* is retrieved and returned to the caller. *Index&*=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, the value -1 is returned.

CHAR (Index&) = Long**Set Property<3>**

The character at the position *Index&* is changed to that specified by the Long Integer character code. *Index&*=1 for the first character, 2 for the second, etc.

CLEAR**Method<4>**

All data in the object is erased.

DELETE (Index&, Count&)**Method<5>**

Count& characters are removed starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc.

INSERT (PowerString\$, Index&)**Method<6>**

The *PowerString\$* parameter is inserted in the string starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, no operation is performed.

LEN () AS Long**Method<7>**

The number of characters currently stored in the object is returned as a long integer value.

STRING AS String**Method<8>**

The string stored in the object is returned to the caller. This string will contain LEN characters.

See also

[BUILD\\$](#), [CHR\\$](#), [CSET](#), [CSET\\$](#), [JOIN\\$](#), [LSET](#), [LSET\\$](#), [REPEAT\\$](#), [RSET](#), [RSET\\$](#), [STRING\\$](#), [STRINSERT\\$](#), [WRAP\\$](#)

ISFALSE operator**ISFALSE and ISTRUE operators**

Purpose Return the logical truth or falsity of a given expression.

Syntax **ISFALSE** *expr*
ISTRUE *expr*

Remarks ISTRUE returns -1 (TRUE) when *expr* evaluates as non-zero; otherwise, it returns zero (FALSE). ISFALSE returns -1 when *expr* evaluates as 0 (FALSE); otherwise, it returns zero.

Truth table

| operator | <i>expr</i> | Result |
|----------|-------------|--------|
| ISTRUE | = 0 | 0 |
| ISTRUE | <> 0 | -1 |

```
ISFALSE    = 0      -1
ISFALSE    <> 0     0
```

PowerBASIC's **NOT** operator serves a double duty: it returns the one's-complement of an expression and "reverses" the value of a TRUE/FALSE (Boolean) expression.

Usually, these two functions do not conflict, but since PowerBASIC accepts any non-zero value as TRUE, the following condition can arise:

```
test1 = 0          ' test1 is FALSE (zero)
IF NOT test1 THEN ' TRUE (-1 is non-zero)
[statements]

test2 = 1          ' test2 is TRUE (1 is non-zero)
IF NOT test2 THEN ' still TRUE (-2 is non-zero)
[statements]
```

In this case, NOT does not reverse the TRUE/FALSE value of test2. ISFALSE ensures that the test is performed exactly as you would expect:

```
test2 = 1          ' test2 is TRUE (non-zero)
IF ISFALSE test2 THEN ' ISFALSE detects test2 is
[statements]         ' TRUE so the IF test fails
```

This problem does not exist when you're testing for logical truth. PowerBASIC considers that an expression is TRUE in every case *except* when the expression is zero. However, ISTRUE converts all non-zero values to the "most true" value, -1, which provides the most consistent results with both boolean and arithmetic expressions.

Restrictions

ISTRUE and ISFALSE operators evaluate the "whole" expression following the keyword, subject to their Operator Precedence level. For example, parentheses contained within the expression are regarded as an integral part of the expression, and do not act as delimiters for the ISTRUE and ISFALSE operators.

With this in mind, combining a logical test result into a further expression means that the expressions must be separated to ensure the correct evaluation.

Consider the following statement:

```
IF ISTRUE (x&) + y& THEN
```

PowerBASIC evaluates the entire expression $(x\&) + y\&$ and then calculates the logical truth from the overall result of that expression. That is, the parentheses around the first part of the expression do not stop ISTRUE from evaluating the whole expression. To demonstrate this, the statement can be rewritten to concisely demonstrate the scope of the logical evaluation:

```
IF ISTRUE (x& + 2) THEN
```

or it could be simplified even further:

```
IF ISTRUE x& + 2 THEN
```

If you wish to utilize the numeric result of the logical test in a further expression, parentheses must be added to separate the expressions correctly:

```
IF (ISTRUE x&) + 2 THEN
```

See also

[Arithmetic Operators](#), [NOT](#), [Short-circuit evaluation](#)

ISFILE Function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

ISFILE Function

| | |
|-----------------|--|
| Purpose | Determine whether or not a file exists. |
| Syntax | <i>FileExists</i> & = ISFILE(<i>FileName</i>) |
| Remarks | The file subsystem is checked to determine whether the file specified by <i>FileName</i> currently exists. If it is found in any form (hidden, system, read-only, etc.), the value true (-1) is returned. Otherwise, the value false (0) is returned. <i>Filename</i> is an unambiguous file name, which may not contain an asterisk (*) or query (?). If it contains one or more of those characters, the function always returns false (0). |
| See also | DIR\$, DISPLAY BROWSE , DISPLAY OPENFILE , DISPLAY SAVEFILE , ISFOLDER , PATHSCAN\$ |

ISFOLDER function

ISFOLDER function

| | |
|-----------------|--|
| Purpose | Determine whether or not a folder exists. |
| Syntax | <i>FolderExists</i> & = ISFOLDER(<i>FolderName</i>) |
| Remarks | The file subsystem is checked to determine whether the folder specified by <i>FolderName</i> currently exists. If it is found in any form (hidden, system, read-only, etc.), the value true (-1) is returned. Otherwise, the value false (0) is returned. The root directory (for example, "C:\") is considered to be a folder, and returns the value true (-1). <i>FolderName</i> is an unambiguous file name, which may not contain an asterisk (*) or query (?). If it contains one or more of those characters, the function always returns false (0). |
| See also | DIR\$, DISPLAY BROWSE , DISPLAY OPENFILE , DISPLAY SAVEFILE , ISFILE , PATHSCAN\$ |

ISINTERFACE Function

Keyword Template

| |
|-----------------|
| Purpose |
| Syntax |
| Remarks |
| See also |
| Example |

ISINTERFACE Function

| | |
|----------------|--|
| Purpose | Determine whether an object supports a particular interface . |
| Syntax | <i>IfaceValid</i> = ISINTERFACE(<i>ObjectVar</i> , <i>InterfaceName</i>) |
| Remarks | The object referenced by the parameter <i>ObjectVar</i> is tested to determine if the specified <i>InterfaceName</i> is supported. If so, the value true (-1) is returned. Otherwise, the value false (0) is returned. |

See also [CLASS](#), [INTERFACE \(Direct\)](#), [INTERFACE \(IDBind\)](#), [What is an object, anyway?](#)

ISMISSING function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

ISMISSING function

| | |
|---------------------|---|
| Purpose | Determine whether an was passed by the calling code. |
| Syntax | <i>ParamStatus</i> = ISMISSING(<i>ParamVar</i>) |
| Remarks | The ISMISSING function may be used to test certain optional parameters to determine whether or not the parameter was actually passed by the calling code. It may be used to test VARIANT parameters, or other variable types passed ByRef. An attempt to test a ByVAL parameter other than VARIANT will generate an error 579 (BYREF variable or BYVAL/BYREF variant expected) to be generated during compilation. A ByRef parameter is considered to be missing when the pointer has the value zero. A variant parameter is considered to be missing when it has a type of %VT_ERROR and an error value of %DISP_E_PARAMNOTFOUND. If the specified optional parameter is missing, the value true (-1) is returned. Otherwise, the value false (0) is returned. |
| Restrictions | The ISMISSING function may only be used within the procedure which uses the specified optional parameter. |
| See also | DECLARE , FUNCTION , METHOD , PROPERTY , SUB |

ISNOTHING function

ISNOTHING function

| | |
|---------------------|---|
| Purpose | Determine the current status of a given object variable. |
| Syntax | <i>oStatus</i> = ISNOTHING(<i>objectvar</i>) |
| Remarks | ISNOTHING is particularly useful in determining the success or failure of a LET statement. It returns TRUE (-1) if the object variable contains nothing, or FALSE (0) if it contains a valid current reference to an object interface. ISNOTHING is the complement to the ISOBJECT function. |
| Restrictions | <i>objectvar</i> must be an or IDispatch object variable. |
| See also | DIM , INTERFACE (Direct) , INTERFACE (IDBind) , ISOBJECT , LET (with Objects) , OBJECT , What is an object, anyway? |
| Example | <code>DIM oApp AS IAPPDatabase</code> |

```
LET oApp = NEW IAPPDatabase IN "DBApp.0"
IF ISNOTHING(oApp) OR ERR THEN ' Handle error
```

ISNOTNULL function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

ISNOTNULL function **New!**

Purpose Determine if a
is not null (contains 1 or more characters).

Syntax *ResultVar&* = ISNOTNULL(*StrgExpr*)

Remarks The *StrgExpr* is examined to determine if it is null, or if it contains one or more characters. The value [true](#) (-1) is returned if the *StrgExpr* contains characters, or [false](#) (0) if it is null (zero-length).

The complementary function is [ISNULL](#).

See also [ISNULL](#)

ISNULL function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

ISNULL function **New!**

Purpose Determine if a
is null (zero-length).

Syntax *ResultVar&* = ISNULL(*StrgExpr*)

Remarks The *StrgExpr* is examined to determine whether it is null (has zero characters). The value [true](#) (-1) is returned if the *StrgExpr* is null, or [false](#) (0) if it contains characters.

The complementary function is [ISNOTNULL](#).

See also [ISNOTNULL](#)

ISOBJECT function

ISOBJECT function

| | |
|---------------------|---|
| Purpose | Determine the current status of a given object variable. |
| Syntax | <code>oStatus = ISOBJECT(objectvar)</code> |
| Remarks | ISOBJECT is particularly useful in determining the success or failure of a LET (with Objects) statement. It returns TRUE (-1) if the object variable contains a valid current reference to an object interface, or FALSE (0) if it contains nothing. ISOBJECT is the complement to the ISNOTHING function. |
| Restrictions | <code>objectvar</code> must be an or IDispatch object variable. |
| See also | DIM , INTERFACE (Direct) , INTERFACE (IDBind) , ISNOTHING , LET (with Objects) , OBJECT , What is an object, anyway? |
| Example | <pre>DIM oApp AS IAPPDatabase LET oApp = NEWCOM "DBApp.0" IF ISOBJECT(oApp) AND ISFALSE ERR THEN 'Handle error</pre> |

IStackCollection

Keyword Template

| |
|-----------------|
| Purpose |
| Syntax |
| Remarks |
| See also |
| Example |

COLLECTION Object Group New!

| | |
|----------------|--|
| Purpose | <p>A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.</p> <p>You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.</p> <pre>LOCAL Collect AS IPowerCollection LET Collect = CLASS "PowerCollection"</pre> <p>Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may be referenced using either Direct or Dispatch form.</p> <p>While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.</p> <p>Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:</p> <pre>[LET] VvntVar = TypeVar AS STRING</pre> |
|----------------|--|

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
Col1Obj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of [bytes](#) (v_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a [variant](#), while the key is passed and stored as a [wide](#) (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
```

```
RetVal = <ObjectVar>.membername(params)
```

```
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (PowerKey AS WString, PowerItem AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HRESULT of S_OK (0) is returned. If it fails because of a duplicate key, an HRESULT of E_DUPLICATEKEY (&H800A01C9) is returned, and an [Object Error](#) (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (PowerKey AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as [true](#). If not found, the value [false](#) (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (Index AS Long, OUT PowerKey as WString, OUT PowerItem as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified [OUT](#) parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the [OBJRESULT](#) will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The

previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar*& = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar*&.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially.

Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter *Flags* is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

<ObjectVar>.membername(params)

RetVal = <ObjectVar>.membername(params)

<ObjectVar>.membername(params) TO ReturnVariable

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar*& = ObjectVar.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar*&.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection.

The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine [stack](#) on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax *The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also [FOR EACH/NEXT](#)

ISTRUE operator

ISFALSE and ISTRUE operators

| | |
|----------------|--|
| Purpose | Return the logical truth or falsity of a given expression. |
| Syntax | <code>ISFALSE expr</code> <code>ISTRUE expr</code> |
| Remarks | ISTRUE returns -1 (TRUE) when expr evaluates as non-zero; otherwise, it returns zero (FALSE). ISFALSE returns -1 when expr evaluates as 0 (FALSE); otherwise, it returns zero. |

Truth table

| operator | expr | Result |
|----------|------|--------|
| ISTRUE | = 0 | 0 |
| ISTRUE | <> 0 | -1 |
| ISFALSE | = 0 | -1 |
| ISFALSE | <> 0 | 0 |

PowerBASIC's **NOT** operator serves a double duty: it returns the one's-complement of an expression and "reverses" the value of a TRUE/FALSE (Boolean) expression.

Usually, these two functions do not conflict, but since PowerBASIC accepts any non-zero value as TRUE, the following condition can arise:

```
test1 = 0          ' test1 is FALSE (zero)
IF NOT test1 THEN ' TRUE (-1 is non-zero)
[statements]

test2 = 1          ' test2 is TRUE (1 is non-zero)
IF NOT test2 THEN ' still TRUE (-2 is non-zero)
[statements]
```

In this case, NOT does not reverse the TRUE/FALSE value of test2. ISFALSE ensures that the test is performed exactly as you would expect:

```
test2 = 1          ' test2 is TRUE (non-zero)
IF ISFALSE test2 THEN ' ISFALSE detects test2 is
[statements]         ' TRUE so the IF test fails
```

This problem does not exist when you're testing for logical truth. PowerBASIC considers that an expression is TRUE in every case *except* when the expression is zero. However, ISTRUE converts all non-zero values to the "most true" value, -1, which provides the most consistent results with both boolean and arithmetic expressions.

Restrictions ISTRUE and ISFALSE operators evaluate the "whole" expression following the keyword, subject to their Operator Precedence level. For example, parentheses contained within the expression are regarded as an integral part of the expression, and do not act as delimiters for the ISTRUE and ISFALSE operators.

With this in mind, combining a logical test result into a further expression means that the expressions must be separated to ensure the correct evaluation.

Consider the following statement:

```
IF ISTRUE (x&) + y& THEN
```

PowerBASIC evaluates the entire expression `(x&) + y&` and then calculates the logical truth from the overall result of that expression. That is, the parentheses around the first part of the expression do not stop ISTRUE from evaluating the whole expression. To demonstrate this, the statement can be rewritten to concisely demonstrate the scope of the logical evaluation:

```
IF ISTRUE (x& + 2) THEN
```

or it could be simplified even further:

```
IF ISTRUE x& + 2 THEN
```

If you wish to utilize the numeric result of the logical test in a further expression,

parentheses must be added to separate the expressions correctly:

```
IF (ISTRUE x&) + 2 THEN
```

See also [Arithmetic Operators](#), [NOT](#), [Short-circuit evaluation](#)

ISWIN function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

ISWIN function

Purpose Determine whether a

[/Dialog](#)/Window currently exists

Syntax

```
DialogExists& = ISWIN(hDlg&)
```

```
ControlExists& = ISWIN(hParentDlg&, Ident&)
```

Remarks

The Window subsystem is checked to determine whether the specified Dialog or Control currently exists. This function may be used for a wide range of purposes, but it's particularly valuable when you want to be sure that a CONTROL was created successfully with the

statement.

If you use a single parameter, it must specify the [handle](#) of a Window, Dialog, or Control you are checking. If you use two parameters, you would specify the handle of the [parent](#) and the identifier of the Control you are checking.

If the target of the function currently exists, [TRUE](#) (-1) is returned. If it does not exist, the return value is [FALSE](#) (0).

See also , [CONTROL HANDLE](#), [DIALOG NEW](#)

ITERATE statement

ITERATE statement

Purpose Start an immediate iteration of a

structure.

Syntax

```
ITERATE [DO | LOOP | FOR]
```

Remarks

ITERATE is just like using a [GOTO](#) to the line immediately before the NEXT statement (of a [FOR...NEXT](#) loop), the LOOP statement (of a [DO...LOOP](#) loop), or the WEND statement (of a [WHILE..WEND](#) loop). For example, the following code fragments are equivalent:

```
FOR ix = 1 TO 100
  [statements]
ITERATE FOR
  [statements]
NEXT
```

```

FOR ix = 1 TO 100
  [statements]
  GOTO iterateForLoop
  [statements]
iterateForLoop:
NEXT

```

If you do not specify DO, LOOP, or FOR, ITERATE will iterate the most recently executed structure. For example:

```

FOR ix = 1 TO 10
  DO UNTIL x > 10
    [statements]
    ITERATE ' will iterate the DO LOOP
    [statements]
  LOOP
NEXT
ITERATE DO and ITERATE LOOP are interchangeable.

```

| Use this statement... | To iterate this kind of loop |
|--------------------------|------------------------------|
| ITERATE FOR | FOR/NEXT |
| ITERATE DO, ITERATE LOOP | DO/LOOP, WHILE/WEND |

See also [DO/LOOP](#), [EXIT](#), [FOR EACH/NEXT](#), [FOR/NEXT](#), [WHILE/WEND](#)

JOIN\$ function

JOIN\$ function

| | |
|-----------------|---|
| Purpose | Return a consisting of all of the strings in an array , each separated by a delimiter. |
| Syntax | <code>A\$ = JOIN\$(array(), {delim\$ BINARY})</code> |
| Remarks | <p>JOIN\$ requires a delimiter string <i>delim\$</i> which may be any length.</p> <p>If the delimiter expression is a null (zero-length) string, no separators are inserted between the string sections. If the delimiter expression is the 3-byte value of "," (which may be expressed in your source code as the string literal """, """), a leading and trailing double-quote is added to each string section. This ensures that the returned string contains standard, comma-delimited quoted fields that can be easily parsed.</p> <p>The array specified by <i>array()</i> may be any data type.</p> |
| BINARY | <p>If the array consists of fixed size elements (Nul-Terminated Strings, etc.), the returned string consists of an exact memory image of the array data in internal format. If the array contains variable length data (Dynamic string, Field string), it is stored in PowerBASIC and/or Visual Basic packed string format: If a string is shorter than 65535 bytes, it starts with a 2-byte length WORD followed by the string data. Otherwise, it will start with a 2-byte value of 65535, followed by a DWORD indicating the string length, then finally the string data itself.</p> <p>The JOIN\$ function is the natural complement to the PARSE statement.</p> |
| See also | BUILDS , PARSE , PARSES , PARSECOUNT |
| Example | <pre> FUNCTION PBMAIN DIM a\$(2), s1\$, s2\$ a\$(0) = "Hello" a\$(1) = "Power" a\$(2) = "BASIC" s1\$ = JOIN\$(a\$(), """, """) s2\$ = JOIN\$(a\$(), \$SPC) </pre> |

```

END FUNCTION
Result    s1$ contains:  "Hello","Power","BASIC"
          s2$ contains:  Hello Power BASIC

```

KILL statement

KILL statement

Purpose Delete a disk file.

Syntax `KILL filespec`

Remarks *filespec* is a [string expression](#) specifying the file or files to be deleted, and can include a path name and/or "wildcard" characters. *filespec* may be either a Short File Name (SFN) or a Long File Name (LFN). For example:

```

KILL "TEST.DOC"
KILL "C:\MY APPLICATION DATA\INCOME.?87"
MyFile$ = "*.BAS"
KILL MyFile$      ' Potentially dangerous!

```

If *filespec* does not exist, [Error 53](#) ("File not found") is generated. If *filespec* is read only, [Error 70](#) ("Permission denied") occurs. You should not attempt to KILL an open file.

Files with the HIDDEN or SYSTEM attribute can not be deleted with KILL. An attempt to do so is ignored, with no error generated.

KILL is analogous to the DOS "DEL" and "ERASE" commands. KILL cannot delete a directory - use [RMDIR](#) instead, after first deleting all the files in the directory.

See also [FILEATTR](#), [FILECOPY](#), [FILENAMES](#), [GETATTR](#), [NAME](#), [RMDIR](#), [SETATTR](#), [SETEOF](#)

LBOUND function

LBOUND function

Purpose Return the smallest possible [subscript](#) (boundary) for an [array's](#) specified dimension.

Syntax `y& = LBOUND(array [(dimension)])`
`y& = LBOUND(array, dimension)`

Remarks LBOUND can be used in combination with [UBOUND](#) to determine the size of an array. LBOUND of an undimensioned array returns zero. The LBOUND function has the following parts:

array Name of the array of interest.

dimension An
 indicating which dimension's lower bound is returned. If not specified, the first dimension is assumed.

Restrictions LBOUND cannot be used on arrays within [User-Defined Types](#).

See also [ARRAYATTR](#), [DIM](#), [REDIM](#), [UBOUND](#)

Example

```

' Dimension an array with lower and upper bounds
DIM MyArray%(1900 TO 2000,5 TO 10)
' get the values of the array
l1 = LBOUND(MyArray%)
u2 = UBOUND(MyArray%)
l2 = LBOUND(MyArray%(2))
u2 = UBOUND(MyArray%, 2)

```

LCASE\$ function

LCASE\$ function

| | |
|-----------------|---|
| Purpose | Return a lowercase version of a argument. |
| Syntax | <code>s\$ = LCASE\$(string_expression [,ANSI OEM])</code> |
| Remarks | <p>LCASE\$ returns a string equivalent to <i>string_expression</i>, except that uppercase letters in <i>string_expression</i> are converted to lowercase. The optional ANSI or OEM parameter specifies whether the conversion is made using the ANSI charset for the system, or the original IBM OEM charset. If no charset is specified, PowerBASIC for Windows uses the system ANSI charset, while PB/CC uses the IBM OEM charset. Only "International" characters in the range of CHR\$(128) to CHR\$(255) are affected by this parameter.</p> <p>The OEM charset is based upon the original IBM OEM charset to ensure compatibility with programs written for all previous versions of the PowerBASIC compiler.</p> |
| See also | MCASE\$, UCASE\$ |
| Example | <code>x\$ = LCASE\$("Cats aren't ALWAYS good.")</code> |
| Result | <code>cats aren't always good.</code> |

LEFT\$ function

LEFT\$ function

| | |
|-----------------|--|
| Purpose | Return the left-most <i>n</i> characters of a |
| Syntax | <code>s\$ = LEFT\$(string_expression, n&)</code> |
| Remarks | <p><i>n&</i> is a Long-integer expression and specifies the number of characters in <i>string_expression</i> to be returned.</p> <p>LEFT\$ returns a string consisting of the left most <i>n&</i> characters of its string argument. If <i>n&</i> is greater than or equal to the length of <i>string_expression</i>, all of <i>string_expression</i> is returned. If <i>n&</i> is zero, LEFT\$ returns an empty string. If the length value parameter is negative, it is interpreted as LEN(string_expression)-ABS(n&). For example, <code>LEFT\$("1234567890",-2)</code> returns "12345678".</p> |
| See also | EXTRACT\$, INSTR , LTRIM\$, MID\$, RIGHT\$, RTRIM\$, SPLIT , TALLY , TRIM\$, VERIFY |
| Example | <pre>' Demonstrate LEFT\$ and RIGHT\$ functions DIM TestString\$, x\$, y\$, n AS LONG TestString\$ = "ABCDEFGHJKLMNOP" FOR n = 1 TO 14 STEP 2 x\$ = LEFT\$(TestString\$,n) y\$ = RIGHT\$(TestString\$,n) NEXT n</pre> |

LEN function

LEN function

| | |
|----------------|--|
| Purpose | Return the logical length of a variable , User-Defined Type , or Union . |
| Syntax | <code>y& = LEN(target)</code> |
| Remarks | If <i>target</i> is a |

variable or a [string expression](#), LEN returns a value from 0 to the current string length, representing the number of characters in *target*. If *target* is a [fixed-length string](#), the length of the fixed buffer is returned. If *target* is an [nul-terminated](#) string, the length of the data stored in the nul-terminated string is returned, not the maximum size of the nul-terminated string. Use [SIZEOF](#) to determine the maximum size of an nul-terminated string.

When used with [pointers](#), LEN returns a value of 4, since a pointer is always stored as a [DWORD](#). You can use LEN with the target of a pointer to return the size of target. If the target is a [dynamic string](#), you will receive the length of the string, not the length of the handle.

target can also be any other variable type, including

and User-Defined Types (defined with [TYPE/END TYPE](#)). In that case, PowerBASIC will return the number of bytes needed to store a variable of that type.

When measuring the size of a padded (aligned) [UDT](#) structure with the LEN (or SIZEOF) statement, the measured length includes any padding that was added to the structure. For example, the following UDT structure:

```
TYPE LengthTestType DWORD
  a AS INTEGER
END TYPE
' code here
DIM abc AS LengthTestType
x& = LEN(abc)
```

Returns a length of 4 bytes in x&, since the UDT was padded with 2 additional bytes to enforce DWORD alignment. Note that the LEN of individual UDT members returns the true size of the member without regard to padding or alignment. In the previous example, LEN(abc.a) returns 2.

See also [CHRBYTES](#), [SIZEOF](#)

Example

```
DIM p AS BYTE POINTER
ByteLen = LEN(p) ' size of a pointer = 4 bytes
ByteLen = LEN(@p) ' size of byte (target) = 1 byte
```

LET statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LET statement

Purpose Assign a value to a [variable](#).

Syntax

```
[LET] variable = expression
[LET] variable += expression
[LET] variable -= expression
[LET] variable *= expression
[LET] variable /= expression
[LET] variable \= expression
[LET] variable &= expression
```

```
[LET] variable AND= expression
[LET] variable OR= expression
[LET] variable EQV= expression
[LET] variable IMP= expression
[LET] variable MOD= expression
[LET] variable XOR= expression
```

Remarks**Simple assignment**

variable is a

or *variable*, and *expression* is of a suitable type (that is, a string expression for string variables and numeric expression for numeric variables).

The word LET is optional in assignment statements. It is allowed to provide compatibility BASIC source files written for early versions of BASIC. In practice, the word LET is very rarely used.

To allow easy conversion, PowerBASIC allows a [User-Defined Type](#) in a [string expression](#).

The User-Defined Type is simply copied, byte for byte, into the expression. However, to assign a string back to a User-Defined Type, you should use the [TYPE SET](#) statement.

```
DIM abc as MyType
MyString$ = abc
```

Please refer to the following sections of the LET statement for special information regarding assignment using Object variables, Variant variables, and User-Defined Type variables.

Compound assignment

A compound assignment statement combines a binary [arithmetic operator](#), a binary [string operator](#), or a binary string operator (concatenation) as an integral part of the assignment. This offers the programmer a "shortcut" in your source code, and can even result in more efficient code generation. That's because the target variable is evaluated only once, even if an array or pointer calculation could have a side effect which changes it.

Compound assignments are available for the standard arithmetic operations of add, subtract, multiply, divide, int-divide, and modulo (+ - * / \ MOD), the bitwise operations ([AND](#), [OR](#), [XOR](#), [EQV](#), [IMP](#)), and the concatenation operators (+ &). Each are represented by one of the following tokens:

```
+=      AND=
-=      OR=
/=      EQV=
\  
=      IMP=
&=      MOD=
*=      XOR=
```

Each of the following pairs of code are functionally identical:

```
x = x + 1           x += 1
x = x / y           x /= y
x = x XOR 3         x XOR= 3
x(7) = x(7) AND    x(7) AND= 5
5
x$ = x$ + y$       x$ += y$
```

See also

[BUILDS](#), [JOINS](#), [LET \(with Objects\)](#), [LET \(with Variants\)](#), [LET \(with Types\)](#), [TYPE SET](#)

Example

```
MyString$ = "This is a test."
LET TempStr$ = MyString$
LET MyVarr -= YourVar
```

LET statement (with Objects)

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LET statement (with Objects)

Purpose Assign an [object](#) reference to an object variable.

Syntax `[LET] objvar = object expression`

Remarks The LET Statement, and its implied form (without using the word LET), may be used to assign an object reference to an object variable. After you declare an object variable as a particular [interface](#), you must create an object and or assign an object reference to it before you can use the objects members ([methods](#), [properties](#), etc.).

If an object creation or assignment fails for any reason, the *objvar* is set to [NOTHING](#). If this statement fails, no errors are generated, nor is an [OBJRESULT](#) set. You should test for success of the operation with [ISOBJECT\(objvar\)](#) before trying to use the object or execute its methods.

LET objvar = CLASS ClassName\$

The term *ClassName* must be specified as a quoted [string literal](#), which is the name of a class implemented within the program. Since the class is internal (the name is known at compile-time), you may not use a

variable or [expression](#). Upon execution, a new object is created, and a reference to that object is assigned to the object variable *objvar*. The interface requested is determined by the original declaration of *objvar*. If InterfaceName is DISPATCH, you can reference it with the [OBJECT](#) statement -- otherwise, regular Method and Property references are used.

LET objvar = NEWCOM ProgID\$

LET objvar = GETCOM ProgID\$

LET objvar = ANYCOM ProgID\$

This form of the LET statement is used to obtain an object reference external to the program using the [COM](#) facilities of Windows. If the requested object is in a [DLL](#) (in-process server), you will always use the NEWCOM option, as you're asking for a new object. If the request is successful, the object reference is assigned to the *objvar*.

If the requested object is in an EXE (out-of-process server), you may use any of the three options. If the director word NEWCOM is specified, a new instance of a COM application is created. With GETCOM, an interface will be opened on an existing, running application, which has been registered as the active [automation](#) object for its class. With ANYCOM, the compiler will first try to use an existing, running application if available, or a new instance if not.

The string expression *ProgID\$* evaluates to a [ProgID](#) name on an external COM server. If the InterfaceName is DISPATCH, you can reference it with the OBJECT statement -- otherwise, regular Method and Property references are used instead.

LET objvar = NEWCOM CLSID ClassID\$

LET *objvar* = GETCOM CLSID *ClassID*\$
LET *objvar* = ANYCOM CLSID *ClassID*\$

This form also obtains a [COM object](#), just as the examples in the above section. There is always a one-to-one relationship between a ProgID and a [CLSID](#) (Class ID). An object can be identified by either of these tokens, as long as they are both available. In some instances, you may encounter an object which has no ProgID published. You can substitute the clause "CLSID *ClassID*\$" for the *ProgID*\$. It works exactly as the usual form above, except that it describes the requested object by its 16-byte GUID which is the CLSID (Class ID) of the object.

LET *objvar* = NEWCOM CLSID *ClassID*\$ LIB *DllPath*\$

PowerBASIC offers the unique ability to create and reference COM objects without any reference to the registry at all. As long as you know the CLSID (Class ID) and the file path/name of the DLL to be accessed, you can do so with no registry access at all. You don't need a special type of COM server. This technique can be used with any server, whether created by PowerBASIC or another compiler. By using this method of object creation, there is simply no need for the server to be registered at all. That allows you to keep local copies of the COM servers you use, with no chance they will be altered or replaced by another application. You use the above form, where the clause "CLSID *ClassID*\$" identifies the 16-byte Class ID, and the clause "LIB *DllPath*\$" identifies the file path and file name of the COM Server. Once you've obtained the COM object reference in *objvar*, it is used exactly as you would with a traditional object.

LET *objvar1* = *objvar2*

If both object variables have been declared as the same object type (the same interface name), the source variable (*objvar2*) is copied to the destination variable (*objvar1*), and the reference count of the object is incremented. If the object variables are of different object types, a new interface (of the type implied by *objvar1*) is opened on *objvar2*, and a reference to it is assigned to *objvar1*.

LET *objvar* = *objmethod*(*params*)

It is assumed that the METHOD or GET PROPERTY specified by *objmethod* returns an object of the type of *objvar*. The *objmethod* is evaluated, and the object reference which it returns is assigned to *objvar*.

LET *objvar* = ME

This form may only be used within a METHOD or PROPERTY. A new interface (of the type implied by *objvar*) is opened on the current object, and a reference to it is assigned to *objvar*.

LET *objvar* = NOTHING

This destroys an object variable, discontinuing its association with a specific object. This in turn releases all system and memory resources associated with the object when no more object variables refer to it.

LET *objvar* = *vrnt*

Attempts to open an interface of the specified class for *objvar* on the object of *vrnt*, and assigns a reference to *objvar*. It assumes that *vrnt* contains a reference to an object of type %VT_UNKNOWN or %VT_DISPATCH. If the desired interface can not be opened, the object variable *objvar* is set to NOTHING.

LET *vrnt* = *objvar*

This may be used to assign an object reference from an object variable to a [variant](#)

variable. It attempts to open an IDispatch interface, else an IUnknown interface on the object of *objvar*, and assigns that reference to *vmt*. Variant variables can not contain references to custom interfaces, only IDispatch or IUnknown. If the assignment is successful, [VARIANTVT\(vmt\)](#) will return either %VT_UNKNOWN or %VT_DISPATCH. If it is unsuccessful, *vmt* is set to %VT_EMPTY.

Previous versions of PowerBASIC Compilers used the SET statement for creation of objects. LET now includes all the functionality of the old SET statement, so you should plan to remove all SET statements as soon as possible. This involves nothing more than changing every SET to LET, or simply deleting every SET.

See also [LET](#), [LET \(with Variants\)](#), [LET \(with Types\)](#), [INTERFACE \(Direct\)](#), [INTERFACE \(IDBind\)](#), [ISINTERFACE](#), [ISNOTHING](#), [ISOBJECT](#), [Just what is COM?](#), [ME](#), [OBJECT](#), [What is an object, anyway?](#)

LET statement (with Types)

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LET statement (with Types) IMPROVED

Purpose Assign data to a [user-defined type](#) variable.

Syntax
 [LET] *TypeVar* = *TypeVar*
 [LET] *TypeVar* = VARIANT\$(*VrntVar*)

Remarks *Typevar* is a user-defined type variable. In order to perform direct assignment of data from one user-defined type variable to another, they must be dimensioned to the same type. To assign data between two different types, you should use the [TYPE SET](#) statement instead.

The word LET is optional in assignment statements. It is allowed to provide compatibility BASIC source files written for early versions of BASIC. In practice, the word LET is very rarely used.

When [User-Defined Type](#) data is stored in a [variant](#) variable, it may be extracted as in the second syntax example. The [Variant\\$\(\)](#) function understands that UDT data is stored as a byte string.

To allow easy conversion, PowerBASIC allows a User-Defined Type in a [string expression](#).

The User-Defined Type is simply copied, [byte](#) for byte, into the expression. To assign a string back to a User-Defined Type, you may also use the TYPE SET statement.

Generally speaking, if a UDT is used in a [WIDE](#) string expression (Unicode), it will give unpredictable results from the character conversions.

```
DIM abc as MyType
MyString$ = abc
```

See also [LET](#), [LET \(with Objects\)](#), [LET \(with Variants\)](#), [TYPE SET](#), [VARIANT\\$](#)

Example
 MyString\$ = "This is a test."
 LET TempStr\$ = MyString\$

LET statement (with Variants)

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LET statement (with Variants) IMPROVED

Purpose Assign a value or an [object](#) reference to a [variant](#) variable.

Syntax `[LET] VariantVar = variant expression`
`[LET] VariantVar = TypeVar AS STRING`

Remarks Although notoriously lacking in efficiency, [Variant](#) variables are commonly used as [COM](#) Object parameters due to their flexibility. They also prove valuable in a situation where a procedure must run properly with parameters of multiple data types (a Collection would be a good example). You can think of a Variant as a kind of container, which can hold a variable of most any data type,

, , object, or even a [UDT](#) or an entire [array](#). This simplifies the process of calling procedures in a [COM Object](#) Server, as there is little need to worry about the myriad of possible data types for each parameter.

This flexibility comes at a great price in performance, so PowerBASIC limits their use to data storage and parameters only. You may assign a numeric value, a string value, a UDT, an object, or even an entire array to a Variant with the LET statement, or its implied equivalent. In the same way, you may assign one Variant value to another Variant variable, or even assign an array contained in a Variant to a compatible PowerBASIC array, or the reverse.

You may extract a scalar value from a Variant with [VARIANT#](#) (for numeric values), [VARIANT\\$](#) (for [ANSI](#) byte strings or user-defined types), or [VARIANT\\$\\$](#) (for wide [Unicode](#) strings). When you assign string data to a variant variable, ANSI strings are automatically converted to wide Unicode characters, as this is the accepted standard for variants. However, when you assign UDT data to a variant variable, it is stored as a dynamic string of bytes. When you retrieve that UDT data (with [Variant\\$](#)), PowerBASIC understands the content and handles it accurately. However, other programming languages may not, so the use of this technique should be limited to PowerBASIC applications.

LET VrrntVar= vrrntvar

This form duplicates the contents of one variant variable, assigning it to a second variant variable.

LET VrrntVar= expression [AS vartype]

The numeric or string expression is evaluated, and the result is stored in the variant variable. PowerBASIC will choose an appropriate numeric or string data type to use.

However, you can specify a preferred format by adding an optional AS vartype clause. This can be [BYTE](#), [WORD](#), [DWORD](#), [INTEGER](#), [LONG](#), [QUAD](#), [SINGLE](#), [DOUBLE](#), [CURRENCY](#), or [WSTRING](#). Strings in a variant are always stored in wide [Unicode](#), regardless of whether you add AS WSTRING or not. PowerBASIC handles the conversion automatically, if it is needed.

In prior versions of PowerBASIC, the term AS STRING was interpreted to mean AS WSTRING for wide Unicode. However, with the new support for Unicode data types, this can no longer be allowed. All references to AS STRING with variants must be changed to AS WSTRING.

LET VmntVar = TypeVar AS STRING

The data contained in the User-Defined Type variable (UDT) is stored in the variant variable. It is stored internally as a dynamic string of bytes (*v_bstr*). When you retrieve that UDT data (with *Variant\$*), PowerBASIC understands the content and handles it accurately. However, other programming languages may not understand this technique, so it should generally be limited to PowerBASIC applications.

In prior versions of PowerBASIC, the AS STRING clause was not a requirement, as it is currently. Although it represents a change, it was a necessary restriction to confirm that the conversion to string is your intention.

LET VmntVar = EMPTY

The variant variable is set to *%VT_EMPTY*, which means it contains no value of any kind.

LET VmntVar = ERROR numr

This form assigns a specific COM error number, which is usually a COM specific error, such as *%E_NOINTERFACE*, etc.

LET VmntVar = array()

An entire PowerBASIC array is assigned to a variant variable. In the case of a [string array](#), PowerBASIC automatically handles [Unicode](#) conversions needed for the COM specification. Array assignment is limited to the following data types: BYTE, WORD, DWORD, INTEGER, LONG, QUAD, SINGLE, DOUBLE, CURRENCY, or STRING, as Windows does not support all PowerBASIC data forms.

LET array() = vmntvar

An entire array is assigned from a variant variable to a PowerBASIC array. In the case of a [string array](#), PowerBASIC automatically handles Unicode conversions. You can not assign an array with more than eight [dimensions](#) to a PowerBASIC array.

LET VmntVar = BYREF variable

This form is used to allow a variant to contain a typed [pointer](#) to a specific variable. Any changes to the variant will cause the variable to be changed, as it is the target of the pointer. The variable may be of any data type which is supported by variants and COM objects: Byte, Word, Dword, Integer, Long, Quad, Single, Double, Currency, Variant, String, and WString. If you attempt to use an unsupported variable type (like [Extended](#), [Bit](#), [STRINGZ](#), etc.), PowerBASIC will generate an [error 482](#) (Data Type Mismatch).

Further, you may not use a register variable (automatic or explicit), or an [error 491](#) (Invalid Register Variable) will be generated. Note that strings used with COM objects are expected to be in Unicode format, rather than ANSI. The [ACODES\\$](#) and [UCODES\\$](#) functions may be used to convert the strings as necessary. You should exercise caution with a BYREF ANSI string, as it may not be recognized accurately by other code which expects only Unicode strings.

LET objvar = vmnt

Attempts to open an [interface](#) of the specified [class](#) for *objvar* on the object of *vmnt*, and assigns a reference to *objvar*. It assumes that *vmnt* contains a reference to an object of type *%VT_UNKNOWN* or *%VT_DISPATCH*. If the desired interface can not be opened, the object variable *objvar* is set to NOTHING. You can test for success/failure with the [ISOBJECT\(objvar\)](#) function.

LET *vrnt* = *objvar*

This may be used to assign an object reference from an object variable to a variant variable. It attempts to open an [IDispatch](#) interface, else an [IUnknown](#) interface on the object of *objvar*, and assigns that reference to *vrnt*. Variant variables can not contain references to custom interfaces, only IDispatch or IUnknown. If the assignment is successful, [VARIANTVT\(*vrnt*\)](#) will return either %VT_UNKNOWN or %VT_DISPATCH. If it is unsuccessful, *vrnt* is set to %VT_EMPTY.

See also [Just what is COM?](#), [LET](#), [LET \(with Objects\)](#), [LET \(with Types\)](#), [VARIANT#](#), [VARIANT\\$](#), [VARIANTVT](#)

LIBMAIN function**LIBMAIN function**

Purpose LIBMAIN (or its synonym DLLMAIN) is an optional user-defined function called by Windows each time a [DLL](#) is loaded into, and unloaded from, memory. The [PBLIBMAIN](#) function performs a similar task to LIBMAIN, but takes no parameters.

Syntax

```
FUNCTION { LIBMAIN | DLLMAIN } ( _
    BYVAL hInstance AS DWORD, _
    BYVAL lReason AS LONG, _
    BYVAL lReserved AS LONG ) AS LONG
```

In 32-bit Windows, LIBMAIN is called by Windows each time a DLL is loaded or unloaded by an application or process, and (usually) when a thread is started and stopped. Your code should never call LIBMAIN.

Remarks The LIBMAIN / DLLMAIN function provides the following parameters:

hInstance The unique instance handle of the DLL. This handle is used by the calling application to identify the DLL. The instance handle value is commonly used to load [resources](#) embedded within the DLL, and to obtain the actual file name of the DLL (via the GetModuleFilename API function). In these cases, it is common to copy the *hInstance* value to a [global](#) variable, allowing the instance handle value to be utilized elsewhere in the DLL.

lReason This flag indicates why the DLL entry-point is being called. It can be one of the following values (as defined in [WIN32API.INC](#)):

| | |
|-------------------------|---|
| % DLL_PROCESS_ATTACH | Indicates that the DLL is being loaded by a process (another DLL or EXE is loading the DLL). DLLs can use this opportunity to initialize any instance or global data, such as arrays . <i>lReserved</i> is zero if the DLL is being loaded explicitly (run-time linking) using LoadLibrary(), or non-zero if the DLL is being loaded implicitly (load-time linking) during process initialization. |
| % DLL_PROCESS_DETACH | Indicates that the DLL is being cleanly unloaded or detached from the calling application. DLLs can take this opportunity to clean up all resources for all threads attached and known to the DLL. This is functionally equivalent to the WEP function in 16-bit DLLs. <i>lReserved</i> is zero if LIBMAIN was executed via the FreeLibrary API and the DLLs reference count reached zero (no further instances of the DLL are loaded), or non-zero if LIBMAIN is executed during process termination. A %DLL_PROCESS_DETACH does not generate %DLL_THREAD_DETACH for active threads. |
| %DLL_THREAD_ATTACH | Indicates that the DLL is being loaded by a new thread in the calling application. DLLs can use this opportunity |

to initialize any [Thread Local Storage](#) (TLS). This execution occurs in the context of the new thread.

`%DLL_THREAD_DETACH` Indicates that the thread is exiting cleanly. If the DLL has allocated any thread-specific storage (Thread Local Storage or TLS), it should be released. This may occur even if there was no matching `%DLL_THREAD_ATTACH` call. A `%DLL_PROCESS_DETACH` does not generate `%DLL_THREAD_DETACH` for active threads.

Reserved The *Reserved* parameter specifies further aspects of the DLL initialization and cleanup. If *Reason* is `%DLL_PROCESS_ATTACH`, *Reserved* is zero (0) for explicit (dynamic) loads and non-zero for implicit loads. If *Reason* is `%DLL_PROCESS_DETACH`, *Reserved* is zero if LIBMAIN has been called by using the FreeLibrary API call, and non-zero if LIBMAIN has been called during process termination.

Return value If LIBMAIN is called with `%DLL_PROCESS_ATTACH`, your LIBMAIN function should return a zero (0) if any part of your initialization process fails, or a one (1) if no errors were encountered. If a zero is returned, Windows will abort and unload the DLL from memory. When LIBMAIN is called with any other value than `%DLL_PROCESS_ATTACH`, the return value is ignored.

Restrictions Note that Windows does not guarantee that LIBMAIN will be called in a "balanced" manner. For example, a `%DLL_PROCESS_ATTACH` is not followed by a `%DLL_THREAD_ATTACH` for the primary thread. In some conditions, `%DLL_THREAD_DETACH` may not occur at all. Further discussion on these Windows traits are beyond the scope of this documentation; however, an excellent source of information can be found in "Win32 Programming", Rector/Newcomer, ISBN 0-201-63492-9.

At the point where a DLL is loaded into memory during process startup, Windows only guarantees that the KERNEL32.DLL system library will be loaded in memory. On this basis, API calls made from within LIBMAIN must be restricted to the range of API functions present in KERNEL32.DLL, with the exception of the LoadLibrary, LoadLibraryEx, and FreeLibrary API functions.

In addition, code within LIBMAIN must not call API functions in any other DLL (for example, USER32.DLL, SHELL32.DLL, ADVAPU32.DLL, GDI32.DLL, etc), because some API functions in those DLLs may attempt to load other libraries via LoadLibrary, etc. For example, never call the MessageBox API function from within LIBMAIN, nor use the related [MSGBOX](#) function or [MSGBOX](#) statement.

Failure to observe these restrictions will result in Access Violation or General Protection Faults (GPFs), typically caused by the execution of code in DLLs that has yet to be initialized.

See also [DLLMAIN](#), [PBLIBMAIN](#), [PBMMAIN](#), [THREAD CREATE](#), [WINMAIN](#)

Example

```
#DIM ALL
#COMPILE DLL "LIBTEST.DLL"
#include "WIN32API.INC"

GLOBAL gNumOfTimes AS DWORD

FUNCTION LIBMAIN(BYVAL hInstance AS DWORD, _
    BYVAL lReason AS LONG, _
    BYVAL lReserved AS LONG) AS LONG

    INCR gNumOfTimes

    SELECT CASE AS LONG lReason

        CASE %DLL_PROCESS_ATTACH
            ' This DLL has been mapped into the memory context of
            ' the calling program, and can be initialized as required.
            ' Here we return a non-zero LIBMAIN result to indicate success.
```

```

LIBMAIN = 1
EXIT FUNCTION

CASE %DLL_PROCESS_DETACH
  ' This DLL is about to be unloaded
  EXIT FUNCTION

CASE %DLL_THREAD_ATTACH
  ' A [New] thread is starting (see THREADID)
  EXIT FUNCTION

CASE %DLL_THREAD_DETACH
  ' This thread is closing (see THREADID)
  EXIT FUNCTION

END SELECT

' Theoretically execution should never get to this point.
' However, if the DLL is being implicitly linked then return
' Zero (0) and the process (program) will fail to start
' running. For Explicit linking, returning Zero (0) will
' simply cause the LoadLibrary/LoadLibraryEx API call to fail.
LIBMAIN = 0 ' Indicate failure to initialize the DLL!
END FUNCTION

SUB TestIt ALIAS "TestIt" () EXPORT
  MSGBOX "TestIt" + $CRLF + "_"gNumOfTimes =" + STR$(gNumOfTimes)
END SUB

```

LINE INPUT# statement

LINE INPUT# statement

| | |
|----------------|---|
| Purpose | Read line(s) from a sequential file into a variable or string array , ignoring delimiters. |
| Syntax | <pre> LINE INPUT #filenum&, string_variable LINE INPUT #filenum&, Arr\$() [RECORDS rcds] [TO count] </pre> |
| Remarks | <p><i>filenum&</i> is the file number, or variable containing a file number, given when the file was opened. <i>string_variable</i> is the string variable to be loaded with the data read from the file.</p> <p><i>string_variable</i> may be a fixed-length, nul-terminated, or dynamic string. For fixed-length and nul-terminated strings, data that is longer than the string is truncated to fit into the string. Dynamic strings receive the data without truncation. <i>string_variable</i> may not be a UDT variable, although fixed-length and nul-terminated UDT member variables are supported.</p> <p>LINE INPUT# is intended for use with text files composed of lines terminated by CR/LF (\$CRLF or CHR\$(13,10)) sequences. It reads a line from the file and returns it, minus the CR/LF delimiter. Commas, quotation marks and other characters have no special meaning for LINE INPUT#, and are treated like any other text.</p> <p>If the file consists of comma-delimited data items, INPUT# is likely to be more suitable than LINE INPUT#.</p> <p>The second syntax definition of LINE INPUT# reads a file opened for INPUT, assigning full lines of text to each element of the array.</p> <p>It is assumed the data is standard text, delimited by a CR/LF (\$CRLF) or EOF (1A hex or \$EOF). LINE INPUT# attempts to read the number of lines specified in the RECORDS <i>rcds</i> option, or the number of elements in the array, whichever is smaller.</p> |

The actual number of lines read is assigned to the variable specified in the optional `TO count` clause. [FILESCAN](#) is useful in conjunction, to determine the dimensioned size of the string array. EOF is set just as with single Line Input.

See also

[EOF](#), [FILESCAN](#), [INPUT#](#), [PRINT#](#)

Example

```
SUB MakeFile
  ' Open a sequential file for output. Use PRINT#
  ' to write different data types to the file.
  OPEN "LINEINP#.DTA" FOR OUTPUT AS #1

  ' Define some variables.
  sVar$ = "There's trouble in River City, by George."
  iVar% = 1000
  fpVar! = 30000.12

  ' Write a line of text to the file.
  PRINT# 1, sVar$; iVar%; fpVar!
  CLOSE #1      'close the file
END SUB 'end procedure MakeFile

SUB ReadFile
  'Open a sequential file for input, then use
  'LINE INPUT # to read lines of different
  'data types from the file.

  OPEN "LINEINP#.DTA" FOR INPUT AS #1
  StringVar$ = ""

  'Input an entire line regardless of length or
  'delimiters.
  LINE INPUT #1, StringVar$
  CLOSE #1      'close the file
END SUB 'end procedure ReadFile
```

LISTBOX ADD statement

Keyword Template

Purpose**Syntax****Remarks****See also****Example**

LISTBOX statement IMPROVED

Purpose Manipulate a [LISTBOX](#) control in order to set/retrieve data.

Syntax

```
LISTBOX ADD hDlg, id&, StrExpr [TO datav&]
LISTBOX DELETE hDlg, id&, item&
LISTBOX FIND hDlg, id&, item&, StrExpr TO datav&
LISTBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTBOX GET COUNT hDlg, id& TO datav&
LISTBOX GET SELCOUNT hDlg, id& TO datav&
LISTBOX GET SELECT hDlg, id& [,item&] TO datav&
LISTBOX GET STATE hDlg, id&, item& TO datav&
```

```

LISTBOX GET TEXT hDlg, id& [,item&] TO txtv$
LISTBOX GET USER hDlg, id&, item& TO datav&
LISTBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
LISTBOX RESET hDlg, id&
LISTBOX SELECT hDlg, id&, item&
LISTBOX SET TEXT hDlg, id&, item&, StrExpr
LISTBOX SET USER hDlg, id&, item&, NumExpr
LISTBOX UNSELECT hDlg, id& [,item&]

```

| | |
|-------------------|--|
| <i>hDlg</i> | Handle of the dialog that owns the list box. |
| <i>id&</i> | The control identifier assigned with CONTROL ADD LISTBOX . |
| <i>item&</i> | Position of data in the LISTBOX. First string=1, second=2... |
| <i>NumExpr</i> | A expression passed as a parameter. |
| <i>StrExpr</i> | A string expression passed as a parameter. |
| <i>txtv\$</i> | A variable to which result text is assigned. |
| <i>datav&</i> | A long integer variable to which result data is assigned. |

Remarks In each of the following samples and descriptions, the LISTBOX control which is the subject of the statement is identified by the handle of the dialog that owns the LISTBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD LISTBOX.

The value *item&* refers to the position of the string data item in the LISTBOX, and is always indexed to one. The first string is position 1, the second is position 2, and so forth.

LISTBOX ADD *hDlg*, *id&*, *StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the LISTBOX control. If the LISTBOX has the [%LBS_SORT](#) style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

LISTBOX DELETE *hDlg*, *id&*, *item&*

The string at the position specified by *item&* is deleted from the LISTBOX. The parameter *item&* is indexed to one (1 for the first string, 2 for the second, and so on).

LISTBOX FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1

(1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX GET COUNT *hDlg, id& TO datav&*

The number of items in the LISTBOX is retrieved, and assigned to the [long integer](#) variable specified by *datav&*.

LISTBOX GET SELCOUNT *hDlg, id& TO datav&*

The number of selected items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELECT *hDlg, id& [,item&] TO datav&*

The LISTBOX is searched to find the first selected item. If the *item&* parameter is included, searching starts at that position to facilitate retrieving multiple selected items. If *item&* is omitted, the search starts at the first data item. The index number of the selected item is assigned to the variable designated by *datav&*. If no item is selected, the value zero (0) is assigned to it.

LISTBOX GET STATE *hDlg, id&, item& TO datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTBOX GET TEXT *hDlg, id& [,item&] TO txtv\$*

Text is retrieved from the LISTBOX and assigned to the string variable specified by *txtv\$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc.

The parameter *item&* may be omitted, or contain the value zero (0). In the case of a single-selection listbox, the current selected text (if any) is retrieved and assigned to *txtv\$*. With a multiple-selection listbox ([%LBS_MULTIPLESEL](#) or [%LBS_EXTENDEDSEL](#) style), the text of the first (base) selected item is assigned to *txtv\$*. To retrieve additional selected text items from a multiple-selection listbox, use LISTBOX GET SELECT to retrieve selected item numbers. Then apply the item numbers with LISTBOX GET TEXT to retrieve the string data.

LISTBOX GET USER *hDlg, id&, item& TO datav&*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTBOX user values are assigned with the LISTBOX SET USER statement. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTBOX INSERT *hDlg, id&, item&, StrExpr [TO datav&]*

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style [%LBS_SORT](#). If you wish to sort all of the items, use LISTBOXADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable

represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

LISTBOX RESET *hDlg, id&*

Delete all contents of the specified LISTBOX.

LISTBOX SELECT *hDlg, id&, item&*

The string data item specified by *item&* is chosen as selected text for the LISTBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc. If the value of *item&* = 0 with a multiple selection listbox, then all string data items are selected. LISTBOX SELECT may be used with both single and multiple selection listboxes.

LISTBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*.

The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort the items, use LISTBOX DELETE followed by LISTBOX ADD instead.

LISTBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTBOX SET USER, and retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTBOX user values, every [DDT](#) control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX UNSELECT *hDlg, id& [,item&]*

The string value specified by *item&* is set to an unselected state for the LISTBOX control.

The value of *item&* = 1 for the first item, 2 for the second item, etc. If *item&* is missing, or has the value zero, all items are set to an unselected state. LISTBOX UNSELECT may be used with both single and multiple selection listboxes.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD LISTBOX](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#)

LISTBOX DELETE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTBOX statement IMPROVED

Purpose Manipulate a [LISTBOX](#) control in order to set/retrieve data.

Syntax

```
LISTBOX ADD hDlg, id&, StrExpr [TO datav&]
LISTBOX DELETE hDlg, id&, item&
LISTBOX FIND hDlg, id&, item&, StrExpr TO datav&
LISTBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTBOX GET COUNT hDlg, id& TO datav&
LISTBOX GET SELCOUNT hDlg, id& TO datav&
LISTBOX GET SELECT hDlg, id& [,item&] TO datav&
LISTBOX GET STATE hDlg, id&, item& TO datav&
LISTBOX GET TEXT hDlg, id& [,item&] TO txtv$
LISTBOX GET USER hDlg, id&, item& TO datav&
LISTBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
LISTBOX RESET hDlg, id&
LISTBOX SELECT hDlg, id&, item&
LISTBOX SET TEXT hDlg, id&, item&, StrExpr
LISTBOX SET USER hDlg, id&, item&, NumExpr
LISTBOX UNSELECT hDlg, id& [,item&]
```

hDlg [Handle](#) of the [dialog](#) that owns the list box.

id& The [control identifier](#) assigned with [CONTROL ADD LISTBOX](#).

item& Position of data in the LISTBOX. First string=1, second=2...

NumExpr A
expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A
variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the LISTBOX control which is the subject of the statement is identified by the handle of the dialog that owns the LISTBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD LISTBOX.

The value *item*& refers to the position of the string data item in the LISTBOX, and is always indexed to one. The first string is position 1, the second is position 2, and so forth.

LISTBOX ADD *hDlg*, *id*&, *StrExpr* [TO *datav*&]

The string value specified by *StrExpr* is added to the LISTBOX control. If the LISTBOX has the [%LBS_SORT](#) style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav*&. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

LISTBOX DELETE *hDlg*, *id*&, *item*&

The string at the position specified by *item*& is deleted from the LISTBOX. The parameter *item*& is indexed to one (1 for the first string, 2 for the second, and so on).

LISTBOX FIND *hDlg*, *id*&, *item*&, *StrExpr* TO *datav*&

Strings in the LISTBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive.

Strings are searched beginning with the string specified by *item*&, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item*&) is indexed to 1 (1=first, 2=second, etc.). To search the entire

LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the LISTBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX GET COUNT *hDlg, id& TO datav&*

The number of items in the LISTBOX is retrieved, and assigned to the [long integer](#) variable specified by *datav&*.

LISTBOX GET SELCOUNT *hDlg, id& TO datav&*

The number of selected items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELECT *hDlg, id& [,item&] TO datav&*

The LISTBOX is searched to find the first selected item. If the *item&* parameter is included, searching starts at that position to facilitate retrieving multiple selected items. If *item&* is omitted, the search starts at the first data item. The index number of the selected item is assigned to the variable designated by *datav&*. If no item is selected, the value zero (0) is assigned to it.

LISTBOX GET STATE *hDlg, id&, item& TO datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTBOX GET TEXT *hDlg, id& [,item&] TO txtv\$*

Text is retrieved from the LISTBOX and assigned to the string variable specified by *txtv\$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc.

The parameter *item&* may be omitted, or contain the value zero (0). In the case of a single-selection listbox, the current selected text (if any) is retrieved and assigned to *txtv\$*. With a multiple-selection listbox ([%LBS_MULTIPLESEL](#) or [%LBS_EXTENDEDSEL](#) style), the text of the first (base) selected item is assigned to *txtv\$*. To retrieve additional selected text items from a multiple-selection listbox, use LISTBOX GET SELECT to retrieve selected item numbers. Then apply the item numbers with LISTBOX GET TEXT to retrieve the string data.

LISTBOX GET USER *hDlg, id&, item& TO datav&*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTBOX user values are assigned with the LISTBOX SET USER statement. In addition to these LISTBOX user values, every DDT control offers an

additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTBOX INSERT *hDlg, id&, item&, StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style [%LBS_SORT](#).

If you wish to sort all of the items, use LISTBOXADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

LISTBOX RESET *hDlg, id&*

Delete all contents of the specified LISTBOX.

LISTBOX SELECT *hDlg, id&, item&*

The string data item specified by *item&* is chosen as selected text for the LISTBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc. If the value of *item&* = 0 with a multiple selection listbox, then all string data items are selected. LISTBOX SELECT may be used with both single and multiple selection listboxes.

LISTBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*.

The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style [%LBS_SORT](#). If you wish to sort the items, use LISTBOX DELETE followed by LISTBOXADD instead.

LISTBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTBOX SET USER, and retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTBOX user values, every [DDI](#) control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX UNSELECT *hDlg, id&* [,*item&*]

The string value specified by *item&* is set to an unselected state for the LISTBOX control.

The value of *item&* = 1 for the first item, 2 for the second item, etc. If *item&* is missing, or has the value zero, all items are set to an unselected state. LISTBOX UNSELECT may be used with both single and multiple selection listboxes.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD LISTBOX](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#)

LISTBOX FIND statement

Keyword Template

Purpose

Syntax
Remarks
See also
Example

LISTBOX statement IMPROVED

Purpose Manipulate a [LISTBOX](#) control in order to set/retrieve data.

Syntax

```
LISTBOX ADD hDlg, id&, StrExpr [TO datav&]
LISTBOX DELETE hDlg, id&, item&
LISTBOX FIND hDlg, id&, item&, StrExpr TO datav&
LISTBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTBOX GET COUNT hDlg, id& TO datav&
LISTBOX GET SELCOUNT hDlg, id& TO datav&
LISTBOX GET SELECT hDlg, id& [,item&] TO datav&
LISTBOX GET STATE hDlg, id&, item& TO datav&
LISTBOX GET TEXT hDlg, id& [,item&] TO txtv$
LISTBOX GET USER hDlg, id&, item& TO datav&
LISTBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
LISTBOX RESET hDlg, id&
LISTBOX SELECT hDlg, id&, item&
LISTBOX SET TEXT hDlg, id&, item&, StrExpr
LISTBOX SET USER hDlg, id&, item&, NumExpr
LISTBOX UNSELECT hDlg, id& [,item&]
```

hDlg [Handle](#) of the [dialog](#) that owns the list box.

id& The [control identifier](#) assigned with [CONTROL ADD LISTBOX](#).

item& Position of data in the LISTBOX. First string=1, second=2...

NumExpr A
expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A
variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the LISTBOX control which is the subject of the statement is identified by the handle of the dialog that owns the LISTBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD LISTBOX.

The value *item*& refers to the position of the string data item in the LISTBOX, and is always indexed to one. The first string is position 1, the second is position 2, and so forth.

LISTBOX ADD *hDlg*, *id*&, *StrExpr* [TO *datav*&]

The string value specified by *StrExpr* is added to the LISTBOX control. If the LISTBOX has the [%LBS_SORT](#) style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav*&. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

LISTBOX DELETE *hDlg*, *id*&, *item*&

The string at the position specified by *item*& is deleted from the LISTBOX. The parameter

item& is indexed to one (1 for the first string, 2 for the second, and so on).

LISTBOX FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the LISTBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive.

Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the LISTBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX GET COUNT *hDlg, id& TO datav&*

The number of items in the LISTBOX is retrieved, and assigned to the [long integer](#) variable specified by *datav&*.

LISTBOX GET SELCOUNT *hDlg, id& TO datav&*

The number of selected items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELECT *hDlg, id& [,item&] TO datav&*

The LISTBOX is searched to find the first selected item. If the *item&* parameter is included, searching starts at that position to facilitate retrieving multiple selected items. If *item&* is omitted, the search starts at the first data item. The index number of the selected item is assigned to the variable designated by *datav&*. If no item is selected, the value zero (0) is assigned to it.

LISTBOX GET STATE *hDlg, id&, item& TO datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTBOX GET TEXT *hDlg, id& [,item&] TO txtv\$*

Text is retrieved from the LISTBOX and assigned to the string variable specified by *txtv\$*.

If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc.

The parameter *item&* may be omitted, or contain the value zero (0). In the case of a single-selection listbox, the current selected text (if any) is retrieved and assigned to *txtv\$*. With a multiple-selection listbox ([%LBS_MULTIPLESEL](#) or [%LBS_EXTENDEDESEL](#) style), the text of the first (base) selected item is assigned to *txtv\$*. To retrieve additional selected text items from a multiple-selection listbox, use LISTBOX GET SELECT to retrieve selected item numbers. Then apply the item numbers with LISTBOX GET TEXT to retrieve the string data.

LISTBOX GET USER *hDlg, id&, item& TO datav&*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTBOX user values are assigned with the LISTBOX SET USER statement. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTBOX INSERT *hDlg, id&, item&, StrExpr [TO datav&]*

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style [%LBS_SORT](#). If you wish to sort all of the items, use LISTBOXADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

LISTBOX RESET *hDlg, id&*

Delete all contents of the specified LISTBOX.

LISTBOX SELECT *hDlg, id&, item&*

The string data item specified by *item&* is chosen as selected text for the LISTBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc. If the value of *item&* = 0 with a multiple selection listbox, then all string data items are selected. LISTBOX SELECT may be used with both single and multiple selection listboxes.

LISTBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style [%LBS_SORT](#). If you wish to sort the items, use LISTBOX DELETE followed by LISTBOXADD instead.

LISTBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTBOX SET USER, and retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTBOX user values, every [DDI](#) control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX UNSELECT *hDlg, id& [,item&]*

The string value specified by *item&* is set to an unselected state for the LISTBOX control. The value of *item&* = 1 for the first item, 2 for the second item, etc. If *item&* is missing, or has the value zero, all items are set to an unselected state. LISTBOX UNSELECT may be used with both single and multiple selection listboxes.

Restrictions

Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also

[Dynamic Dialog Tools](#), [CONTROL ADD LISTBOX](#), [CONTROL SET COLOR](#), [CONTROL](#)

[SET FONT](#)**LISTBOX FIND EXACT statement****Keyword Template**

Purpose

Syntax

Remarks

See also

Example

LISTBOX statement IMPROVED**Purpose** Manipulate a [LISTBOX](#) control in order to set/retrieve data.

Syntax

```
LISTBOX ADD hDlg, id&, StrExpr [TO datav&]
LISTBOX DELETE hDlg, id&, item&
LISTBOX FIND hDlg, id&, item&, StrExpr TO datav&
LISTBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTBOX GET COUNT hDlg, id& TO datav&
LISTBOX GET SELCOUNT hDlg, id& TO datav&
LISTBOX GET SELECT hDlg, id& [,item&] TO datav&
LISTBOX GET STATE hDlg, id&, item& TO datav&
LISTBOX GET TEXT hDlg, id& [,item&] TO txtv$
LISTBOX GET USER hDlg, id&, item& TO datav&
LISTBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
LISTBOX RESET hDlg, id&
LISTBOX SELECT hDlg, id&, item&
LISTBOX SET TEXT hDlg, id&, item&, StrExpr
LISTBOX SET USER hDlg, id&, item&, NumExpr
LISTBOX UNSELECT hDlg, id& [,item&]
```

hDlg [Handle](#) of the [dialog](#) that owns the list box.*id&* The [control identifier](#) assigned with [CONTROL ADD LISTBOX](#).*item&* Position of data in the LISTBOX. First string=1, second=2...*NumExpr* A
expression passed as a parameter.*StrExpr* A [string expression](#) passed as a parameter.*txtv\$* A
variable to which result text is assigned.*datav&* A [long integer](#) variable to which result data is assigned.**Remarks** In each of the following samples and descriptions, the LISTBOX control which is the subject of the statement is identified by the handle of the dialog that owns the LISTBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD LISTBOX.

The value *item&* refers to the position of the string data item in the LISTBOX, and is always indexed to one. The first string is position 1, the second is position 2, and so forth.

LISTBOX ADD *hDlg*, *id&*, *StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the LISTBOX control. If the LISTBOX has the [%LBS_SORT](#) style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

LISTBOX DELETE *hDlg, id&, item&*

The string at the position specified by *item&* is deleted from the LISTBOX. The parameter *item&* is indexed to one (1 for the first string, 2 for the second, and so on).

LISTBOX FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the LISTBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the LISTBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX GET COUNT *hDlg, id& TO datav&*

The number of items in the LISTBOX is retrieved, and assigned to the [long integer](#) variable specified by *datav&*.

LISTBOX GET SELCOUNT *hDlg, id& TO datav&*

The number of selected items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELECT *hDlg, id& [,item&] TO datav&*

The LISTBOX is searched to find the first selected item. If the *item&* parameter is included, searching starts at that position to facilitate retrieving multiple selected items. If *item&* is omitted, the search starts at the first data item. The index number of the selected item is assigned to the variable designated by *datav&*. If no item is selected, the value zero (0) is assigned to it.

LISTBOX GET STATE *hDlg, id&, item& TO datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*.

Otherwise, 0 ([false](#)) is assigned to it.

LISTBOX GET TEXT *hDlg, id& [,item&] TO txtv\$*

Text is retrieved from the LISTBOX and assigned to the string variable specified by *txtv\$*.

If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc.

The parameter *item&* may be omitted, or contain the value zero (0). In the case of a single-selection listbox, the current selected text (if any) is retrieved and assigned to *txtv\$*. With a multiple-selection listbox ([%LBS_MULTIPLESEL](#) or [%LBS_EXTENDEDSEL](#) style), the text of the first (base) selected item is assigned to *txtv\$*. To retrieve additional selected text items from a multiple-selection listbox, use LISTBOX GET SELECT to retrieve selected item numbers. Then apply the item numbers with LISTBOX GET TEXT to retrieve the string data.

LISTBOX GET USER *hDlg, id&, item& TO datav&*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTBOX user values are assigned with the LISTBOX SET USER statement. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTBOX INSERT *hDlg, id&, item&, StrExpr [TO datav&]*

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style [%LBS_SORT](#).

If you wish to sort all of the items, use LISTBOXADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

LISTBOX RESET *hDlg, id&*

Delete all contents of the specified LISTBOX.

LISTBOX SELECT *hDlg, id&, item&*

The string data item specified by *item&* is chosen as selected text for the LISTBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc. If the value of *item&* = 0 with a multiple selection listbox, then all string data items are selected. LISTBOX SELECT may be used with both single and multiple selection listboxes.

LISTBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*.

The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style [%LBS_SORT](#). If you wish to sort the items, use LISTBOX DELETE followed by LISTBOXADD instead.

LISTBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTBOX SET USER, and retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTBOX user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTBOX UNSELECT *hDlg, id& [,item&]*

The string value specified by *item&* is set to an unselected state for the LISTBOX control. The value of *item&* = 1 for the first item, 2 for the second item, etc. If *item&* is missing, or has the value zero, all items are set to an unselected state. LISTBOX UNSELECT may be used with both single and multiple selection listboxes.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD LISTBOX](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#)

LISTBOX GET COUNT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTBOX statement IMPROVED

Purpose Manipulate a [LISTBOX](#) control in order to set/retrieve data.

Syntax

```
LISTBOX ADD hDlg, id&, StrExpr [TO datav&]
LISTBOX DELETE hDlg, id&, item&
LISTBOX FIND hDlg, id&, item&, StrExpr TO datav&
LISTBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTBOX GET COUNT hDlg, id& TO datav&
LISTBOX GET SELCOUNT hDlg, id& TO datav&
LISTBOX GET SELECT hDlg, id& [,item&] TO datav&
LISTBOX GET STATE hDlg, id&, item& TO datav&
LISTBOX GET TEXT hDlg, id& [,item&] TO txtv$
LISTBOX GET USER hDlg, id&, item& TO datav&
LISTBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
LISTBOX RESET hDlg, id&
LISTBOX SELECT hDlg, id&, item&
LISTBOX SET TEXT hDlg, id&, item&, StrExpr
LISTBOX SET USER hDlg, id&, item&, NumExpr
LISTBOX UNSELECT hDlg, id& [,item&]
```

hDlg [Handle](#) of the [dialog](#) that owns the list box.

id& The [control identifier](#) assigned with [CONTROL ADD LISTBOX](#).

item& Position of data in the LISTBOX. First string=1, second=2...

NumExpr A
expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A
variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the LISTBOX control which is the subject of the statement is identified by the handle of the dialog that owns the LISTBOX

(*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD LISTBOX.

The value *item&* refers to the position of the string data item in the LISTBOX, and is always indexed to one. The first string is position 1, the second is position 2, and so forth.

LISTBOX ADD *hDlg, id&, StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the LISTBOX control. If the LISTBOX has the [%LBS_SORT](#) style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

LISTBOX DELETE *hDlg, id&, item&*

The string at the position specified by *item&* is deleted from the LISTBOX. The parameter *item&* is indexed to one (1 for the first string, 2 for the second, and so on).

LISTBOX FIND *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX FIND EXACT *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX GET COUNT *hDlg, id&* TO *datav&*

The number of items in the LISTBOX is retrieved, and assigned to the [long integer](#) variable specified by *datav&*.

LISTBOX GET SELCOUNT *hDlg, id&* TO *datav&*

The number of selected items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELECT *hDlg, id&* [,*item&*] TO *datav&*

The LISTBOX is searched to find the first selected item. If the *item&* parameter is included, searching starts at that position to facilitate retrieving multiple selected items. If *item&* is omitted, the search starts at the first data item. The index number of the selected item is assigned to the variable designated by *datav&*. If no item is selected, the value zero (0) is assigned to it.

LISTBOX GET STATE *hDlg, id&, item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTBOX GET TEXT *hDlg, id& [,item&] TO txtv\$*

Text is retrieved from the LISTBOX and assigned to the string variable specified by *txtv\$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc.

The parameter *item&* may be omitted, or contain the value zero (0). In the case of a single-selection listbox, the current selected text (if any) is retrieved and assigned to *txtv\$*. With a multiple-selection listbox ([%LBS_MULTIPLESEL](#) or [%LBS_EXTENDEDSEL](#) style), the text of the first (base) selected item is assigned to *txtv\$*. To retrieve additional selected text items from a multiple-selection listbox, use LISTBOX GET SELECT to retrieve selected item numbers. Then apply the item numbers with LISTBOX GET TEXT to retrieve the string data.

LISTBOX GET USER *hDlg, id&, item& TO datav&*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTBOX user values are assigned with the LISTBOX SET USER statement. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTBOX INSERT *hDlg, id&, item&, StrExpr [TO datav&]*

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style [%LBS_SORT](#). If you wish to sort all of the items, use LISTBOXADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

LISTBOX RESET *hDlg, id&*

Delete all contents of the specified LISTBOX.

LISTBOX SELECT *hDlg, id&, item&*

The string data item specified by *item&* is chosen as selected text for the LISTBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc. If the value of *item&* = 0 with a multiple selection listbox, then all string data items are selected. LISTBOX SELECT may be used with both single and multiple selection listboxes.

LISTBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style [%LBS_SORT](#). If you wish to sort the items, use LISTBOX DELETE followed by LISTBOXADD instead.

LISTBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a LISTBOX may have a long integer user value associated with it at the

discretion of the programmer. This user value is assigned with LISTBOX SET USER, and retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTBOX user values, every [DDI](#) control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX UNSELECT *hDlg, id& [,item&]*

The string value specified by *item&* is set to an unselected state for the LISTBOX control. The value of *item&* = 1 for the first item, 2 for the second item, etc. If *item&* is missing, or has the value zero, all items are set to an unselected state. LISTBOX UNSELECT may be used with both single and multiple selection listboxes.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD LISTBOX](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#)

LISTBOX GET SELCOUNT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTBOX statement IMPROVED

Purpose Manipulate a [LISTBOX](#) control in order to set/retrieve data.

Syntax

```
LISTBOX ADD hDlg, id&, StrExpr [TO datav&]
LISTBOX DELETE hDlg, id&, item&
LISTBOX FIND hDlg, id&, item&, StrExpr TO datav&
LISTBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTBOX GET COUNT hDlg, id& TO datav&
LISTBOX GET SELCOUNT hDlg, id& TO datav&
LISTBOX GET SELECT hDlg, id& [,item&] TO datav&
LISTBOX GET STATE hDlg, id&, item& TO datav&
LISTBOX GET TEXT hDlg, id& [,item&] TO txtv$
LISTBOX GET USER hDlg, id&, item& TO datav&
LISTBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
LISTBOX RESET hDlg, id&
LISTBOX SELECT hDlg, id&, item&
LISTBOX SET TEXT hDlg, id&, item&, StrExpr
LISTBOX SET USER hDlg, id&, item&, NumExpr
LISTBOX UNSELECT hDlg, id& [,item&]
```

hDlg [Handle](#) of the [dialog](#) that owns the list box.

id& The [control identifier](#) assigned with [CONTROL ADD LISTBOX](#).

item& Position of data in the LISTBOX. First string=1, second=2...

NumExpr A

| | |
|-------------------|--|
| | expression passed as a parameter. |
| <i>StrExpr</i> | A string expression passed as a parameter. |
| <i>txtv\$</i> | A variable to which result text is assigned. |
| <i>datav&</i> | A long integer variable to which result data is assigned. |
| Remarks | In each of the following samples and descriptions, the LISTBOX control which is the subject of the statement is identified by the handle of the dialog that owns the LISTBOX (<i>hDlg</i>), and the unique control identifier you gave it upon creation in CONTROL ADD LISTBOX. The value <i>item&</i> refers to the position of the string data item in the LISTBOX, and is always indexed to one. The first string is position 1, the second is position 2, and so forth. |

LISTBOX ADD *hDlg, id&, StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the LISTBOX control. If the LISTBOX has the [%LBS_SORT](#) style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

LISTBOX DELETE *hDlg, id&, item&*

The string at the position specified by *item&* is deleted from the LISTBOX. The parameter *item&* is indexed to one (1 for the first string, 2 for the second, and so on).

LISTBOX FIND *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX FIND EXACT *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX GET COUNT *hDlg, id&* TO *datav&*

The number of items in the LISTBOX is retrieved, and assigned to the [long integer](#) variable specified by *datav&*.

LISTBOX GET SELCOUNT *hDlg, id&* TO *datav&*

The number of selected items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELECT *hDlg, id& [,item&] TO datav&*

The LISTBOX is searched to find the first selected item. If the *item&* parameter is included, searching starts at that position to facilitate retrieving multiple selected items. If *item&* is omitted, the search starts at the first data item. The index number of the selected item is assigned to the variable designated by *datav&*. If no item is selected, the value zero (0) is assigned to it.

LISTBOX GET STATE *hDlg, id&, item& TO datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTBOX GET TEXT *hDlg, id& [,item&] TO txtv\$*

Text is retrieved from the LISTBOX and assigned to the string variable specified by *txtv\$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc.

The parameter *item&* may be omitted, or contain the value zero (0). In the case of a single-selection listbox, the current selected text (if any) is retrieved and assigned to *txtv\$*. With a multiple-selection listbox ([%LBS_MULTIPLESEL](#) or [%LBS_EXTENDEDSEL](#) style), the text of the first (base) selected item is assigned to *txtv\$*. To retrieve additional selected text items from a multiple-selection listbox, use LISTBOX GET SELECT to retrieve selected item numbers. Then apply the item numbers with LISTBOX GET TEXT to retrieve the string data.

LISTBOX GET USER *hDlg, id&, item& TO datav&*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTBOX user values are assigned with the LISTBOX SET USER statement. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTBOX INSERT *hDlg, id&, item&, StrExpr [TO datav&]*

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style [%LBS_SORT](#). If you wish to sort all of the items, use LISTBOXADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

LISTBOX RESET *hDlg, id&*

Delete all contents of the specified LISTBOX.

LISTBOX SELECT *hDlg, id&, item&*

The string data item specified by *item&* is chosen as selected text for the LISTBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc. If the value of *item&* = 0 with a multiple selection listbox, then all string data items are selected. LISTBOX SELECT may be used with both single and multiple selection listboxes.

LISTBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*.

The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort the items, use LISTBOX DELETE followed by LISTBOXADD instead.

LISTBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTBOX SET USER, and retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTBOX user values, every [DDI](#) control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX UNSELECT *hDlg, id& [,item&]*

The string value specified by *item&* is set to an unselected state for the LISTBOX control.

The value of *item&* = 1 for the first item, 2 for the second item, etc. If *item&* is missing, or has the value zero, all items are set to an unselected state. LISTBOX UNSELECT may be used with both single and multiple selection listboxes.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD LISTBOX](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#)

LISTBOX GET SELECT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTBOX statement IMPROVED

Purpose Manipulate a [LISTBOX](#) control in order to set/retrieve data.

Syntax

```
LISTBOX ADD hDlg, id&, StrExpr [TO datav&]
LISTBOX DELETE hDlg, id&, item&
LISTBOX FIND hDlg, id&, item&, StrExpr TO datav&
LISTBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTBOX GET COUNT hDlg, id& TO datav&
LISTBOX GET SELCOUNT hDlg, id& TO datav&
LISTBOX GET SELECT hDlg, id& [,item&] TO datav&
LISTBOX GET STATE hDlg, id&, item& TO datav&
LISTBOX GET TEXT hDlg, id& [,item&] TO txtv$
LISTBOX GET USER hDlg, id&, item& TO datav&
LISTBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
LISTBOX RESET hDlg, id&
```

```
LISTBOX SELECT hDlg, id&, item&
LISTBOX SET TEXT hDlg, id&, item&, StrExpr
LISTBOX SET USER hDlg, id&, item&, NumExpr
LISTBOX UNSELECT hDlg, id& [,item&]
```

| | |
|-------------------|--|
| <i>hDlg</i> | Handle of the dialog that owns the list box. |
| <i>id&</i> | The control identifier assigned with CONTROL ADD LISTBOX . |
| <i>item&</i> | Position of data in the LISTBOX. First string=1, second=2... |
| <i>NumExpr</i> | A expression passed as a parameter. |
| <i>StrExpr</i> | A string expression passed as a parameter. |
| <i>txtv\$</i> | A variable to which result text is assigned. |
| <i>datav&</i> | A long integer variable to which result data is assigned. |

Remarks

In each of the following samples and descriptions, the LISTBOX control which is the subject of the statement is identified by the handle of the dialog that owns the LISTBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD LISTBOX.

The value *item&* refers to the position of the string data item in the LISTBOX, and is always indexed to one. The first string is position 1, the second is position 2, and so forth.

LISTBOX ADD *hDlg*, *id&*, *StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the LISTBOX control. If the LISTBOX has the [%LBS_SORT](#) style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

LISTBOX DELETE *hDlg*, *id&*, *item&*

The string at the position specified by *item&* is deleted from the LISTBOX. The parameter *item&* is indexed to one (1 for the first string, 2 for the second, and so on).

LISTBOX FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX GET COUNT *hDlg, id& TO datav&*

The number of items in the LISTBOX is retrieved, and assigned to the [long integer](#) variable specified by *datav&*.

LISTBOX GET SELCOUNT *hDlg, id& TO datav&*

The number of selected items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELECT *hDlg, id& [,item&] TO datav&*

The LISTBOX is searched to find the first selected item. If the *item&* parameter is included, searching starts at that position to facilitate retrieving multiple selected items. If *item&* is omitted, the search starts at the first data item. The index number of the selected item is assigned to the variable designated by *datav&*. If no item is selected, the value zero (0) is assigned to it.

LISTBOX GET STATE *hDlg, id&, item& TO datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTBOX GET TEXT *hDlg, id& [,item&] TO txtv\$*

Text is retrieved from the LISTBOX and assigned to the string variable specified by *txtv\$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc.

The parameter *item&* may be omitted, or contain the value zero (0). In the case of a single-selection listbox, the current selected text (if any) is retrieved and assigned to *txtv\$*. With a multiple-selection listbox ([%LBS_MULTIPLESEL](#) or [%LBS_EXTENDEDSSEL](#) style), the text of the first (base) selected item is assigned to *txtv\$*. To retrieve additional selected text items from a multiple-selection listbox, use LISTBOX GET SELECT to retrieve selected item numbers. Then apply the item numbers with LISTBOX GET TEXT to retrieve the string data.

LISTBOX GET USER *hDlg, id&, item& TO datav&*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTBOX user values are assigned with the LISTBOX SET USER statement. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTBOX INSERT *hDlg, id&, item&, StrExpr [TO datav&]*

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style [%LBS_SORT](#). If you wish to sort all of the items, use LISTBOXADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

LISTBOX RESET *hDlg, id&*

Delete all contents of the specified LISTBOX.

LISTBOX SELECT *hDlg, id&, item&*

The string data item specified by *item&* is chosen as selected text for the LISTBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc. If the value of *item&* = 0 with a multiple selection listbox, then all string data items are selected. LISTBOX SELECT may be used with both single and multiple selection listboxes.

LISTBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort the items, use LISTBOX DELETE followed by LISTBOXADD instead.

LISTBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTBOX SET USER, and retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTBOX user values, every [DDI](#) control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX UNSELECT *hDlg, id& [,item&]*

The string value specified by *item&* is set to an unselected state for the LISTBOX control. The value of *item&* = 1 for the first item, 2 for the second item, etc. If *item&* is missing, or has the value zero, all items are set to an unselected state. LISTBOX UNSELECT may be used with both single and multiple selection listboxes.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD LISTBOX](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#)

LISTBOX GET STATE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTBOX statement IMPROVED

Purpose Manipulate a [LISTBOX](#) control in order to set/retrieve data.

Syntax

```
LISTBOX ADD hDlg, id&, StrExpr [TO datav&]
LISTBOX DELETE hDlg, id&, item&
LISTBOX FIND hDlg, id&, item&, StrExpr TO datav&
```

```

LISTBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTBOX GET COUNT hDlg, id& TO datav&
LISTBOX GET SELCOUNT hDlg, id& TO datav&
LISTBOX GET SELECT hDlg, id& [,item&] TO datav&
LISTBOX GET STATE hDlg, id&, item& TO datav&
LISTBOX GET TEXT hDlg, id& [,item&] TO txtv$
LISTBOX GET USER hDlg, id&, item& TO datav&
LISTBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
LISTBOX RESET hDlg, id&
LISTBOX SELECT hDlg, id&, item&
LISTBOX SET TEXT hDlg, id&, item&, StrExpr
LISTBOX SET USER hDlg, id&, item&, NumExpr
LISTBOX UNSELECT hDlg, id& [,item&]

```

| | |
|-------------------|--|
| <i>hDlg</i> | Handle of the dialog that owns the list box. |
| <i>id&</i> | The control identifier assigned with CONTROL ADD LISTBOX . |
| <i>item&</i> | Position of data in the LISTBOX. First string=1, second=2... |
| <i>NumExpr</i> | A expression passed as a parameter. |
| <i>StrExpr</i> | A string expression passed as a parameter. |
| <i>txtv\$</i> | A variable to which result text is assigned. |
| <i>datav&</i> | A long integer variable to which result data is assigned. |
| Remarks | In each of the following samples and descriptions, the LISTBOX control which is the subject of the statement is identified by the handle of the dialog that owns the LISTBOX (<i>hDlg</i>), and the unique control identifier you gave it upon creation in CONTROL ADD LISTBOX. The value <i>item&</i> refers to the position of the string data item in the LISTBOX, and is always indexed to one. The first string is position 1, the second is position 2, and so forth. |

LISTBOX ADD *hDlg*, *id&*, *StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the LISTBOX control. If the LISTBOX has the [%LBS_SORT](#) style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

LISTBOX DELETE *hDlg*, *id&*, *item&*

The string at the position specified by *item&* is deleted from the LISTBOX. The parameter *item&* is indexed to one (1 for the first string, 2 for the second, and so on).

LISTBOX FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX GET COUNT *hDlg, id& TO datav&*

The number of items in the LISTBOX is retrieved, and assigned to the [long integer](#) variable specified by *datav&*.

LISTBOX GET SELCOUNT *hDlg, id& TO datav&*

The number of selected items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELECT *hDlg, id& [,item&] TO datav&*

The LISTBOX is searched to find the first selected item. If the *item&* parameter is included, searching starts at that position to facilitate retrieving multiple selected items. If *item&* is omitted, the search starts at the first data item. The index number of the selected item is assigned to the variable designated by *datav&*. If no item is selected, the value zero (0) is assigned to it.

LISTBOX GET STATE *hDlg, id&, item& TO datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTBOX GET TEXT *hDlg, id& [,item&] TO txtv\$*

Text is retrieved from the LISTBOX and assigned to the string variable specified by *txtv\$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc.

The parameter *item&* may be omitted, or contain the value zero (0). In the case of a single-selection listbox, the current selected text (if any) is retrieved and assigned to *txtv\$*. With a multiple-selection listbox ([%LBS_MULTIPLESEL](#) or [%LBS_EXTENDESEL](#) style), the text of the first (base) selected item is assigned to *txtv\$*. To retrieve additional selected text items from a multiple-selection listbox, use LISTBOX GET SELECT to retrieve selected item numbers. Then apply the item numbers with LISTBOX GET TEXT to retrieve the string data.

LISTBOX GET USER *hDlg, id&, item& TO datav&*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTBOX user values are assigned with the LISTBOX SET USER statement. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTBOX INSERT *hDlg, id&, item&, StrExpr [TO datav&]*

The text for a new data item, specified by *StrExpr*, is inserted at the location given by

item&. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style [%LBS_SORT](#). If you wish to sort all of the items, use LISTBOXADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

LISTBOX RESET *hDlg, id&*

Delete all contents of the specified LISTBOX.

LISTBOX SELECT *hDlg, id&, item&*

The string data item specified by *item&* is chosen as selected text for the LISTBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc. If the value of *item&* = 0 with a multiple selection listbox, then all string data items are selected. LISTBOX SELECT may be used with both single and multiple selection listboxes.

LISTBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style [%LBS_SORT](#). If you wish to sort the items, use LISTBOX DELETE followed by LISTBOXADD instead.

LISTBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTBOX SET USER, and retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTBOX user values, every [DDI](#) control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX UNSELECT *hDlg, id& [,item&]*

The string value specified by *item&* is set to an unselected state for the LISTBOX control. The value of *item&* = 1 for the first item, 2 for the second item, etc. If *item&* is missing, or has the value zero, all items are set to an unselected state. LISTBOX UNSELECT may be used with both single and multiple selection listboxes.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD LISTBOX](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#)

LISTBOX GET TEXT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTBOX statement IMPROVED

Purpose Manipulate a [LISTBOX](#) control in order to set/retrieve data.

Syntax

```
LISTBOX ADD hDlg, id&, StrExpr [TO datav&]
LISTBOX DELETE hDlg, id&, item&
LISTBOX FIND hDlg, id&, item&, StrExpr TO datav&
LISTBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTBOX GET COUNT hDlg, id& TO datav&
LISTBOX GET SELCOUNT hDlg, id& TO datav&
LISTBOX GET SELECT hDlg, id& [, item&] TO datav&
LISTBOX GET STATE hDlg, id&, item& TO datav&
LISTBOX GET TEXT hDlg, id& [, item&] TO txtv$
LISTBOX GET USER hDlg, id&, item& TO datav&
LISTBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
LISTBOX RESET hDlg, id&
LISTBOX SELECT hDlg, id&, item&
LISTBOX SET TEXT hDlg, id&, item&, StrExpr
LISTBOX SET USER hDlg, id&, item&, NumExpr
LISTBOX UNSELECT hDlg, id& [, item&]
```

hDlg [Handle](#) of the [dialog](#) that owns the list box.

id& The [control identifier](#) assigned with [CONTROL ADD LISTBOX](#).

item& Position of data in the LISTBOX. First string=1, second=2...

NumExpr A
expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A
variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the LISTBOX control which is the subject of the statement is identified by the handle of the dialog that owns the LISTBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD LISTBOX.

The value *item*& refers to the position of the string data item in the LISTBOX, and is always indexed to one. The first string is position 1, the second is position 2, and so forth.

LISTBOX ADD *hDlg*, *id*&, *StrExpr* [TO *datav*&]

The string value specified by *StrExpr* is added to the LISTBOX control. If the LISTBOX has the [%LBS_SORT](#) style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav*&. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

LISTBOX DELETE *hDlg*, *id*&, *item*&

The string at the position specified by *item*& is deleted from the LISTBOX. The parameter *item*& is indexed to one (1 for the first string, 2 for the second, and so on).

LISTBOX FIND *hDlg*, *id*&, *item*&, *StrExpr* TO *datav*&

Strings in the LISTBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive.

Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the LISTBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX GET COUNT *hDlg, id& TO datav&*

The number of items in the LISTBOX is retrieved, and assigned to the [long integer](#) variable specified by *datav&*.

LISTBOX GET SELCOUNT *hDlg, id& TO datav&*

The number of selected items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELECT *hDlg, id& [,item&] TO datav&*

The LISTBOX is searched to find the first selected item. If the *item&* parameter is included, searching starts at that position to facilitate retrieving multiple selected items. If *item&* is omitted, the search starts at the first data item. The index number of the selected item is assigned to the variable designated by *datav&*. If no item is selected, the value zero (0) is assigned to it.

LISTBOX GET STATE *hDlg, id&, item& TO datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTBOX GET TEXT *hDlg, id& [,item&] TO txtv\$*

Text is retrieved from the LISTBOX and assigned to the string variable specified by *txtv\$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc.

The parameter *item&* may be omitted, or contain the value zero (0). In the case of a single-selection listbox, the current selected text (if any) is retrieved and assigned to *txtv\$*. With a multiple-selection listbox ([%LBS_MULTIPLESEL](#) or [%LBS_EXTENDEDSEL](#) style), the text of the first (base) selected item is assigned to *txtv\$*. To retrieve additional selected text items from a multiple-selection listbox, use LISTBOX GET SELECT to retrieve selected item numbers. Then apply the item numbers with LISTBOX GET TEXT to retrieve the string data.

LISTBOX GET USER *hDlg, id&, item& TO datav&*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the

second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTBOX user values are assigned with the LISTBOX SET USER statement. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTBOX INSERT *hDlg, id&, item&, StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style [%LBS_SORT](#). If you wish to sort all of the items, use LISTBOXADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

LISTBOX RESET *hDlg, id&*

Delete all contents of the specified LISTBOX.

LISTBOX SELECT *hDlg, id&, item&*

The string data item specified by *item&* is chosen as selected text for the LISTBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc. If the value of *item&* = 0 with a multiple selection listbox, then all string data items are selected. LISTBOX SELECT may be used with both single and multiple selection listboxes.

LISTBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style [%LBS_SORT](#). If you wish to sort the items, use LISTBOX DELETE followed by LISTBOXADD instead.

LISTBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTBOX SET USER, and retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTBOX user values, every [DDT](#) control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX UNSELECT *hDlg, id&* [,*item&*]

The string value specified by *item&* is set to an unselected state for the LISTBOX control. The value of *item&* = 1 for the first item, 2 for the second item, etc. If *item&* is missing, or has the value zero, all items are set to an unselected state. LISTBOX UNSELECT may be used with both single and multiple selection listboxes.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD LISTBOX](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#)

LISTBOX GET USER statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTBOX statement IMPROVED

Purpose Manipulate a [LISTBOX](#) control in order to set/retrieve data.

Syntax

```
LISTBOX ADD hDlg, id&, StrExpr [TO datav&]
LISTBOX DELETE hDlg, id&, item&
LISTBOX FIND hDlg, id&, item&, StrExpr TO datav&
LISTBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTBOX GET COUNT hDlg, id& TO datav&
LISTBOX GET SELCOUNT hDlg, id& TO datav&
LISTBOX GET SELECT hDlg, id& [,item&] TO datav&
LISTBOX GET STATE hDlg, id&, item& TO datav&
LISTBOX GET TEXT hDlg, id& [,item&] TO txtv$
LISTBOX GET USER hDlg, id&, item& TO datav&
LISTBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
LISTBOX RESET hDlg, id&
LISTBOX SELECT hDlg, id&, item&
LISTBOX SET TEXT hDlg, id&, item&, StrExpr
LISTBOX SET USER hDlg, id&, item&, NumExpr
LISTBOX UNSELECT hDlg, id& [,item&]
```

hDlg [Handle](#) of the [dialog](#) that owns the list box.

id& The [control identifier](#) assigned with [CONTROL ADD LISTBOX](#).

item& Position of data in the LISTBOX. First string=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A

variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the LISTBOX control which is the subject of the statement is identified by the handle of the dialog that owns the LISTBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD LISTBOX.

The value *item&* refers to the position of the string data item in the LISTBOX, and is always indexed to one. The first string is position 1, the second is position 2, and so forth.

LISTBOX ADD *hDlg*, *id&*, *StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the LISTBOX control. If the LISTBOX has the [%LBS_SORT](#) style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

LISTBOX DELETE *hDlg, id&, item&*

The string at the position specified by *item&* is deleted from the LISTBOX. The parameter *item&* is indexed to one (1 for the first string, 2 for the second, and so on).

LISTBOX FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the LISTBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive.

Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the LISTBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX GET COUNT *hDlg, id& TO datav&*

The number of items in the LISTBOX is retrieved, and assigned to the [long integer](#) variable specified by *datav&*.

LISTBOX GET SELCOUNT *hDlg, id& TO datav&*

The number of selected items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELECT *hDlg, id& [,item&] TO datav&*

The LISTBOX is searched to find the first selected item. If the *item&* parameter is included, searching starts at that position to facilitate retrieving multiple selected items. If *item&* is omitted, the search starts at the first data item. The index number of the selected item is assigned to the variable designated by *datav&*. If no item is selected, the value zero (0) is assigned to it.

LISTBOX GET STATE *hDlg, id&, item& TO datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTBOX GET TEXT *hDlg, id& [,item&] TO txtv\$*

Text is retrieved from the LISTBOX and assigned to the string variable specified by *txtv\$*.

If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc.

The parameter *item&* may be omitted, or contain the value zero (0). In the case of a single-selection listbox, the current selected text (if any) is retrieved and assigned to *txtv\$*. With a multiple-selection listbox ([%LBS_MULTIPLESEL](#) or [%LBS_EXTENDEDSSEL](#) style), the text of the first (base) selected item is assigned to *txtv\$*. To retrieve additional

selected text items from a multiple-selection listbox, use LISTBOX GET SELECT to retrieve selected item numbers. Then apply the item numbers with LISTBOX GET TEXT to retrieve the string data.

LISTBOX GET USER *hDlg, id&, item& TO datav&*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTBOX user values are assigned with the LISTBOX SET USER statement. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTBOX INSERT *hDlg, id&, item&, StrExpr [TO datav&]*

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style [%LBS_SORT](#). If you wish to sort all of the items, use LISTBOXADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

LISTBOX RESET *hDlg, id&*

Delete all contents of the specified LISTBOX.

LISTBOX SELECT *hDlg, id&, item&*

The string data item specified by *item&* is chosen as selected text for the LISTBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc. If the value of *item&* = 0 with a multiple selection listbox, then all string data items are selected. LISTBOX SELECT may be used with both single and multiple selection listboxes.

LISTBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style [%LBS_SORT](#). If you wish to sort the items, use LISTBOX DELETE followed by LISTBOXADD instead.

LISTBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTBOX SET USER, and retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTBOX user values, every [DDT](#) control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX UNSELECT *hDlg, id& [,item&]*

The string value specified by *item&* is set to an unselected state for the LISTBOX control. The value of *item&* = 1 for the first item, 2 for the second item, etc. If *item&* is missing, or has the value zero, all items are set to an unselected state. LISTBOX UNSELECT may be used with both single and multiple selection listboxes.

Restrictions

Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of

Windows, the actual string data contained by the list box is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD LISTBOX](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#)

LISTBOX INSERT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTBOX statement IMPROVED

Purpose Manipulate a [LISTBOX](#) control in order to set/retrieve data.

Syntax

```
LISTBOX ADD hDlg, id&, StrExpr [TO datav&]
LISTBOX DELETE hDlg, id&, item&
LISTBOX FIND hDlg, id&, item&, StrExpr TO datav&
LISTBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTBOX GET COUNT hDlg, id& TO datav&
LISTBOX GET SELCOUNT hDlg, id& TO datav&
LISTBOX GET SELECT hDlg, id& [,item&] TO datav&
LISTBOX GET STATE hDlg, id&, item& TO datav&
LISTBOX GET TEXT hDlg, id& [,item&] TO txtv$
LISTBOX GET USER hDlg, id&, item& TO datav&
LISTBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
LISTBOX RESET hDlg, id&
LISTBOX SELECT hDlg, id&, item&
LISTBOX SET TEXT hDlg, id&, item&, StrExpr
LISTBOX SET USER hDlg, id&, item&, NumExpr
LISTBOX UNSELECT hDlg, id& [,item&]
```

hDlg [Handle](#) of the [dialog](#) that owns the list box.

id& The [control identifier](#) assigned with [CONTROL ADD LISTBOX](#).

item& Position of data in the LISTBOX. First string=1, second=2...

NumExpr A
expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A
variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the LISTBOX control which is the subject of the statement is identified by the handle of the dialog that owns the LISTBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD LISTBOX.

The value *item&* refers to the position of the string data item in the LISTBOX, and is always indexed to one. The first string is position 1, the second is position 2, and so forth.

LISTBOX ADD *hDlg, id&, StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the LISTBOX control. If the LISTBOX has the [%LBS_SORT](#) style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

LISTBOX DELETE *hDlg, id&, item&*

The string at the position specified by *item&* is deleted from the LISTBOX. The parameter *item&* is indexed to one (1 for the first string, 2 for the second, and so on).

LISTBOX FIND *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX FIND EXACT *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX GET COUNT *hDlg, id&* TO *datav&*

The number of items in the LISTBOX is retrieved, and assigned to the [long integer](#) variable specified by *datav&*.

LISTBOX GET SELCOUNT *hDlg, id&* TO *datav&*

The number of selected items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELECT *hDlg, id&* [,*item&*] TO *datav&*

The LISTBOX is searched to find the first selected item. If the *item&* parameter is included, searching starts at that position to facilitate retrieving multiple selected items. If *item&* is omitted, the search starts at the first data item. The index number of the selected item is assigned to the variable designated by *datav&*. If no item is selected, the value zero (0) is assigned to it.

LISTBOX GET STATE *hDlg, id&, item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTBOX GET TEXT *hDlg, id& [,item&] TO txtv\$*

Text is retrieved from the LISTBOX and assigned to the string variable specified by *txtv\$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc.

The parameter *item&* may be omitted, or contain the value zero (0). In the case of a single-selection listbox, the current selected text (if any) is retrieved and assigned to *txtv\$*. With a multiple-selection listbox ([%LBS_MULTIPLESEL](#) or [%LBS_EXTENDEDSEL](#) style), the text of the first (base) selected item is assigned to *txtv\$*. To retrieve additional selected text items from a multiple-selection listbox, use LISTBOX GET SELECT to retrieve selected item numbers. Then apply the item numbers with LISTBOX GET TEXT to retrieve the string data.

LISTBOX GET USER *hDlg, id&, item& TO datav&*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTBOX user values are assigned with the LISTBOX SET USER statement. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTBOX INSERT *hDlg, id&, item&, StrExpr [TO datav&]*

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style [%LBS_SORT](#). If you wish to sort all of the items, use LISTBOXADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

LISTBOX RESET *hDlg, id&*

Delete all contents of the specified LISTBOX.

LISTBOX SELECT *hDlg, id&, item&*

The string data item specified by *item&* is chosen as selected text for the LISTBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc. If the value of *item&* = 0 with a multiple selection listbox, then all string data items are selected. LISTBOX SELECT may be used with both single and multiple selection listboxes.

LISTBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style [%LBS_SORT](#). If you wish to sort the items, use LISTBOX DELETE followed by LISTBOXADD instead.

LISTBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTBOX SET USER, and retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTBOX user values, every [DDT](#) control offers an additional eight user values which can be accessed with CONTROL GET

USER and CONTROL SET USER.

LISTBOX UNSELECT *hDlg, id& [,item&]*

The string value specified by *item&* is set to an unselected state for the LISTBOX control. The value of *item&* = 1 for the first item, 2 for the second item, etc. If *item&* is missing, or has the value zero, all items are set to an unselected state. LISTBOX UNSELECT may be used with both single and multiple selection listboxes.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD LISTBOX](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#)

LISTBOX RESET statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTBOX statement IMPROVED

Purpose Manipulate a [LISTBOX](#) control in order to set/retrieve data.

Syntax

```
LISTBOX ADD hDlg, id&, StrExpr [TO datav&]
LISTBOX DELETE hDlg, id&, item&
LISTBOX FIND hDlg, id&, item&, StrExpr TO datav&
LISTBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTBOX GET COUNT hDlg, id& TO datav&
LISTBOX GET SELCOUNT hDlg, id& TO datav&
LISTBOX GET SELECT hDlg, id& [,item&] TO datav&
LISTBOX GET STATE hDlg, id&, item& TO datav&
LISTBOX GET TEXT hDlg, id& [,item&] TO txtv$
LISTBOX GET USER hDlg, id&, item& TO datav&
LISTBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
LISTBOX RESET hDlg, id&
LISTBOX SELECT hDlg, id&, item&
LISTBOX SET TEXT hDlg, id&, item&, StrExpr
LISTBOX SET USER hDlg, id&, item&, NumExpr
LISTBOX UNSELECT hDlg, id& [,item&]
```

hDlg [Handle](#) of the [dialog](#) that owns the list box.

id& The [control identifier](#) assigned with [CONTROL ADD LISTBOX](#).

item& Position of data in the LISTBOX. First string=1, second=2...

NumExpr A
expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A
variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the LISTBOX control which is the subject of the statement is identified by the handle of the dialog that owns the LISTBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD LISTBOX

The value *item&* refers to the position of the string data item in the LISTBOX, and is always indexed to one. The first string is position 1, the second is position 2, and so forth.

LISTBOX ADD *hDlg, id&, StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the LISTBOX control. If the LISTBOX has the [%LBS_SORT](#) style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

LISTBOX DELETE *hDlg, id&, item&*

The string at the position specified by *item&* is deleted from the LISTBOX. The parameter *item&* is indexed to one (1 for the first string, 2 for the second, and so on).

LISTBOX FIND *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX FIND EXACT *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX GET COUNT *hDlg, id&* TO *datav&*

The number of items in the LISTBOX is retrieved, and assigned to the [long integer](#) variable specified by *datav&*.

LISTBOX GET SELCOUNT *hDlg, id&* TO *datav&*

The number of selected items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELECT *hDlg, id&* [,*item&*] TO *datav&*

The LISTBOX is searched to find the first selected item. If the *item&* parameter is included, searching starts at that position to facilitate retrieving multiple selected items. If *item&* is omitted, the search starts at the first data item. The index number of the selected item is assigned to the variable designated by *datav&*. If no item is selected,

the value zero (0) is assigned to it.

LISTBOX GET STATE *hDlg, id&, item& TO datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTBOX GET TEXT *hDlg, id& [,item&] TO txtv\$*

Text is retrieved from the LISTBOX and assigned to the string variable specified by *txtv\$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc.

The parameter *item&* may be omitted, or contain the value zero (0). In the case of a single-selection listbox, the current selected text (if any) is retrieved and assigned to *txtv\$*. With a multiple-selection listbox ([%LBS_MULTIPLESEL](#) or [%LBS_EXTENDESEL](#) style), the text of the first (base) selected item is assigned to *txtv\$*. To retrieve additional selected text items from a multiple-selection listbox, use LISTBOX GET SELECT to retrieve selected item numbers. Then apply the item numbers with LISTBOX GET TEXT to retrieve the string data.

LISTBOX GET USER *hDlg, id&, item& TO datav&*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTBOX user values are assigned with the LISTBOX SET USER statement. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTBOX INSERT *hDlg, id&, item&, StrExpr [TO datav&]*

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style [%LBS_SORT](#). If you wish to sort all of the items, use LISTBOXADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

LISTBOX RESET *hDlg, id&*

Delete all contents of the specified LISTBOX.

LISTBOX SELECT *hDlg, id&, item&*

The string data item specified by *item&* is chosen as selected text for the LISTBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc. If the value of *item&* = 0 with a multiple selection listbox, then all string data items are selected. LISTBOX SELECT may be used with both single and multiple selection listboxes.

LISTBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*.

The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style [%LBS_SORT](#). If you wish to sort the items, use LISTBOX DELETE followed by LISTBOXADD instead.

LISTBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTBOX SET USER, and retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTBOX user values, every [DDI](#) control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX UNSELECT *hDlg, id& [,item&]*

The string value specified by *item&* is set to an unselected state for the LISTBOX control. The value of *item&* = 1 for the first item, 2 for the second item, etc. If *item&* is missing, or has the value zero, all items are set to an unselected state. LISTBOX UNSELECT may be used with both single and multiple selection listboxes.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD LISTBOX](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#)

LISTBOX SELECT statement

Keyword Template

Purpose**Syntax****Remarks****See also****Example**

LISTBOX statement IMPROVED

Purpose Manipulate a [LISTBOX](#) control in order to set/retrieve data.

Syntax

```
LISTBOX ADD hDlg, id&, StrExpr [TO datav&]
LISTBOX DELETE hDlg, id&, item&
LISTBOX FIND hDlg, id&, item&, StrExpr TO datav&
LISTBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTBOX GET COUNT hDlg, id& TO datav&
LISTBOX GET SELCOUNT hDlg, id& TO datav&
LISTBOX GET SELECT hDlg, id& [,item&] TO datav&
LISTBOX GET STATE hDlg, id&, item& TO datav&
LISTBOX GET TEXT hDlg, id& [,item&] TO txtv$
LISTBOX GET USER hDlg, id&, item& TO datav&
LISTBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
LISTBOX RESET hDlg, id&
LISTBOX SELECT hDlg, id&, item&
LISTBOX SET TEXT hDlg, id&, item&, StrExpr
LISTBOX SET USER hDlg, id&, item&, NumExpr
LISTBOX UNSELECT hDlg, id& [,item&]
```

hDlg [Handle](#) of the [dialog](#) that owns the list box.

id& The [control identifier](#) assigned with [CONTROL ADD LISTBOX](#).

| | |
|-------------------|---|
| <i>item&</i> | Position of data in the LISTBOX. First string=1, second=2... |
| <i>NumExpr</i> | A expression passed as a parameter. |
| <i>StrExpr</i> | A string expression passed as a parameter. |
| <i>txtv\$</i> | A variable to which result text is assigned. |
| <i>datav&</i> | A long integer variable to which result data is assigned. |
| Remarks | In each of the following samples and descriptions, the LISTBOX control which is the subject of the statement is identified by the handle of the dialog that owns the LISTBOX (<i>hDlg</i>), and the unique control identifier you gave it upon creation in CONTROL ADD LISTBOX. |

The value *item&* refers to the position of the string data item in the LISTBOX, and is always indexed to one. The first string is position 1, the second is position 2, and so forth.

LISTBOX ADD *hDlg, id&, StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the LISTBOX control. If the LISTBOX has the [%LBS_SORT](#) style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

LISTBOX DELETE *hDlg, id&, item&*

The string at the position specified by *item&* is deleted from the LISTBOX. The parameter *item&* is indexed to one (1 for the first string, 2 for the second, and so on).

LISTBOX FIND *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX FIND EXACT *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX GET COUNT *hDlg, id&* TO *datav&*

The number of items in the LISTBOX is retrieved, and assigned to the [long integer](#) variable specified by *datav&*.

LISTBOX GET SELCOUNT *hDlg, id&* TO *datav&*

The number of selected items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELECT *hDlg, id& [,item&] TO datav&*

The LISTBOX is searched to find the first selected item. If the *item&* parameter is included, searching starts at that position to facilitate retrieving multiple selected items. If *item&* is omitted, the search starts at the first data item. The index number of the selected item is assigned to the variable designated by *datav&*. If no item is selected, the value zero (0) is assigned to it.

LISTBOX GET STATE *hDlg, id&, item& TO datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTBOX GET TEXT *hDlg, id& [,item&] TO txtv\$*

Text is retrieved from the LISTBOX and assigned to the string variable specified by *txtv\$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc.

The parameter *item&* may be omitted, or contain the value zero (0). In the case of a single-selection listbox, the current selected text (if any) is retrieved and assigned to *txtv\$*. With a multiple-selection listbox ([%LBS_MULTIPLESEL](#) or [%LBS_EXTENDEDSEL](#) style), the text of the first (base) selected item is assigned to *txtv\$*. To retrieve additional selected text items from a multiple-selection listbox, use LISTBOX GET SELECT to retrieve selected item numbers. Then apply the item numbers with LISTBOX GET TEXT to retrieve the string data.

LISTBOX GET USER *hDlg, id&, item& TO datav&*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTBOX user values are assigned with the LISTBOX SET USER statement. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTBOX INSERT *hDlg, id&, item&, StrExpr [TO datav&]*

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style [%LBS_SORT](#). If you wish to sort all of the items, use LISTBOXADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

LISTBOX RESET *hDlg, id&*

Delete all contents of the specified LISTBOX.

LISTBOX SELECT *hDlg, id&, item&*

The string data item specified by *item&* is chosen as selected text for the LISTBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc. If the value of *item&* = 0 with a multiple

selection listbox, then all string data items are selected. LISTBOX SELECT may be used with both single and multiple selection listboxes.

LISTBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*.

The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort the items, use LISTBOX DELETE followed by LISTBOXADD instead.

LISTBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTBOX SET USER, and retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTBOX user values, every [DDI](#) control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX UNSELECT *hDlg, id& [,item&]*

The string value specified by *item&* is set to an unselected state for the LISTBOX control.

The value of *item&* = 1 for the first item, 2 for the second item, etc. If *item&* is missing, or has the value zero, all items are set to an unselected state. LISTBOX UNSELECT may be used with both single and multiple selection listboxes.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD LISTBOX](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#)

LISTBOX SET TEXT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTBOX statement IMPROVED

Purpose Manipulate a [LISTBOX](#) control in order to set/retrieve data.

Syntax

```
LISTBOX ADD hDlg, id&, StrExpr [TO datav&]
LISTBOX DELETE hDlg, id&, item&
LISTBOX FIND hDlg, id&, item&, StrExpr TO datav&
LISTBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTBOX GET COUNT hDlg, id& TO datav&
LISTBOX GET SELCOUNT hDlg, id& TO datav&
LISTBOX GET SELECT hDlg, id& [,item&] TO datav&
LISTBOX GET STATE hDlg, id&, item& TO datav&
LISTBOX GET TEXT hDlg, id& [,item&] TO txtv$
```

```

LISTBOX GET USER hDlg, id&, item& TO datav&
LISTBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
LISTBOX RESET hDlg, id&
LISTBOX SELECT hDlg, id&, item&
LISTBOX SET TEXT hDlg, id&, item&, StrExpr
LISTBOX SET USER hDlg, id&, item&, NumExpr
LISTBOX UNSELECT hDlg, id& [,item&]

```

| | |
|-------------------|--|
| <i>hDlg</i> | Handle of the dialog that owns the list box. |
| <i>id&</i> | The control identifier assigned with CONTROL ADD LISTBOX . |
| <i>item&</i> | Position of data in the LISTBOX. First string=1, second=2... |
| <i>NumExpr</i> | A expression passed as a parameter. |
| <i>StrExpr</i> | A string expression passed as a parameter. |
| <i>txtv\$</i> | A variable to which result text is assigned. |
| <i>datav&</i> | A long integer variable to which result data is assigned. |

Remarks In each of the following samples and descriptions, the LISTBOX control which is the subject of the statement is identified by the handle of the dialog that owns the LISTBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD LISTBOX.

The value *item&* refers to the position of the string data item in the LISTBOX, and is always indexed to one. The first string is position 1, the second is position 2, and so forth.

LISTBOX ADD *hDlg*, *id&*, *StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the LISTBOX control. If the LISTBOX has the [%LBS_SORT](#) style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

LISTBOX DELETE *hDlg*, *id&*, *item&*

The string at the position specified by *item&* is deleted from the LISTBOX. The parameter *item&* is indexed to one (1 for the first string, 2 for the second, and so on).

LISTBOX FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string,

item& should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX GET COUNT *hDlg, id& TO datav&*

The number of items in the LISTBOX is retrieved, and assigned to the [long integer](#) variable specified by *datav&*.

LISTBOX GET SELCOUNT *hDlg, id& TO datav&*

The number of selected items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELECT *hDlg, id& [,item&] TO datav&*

The LISTBOX is searched to find the first selected item. If the *item&* parameter is included, searching starts at that position to facilitate retrieving multiple selected items. If *item&* is omitted, the search starts at the first data item. The index number of the selected item is assigned to the variable designated by *datav&*. If no item is selected, the value zero (0) is assigned to it.

LISTBOX GET STATE *hDlg, id&, item& TO datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTBOX GET TEXT *hDlg, id& [,item&] TO txtv\$*

Text is retrieved from the LISTBOX and assigned to the string variable specified by *txtv\$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc.

The parameter *item&* may be omitted, or contain the value zero (0). In the case of a single-selection listbox, the current selected text (if any) is retrieved and assigned to *txtv\$*. With a multiple-selection listbox ([%LBS_MULTIPLESEL](#) or [%LBS_EXTENDESEL](#) style), the text of the first (base) selected item is assigned to *txtv\$*. To retrieve additional selected text items from a multiple-selection listbox, use LISTBOX GET SELECT to retrieve selected item numbers. Then apply the item numbers with LISTBOX GET TEXT to retrieve the string data.

LISTBOX GET USER *hDlg, id&, item& TO datav&*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTBOX user values are assigned with the LISTBOX SET USER statement. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTBOX INSERT *hDlg, id&, item&, StrExpr [TO datav&]*

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style [%LBS_SORT](#). If you wish to sort all of the items, use LISTBOXADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the

index is less than one, an error occurred and no string was inserted.

LISTBOX RESET *hDlg, id&*

Delete all contents of the specified LISTBOX.

LISTBOX SELECT *hDlg, id&, item&*

The string data item specified by *item&* is chosen as selected text for the LISTBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc. If the value of *item&* = 0 with a multiple selection listbox, then all string data items are selected. LISTBOX SELECT may be used with both single and multiple selection listboxes.

LISTBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort the items, use LISTBOX DELETE followed by LISTBOX ADD instead.

LISTBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTBOX SET USER, and retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTBOX user values, every [DDT](#) control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX UNSELECT *hDlg, id& [,item&]*

The string value specified by *item&* is set to an unselected state for the LISTBOX control. The value of *item&* = 1 for the first item, 2 for the second item, etc. If *item&* is missing, or has the value zero, all items are set to an unselected state. LISTBOX UNSELECT may be used with both single and multiple selection listboxes.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD LISTBOX](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#)

LISTBOX SET USER statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTBOX statement IMPROVED

Purpose Manipulate a [LISTBOX](#) control in order to set/retrieve data.

Syntax

```
LISTBOX ADD hDlg, id&, StrExpr [TO datav&]
LISTBOX DELETE hDlg, id&, item&
LISTBOX FIND hDlg, id&, item&, StrExpr TO datav&
LISTBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTBOX GET COUNT hDlg, id& TO datav&
LISTBOX GET SELCOUNT hDlg, id& TO datav&
LISTBOX GET SELECT hDlg, id& [,item&] TO datav&
LISTBOX GET STATE hDlg, id&, item& TO datav&
LISTBOX GET TEXT hDlg, id& [,item&] TO txtv$
LISTBOX GET USER hDlg, id&, item& TO datav&
LISTBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
LISTBOX RESET hDlg, id&
LISTBOX SELECT hDlg, id&, item&
LISTBOX SET TEXT hDlg, id&, item&, StrExpr
LISTBOX SET USER hDlg, id&, item&, NumExpr
LISTBOX UNSELECT hDlg, id& [,item&]
```

hDlg [Handle](#) of the [dialog](#) that owns the list box.

id& The [control identifier](#) assigned with [CONTROL ADD LISTBOX](#).

item& Position of data in the LISTBOX. First string=1, second=2...

NumExpr A
expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A
variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the LISTBOX control which is the subject of the statement is identified by the handle of the dialog that owns the LISTBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD LISTBOX.

The value *item*& refers to the position of the string data item in the LISTBOX, and is always indexed to one. The first string is position 1, the second is position 2, and so forth.

LISTBOX ADD *hDlg*, *id*&, *StrExpr* [TO *datav*&]

The string value specified by *StrExpr* is added to the LISTBOX control. If the LISTBOX has the [%LBS_SORT](#) style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav*&. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

LISTBOX DELETE *hDlg*, *id*&, *item*&

The string at the position specified by *item*& is deleted from the LISTBOX. The parameter *item*& is indexed to one (1 for the first string, 2 for the second, and so on).

LISTBOX FIND *hDlg*, *id*&, *item*&, *StrExpr* TO *datav*&

Strings in the LISTBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive.

Strings are searched beginning with the string specified by *item*&, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item*&) is indexed to 1 (1=first, 2=second, etc.). To search the entire

LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the LISTBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX GET COUNT *hDlg, id& TO datav&*

The number of items in the LISTBOX is retrieved, and assigned to the [long integer](#) variable specified by *datav&*.

LISTBOX GET SELCOUNT *hDlg, id& TO datav&*

The number of selected items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELECT *hDlg, id& [,item&] TO datav&*

The LISTBOX is searched to find the first selected item. If the *item&* parameter is included, searching starts at that position to facilitate retrieving multiple selected items. If *item&* is omitted, the search starts at the first data item. The index number of the selected item is assigned to the variable designated by *datav&*. If no item is selected, the value zero (0) is assigned to it.

LISTBOX GET STATE *hDlg, id&, item& TO datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTBOX GET TEXT *hDlg, id& [,item&] TO txtv\$*

Text is retrieved from the LISTBOX and assigned to the string variable specified by *txtv\$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc.

The parameter *item&* may be omitted, or contain the value zero (0). In the case of a single-selection listbox, the current selected text (if any) is retrieved and assigned to *txtv\$*. With a multiple-selection listbox ([%LBS_MULTIPLESEL](#) or [%LBS_EXTENDEDSEL](#) style), the text of the first (base) selected item is assigned to *txtv\$*. To retrieve additional selected text items from a multiple-selection listbox, use LISTBOX GET SELECT to retrieve selected item numbers. Then apply the item numbers with LISTBOX GET TEXT to retrieve the string data.

LISTBOX GET USER *hDlg, id&, item& TO datav&*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTBOX user values are assigned with the LISTBOX SET USER statement. In addition to these LISTBOX user values, every DDT control offers an

additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTBOX INSERT *hDlg, id&, item&, StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style [%LBS_SORT](#).

If you wish to sort all of the items, use LISTBOXADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

LISTBOX RESET *hDlg, id&*

Delete all contents of the specified LISTBOX.

LISTBOX SELECT *hDlg, id&, item&*

The string data item specified by *item&* is chosen as selected text for the LISTBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc. If the value of *item&* = 0 with a multiple selection listbox, then all string data items are selected. LISTBOX SELECT may be used with both single and multiple selection listboxes.

LISTBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*.

The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style [%LBS_SORT](#). If you wish to sort the items, use LISTBOX DELETE followed by LISTBOXADD instead.

LISTBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTBOX SET USER, and retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTBOX user values, every [DDI](#) control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX UNSELECT *hDlg, id&* [,*item&*]

The string value specified by *item&* is set to an unselected state for the LISTBOX control.

The value of *item&* = 1 for the first item, 2 for the second item, etc. If *item&* is missing, or has the value zero, all items are set to an unselected state. LISTBOX UNSELECT may be used with both single and multiple selection listboxes.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD LISTBOX](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#)

LISTBOX UNSELECT statement

Keyword Template

Purpose

Syntax
Remarks
See also
Example

LISTBOX statement IMPROVED

Purpose Manipulate a [LISTBOX](#) control in order to set/retrieve data.

Syntax

```
LISTBOX ADD hDlg, id&, StrExpr [TO datav&]
LISTBOX DELETE hDlg, id&, item&
LISTBOX FIND hDlg, id&, item&, StrExpr TO datav&
LISTBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTBOX GET COUNT hDlg, id& TO datav&
LISTBOX GET SELCOUNT hDlg, id& TO datav&
LISTBOX GET SELECT hDlg, id& [,item&] TO datav&
LISTBOX GET STATE hDlg, id&, item& TO datav&
LISTBOX GET TEXT hDlg, id& [,item&] TO txtv$
LISTBOX GET USER hDlg, id&, item& TO datav&
LISTBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
LISTBOX RESET hDlg, id&
LISTBOX SELECT hDlg, id&, item&
LISTBOX SET TEXT hDlg, id&, item&, StrExpr
LISTBOX SET USER hDlg, id&, item&, NumExpr
LISTBOX UNSELECT hDlg, id& [,item&]
```

hDlg [Handle](#) of the [dialog](#) that owns the list box.

id& The [control identifier](#) assigned with [CONTROL ADD LISTBOX](#).

item& Position of data in the LISTBOX. First string=1, second=2...

NumExpr A
expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A
variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the LISTBOX control which is the subject of the statement is identified by the handle of the dialog that owns the LISTBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD LISTBOX.

The value *item*& refers to the position of the string data item in the LISTBOX, and is always indexed to one. The first string is position 1, the second is position 2, and so forth.

LISTBOX ADD *hDlg*, *id*&, *StrExpr* [TO *datav*&]

The string value specified by *StrExpr* is added to the LISTBOX control. If the LISTBOX has the [%LBS_SORT](#) style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav*&. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

LISTBOX DELETE *hDlg*, *id*&, *item*&

The string at the position specified by *item*& is deleted from the LISTBOX. The parameter

item& is indexed to one (1 for the first string, 2 for the second, and so on).

LISTBOX FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the LISTBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive.

Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the LISTBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX GET COUNT *hDlg, id& TO datav&*

The number of items in the LISTBOX is retrieved, and assigned to the [long integer](#) variable specified by *datav&*.

LISTBOX GET SELCOUNT *hDlg, id& TO datav&*

The number of selected items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELECT *hDlg, id& [,item&] TO datav&*

The LISTBOX is searched to find the first selected item. If the *item&* parameter is included, searching starts at that position to facilitate retrieving multiple selected items. If *item&* is omitted, the search starts at the first data item. The index number of the selected item is assigned to the variable designated by *datav&*. If no item is selected, the value zero (0) is assigned to it.

LISTBOX GET STATE *hDlg, id&, item& TO datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTBOX GET TEXT *hDlg, id& [,item&] TO txtv\$*

Text is retrieved from the LISTBOX and assigned to the string variable specified by *txtv\$*.

If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc.

The parameter *item&* may be omitted, or contain the value zero (0). In the case of a single-selection listbox, the current selected text (if any) is retrieved and assigned to *txtv\$*. With a multiple-selection listbox ([%LBS_MULTIPLESEL](#) or [%LBS_EXTENDEDESEL](#) style), the text of the first (base) selected item is assigned to *txtv\$*. To retrieve additional selected text items from a multiple-selection listbox, use LISTBOX GET SELECT to retrieve selected item numbers. Then apply the item numbers with LISTBOX GET TEXT to retrieve the string data.

LISTBOX GET USER *hDlg, id&, item& TO datav&*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTBOX user values are assigned with the LISTBOX SET USER statement. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTBOX INSERT *hDlg, id&, item&, StrExpr [TO datav&]*

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style [%LBS_SORT](#). If you wish to sort all of the items, use LISTBOXADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

LISTBOX RESET *hDlg, id&*

Delete all contents of the specified LISTBOX.

LISTBOX SELECT *hDlg, id&, item&*

The string data item specified by *item&* is chosen as selected text for the LISTBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc. If the value of *item&* = 0 with a multiple selection listbox, then all string data items are selected. LISTBOX SELECT may be used with both single and multiple selection listboxes.

LISTBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style [%LBS_SORT](#). If you wish to sort the items, use LISTBOX DELETE followed by LISTBOXADD instead.

LISTBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTBOX SET USER, and retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTBOX user values, every [DDI](#) control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX UNSELECT *hDlg, id& [,item&]*

The string value specified by *item&* is set to an unselected state for the LISTBOX control. The value of *item&* = 1 for the first item, 2 for the second item, etc. If *item&* is missing, or has the value zero, all items are set to an unselected state. LISTBOX UNSELECT may be used with both single and multiple selection listboxes.

Restrictions

Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also

[Dynamic Dialog Tools](#), [CONTROL ADD LISTBOX](#), [CONTROL SET COLOR](#), [CONTROL](#)

[SET FONT](#)**LISTVIEW DELETE COLUMN statement****Keyword Template**

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a [LISTVIEW](#) control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&
```

hDlg [Handle](#) of the [dialog](#) that owns the ListView.

hLst Handle of the [ImageList](#) to be used for graphical items.

hLV Handle of the ListView Control.

id& The [control identifier](#) assigned with [CONTROL ADD LISTVIEW](#).

| | |
|-------------------|---|
| <i>item&</i> | A data item number. First=1, second=2... |
| <i>col&</i> | A vertical column number. First=1, second=2... |
| <i>NumExpr</i> | A expression passed as a parameter. |
| <i>StrExpr</i> | A string expression passed as a parameter. |
| <i>txtv\$</i> | A variable to which result text is assigned. |
| <i>datav&</i> | A long integer variable to which result data is assigned. |
| Remarks | <p>There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.</p> <p>Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> <p>Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> <p>Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> <p>Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> |

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col& TO datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either [pixels](#) or [dialog units](#), depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id& TO datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col& TO txtv\$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv\$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id& TO hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the [HEADER](#) statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id& TO datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id& TO datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id& [, item&] TO datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg, id&, item&, col& TO datav&*

A data item is tested to see if it is currently selected. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id& TO datav&*

Listview controls offer a number of optional additional style attributes which are unique and specific to a Listview. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col& TO txtv\$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv\$*. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item& TO datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either

dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item& [, col&]*

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

| | |
|---------------|---------------|
| %LVSIL_NORMAL | Large icons |
| %LVSIL_SMALL | Small icons |
| %LVSIL_STATE | Status images |

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the [%LVS_SHAREIMAGELISTS](#) style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

Listview controls offer a number of optional additional style attributes which are unique and specific to a Listview. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

NumExpr defines the new style from any combination of the following extended styles:

| | |
|--------------------------|--|
| %LVS_EX_GRIDLINES | Grid lines added in report mode |
| %LVS_EX_SUBITEMIMAGES | Icons added to sub-items in report mode |
| %LVS_EX_CHECKBOXES | Enables checkboxes to items |
| %LVS_EX_TRACKSELECT | Enables hot track selection |
| %LVS_EX_HEADERDRAGDROP | Enables drag-drop reordering of columns in report mode |
| %LVS_EX_FULLROWSELECT | Selection highlights full row in report mode |
| %LVS_EX_ONECLICKACTIVATE | Notification sent on single click |
| %LVS_EX_TWOCLICKACTIVATE | Notification sent on double click |
| %LVS_EX_FLATSB | Enables flat scroll bars |
| %LVS_EX_REGIONAL | Sets Listview region to icons and text |
| %LVS_EX_INFOTIP | Listview does InfoTips for you |
| %LVS_EX_UNDERLINEHOT | Hot items have underlined text |
| %LVS_EX_UNDERLINECOLD | Non-hot items have underlined text |
| %LVS_EX_MULTWORKAREAS | Will not auto-arrange until work areas defined |
| %LVS_EX_LABELTIP | Listview unfolds partly hidden labels |
| %LVS_EX_BORDERSELECT | Border selection style instead of highlight |
| %LVS_EX_DOUBLEBUFFER | Paints via double-buffering and reduces flicker |

| | |
|----------------------|--|
| %LVS_EX_HIDELABELS | Hides labels in Icon and Small Icon mode |
| %LVS_EX_SINGLEROW | Display a single row |
| %LVS_EX_SNAPTOGRID | Icons automatically snap to grid |
| %LVS_EX_SIMPLESELECT | Changes overlay rendering to top right |

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col& [, options...]*

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

| | |
|----------|--|
| ASCEND | The items are arranged in ascending sequence. |
| DESCEND | The items are arranged in descending sequence. |
| ALPHANUM | The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string. |
| UCASE | The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string |
| NUMERIC | The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc. |
| MMDDYYYY | A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| DDMMYYYY | A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYMMDD | A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYDDMM | A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |

It is important to note that Windows may overwrite USER data when sorting your ListView

control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item& [, col&]*

The string value specified by *item&/col&* is set to an unselected state for the LISTVIEW control. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD LISTVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [HEADER](#), [IMAGELIST](#)

LISTVIEW DELETE ITEM statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a [LISTVIEW](#) control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
```

```

LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&

```

hDlg [Handle](#) of the [dialog](#) that owns the ListView.

hLst Handle of the [ImageList](#) to be used for graphical items.

hLV Handle of the ListView Control.

id& The [control identifier](#) assigned with [CONTROL ADD LISTVIEW](#).

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A

variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control [style](#) parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with [header](#) text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard [LISTBOX](#) control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the

unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col& TO datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either [pixels](#) or [dialog units](#), depending upon which was used at creation. The value *col&* specifies the column number

(1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id& TO datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col& TO txtv\$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv\$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id& TO hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the [HEADER](#) statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id& TO datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id& TO datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id& [, item&] TO datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg, id&, item&, col& TO datav&*

A data item is tested to see if it is currently selected. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id& TO datav&*

Listview controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col& TO txtv\$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv\$*. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item& TO datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER.

The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item& [, col&]*

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&*

specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

| | |
|---------------|---------------|
| %LVSIL_NORMAL | Large icons |
| %LVSIL_SMALL | Small icons |
| %LVSIL_STATE | Status images |

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the [%LVS_SHAREIMAGELISTS](#) style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

NumExpr defines the new style from any combination of the following extended styles:

| | |
|------------------------|--|
| %LVS_EX_GRIDLINES | Grid lines added in report mode |
| %LVS_EX_SUBITEMIMAGES | Icons added to sub-items in report mode |
| %LVS_EX_CHECKBOXES | Enables checkboxes to items |
| %LVS_EX_TRACKSELECT | Enables hot track selection |
| %LVS_EX_HEADERDRAGDROP | Enables drag-drop reordering of columns in report mode |
| %LVS_EX_FULLROWSELECT | Selection highlights full row in report mode |

| | |
|---------------------------|---|
| %LVS_EX_ONECLICKACTIVATE | Notification sent on single click |
| %LVS_EX_TWOCCLICKACTIVATE | Notification sent on double click |
| %LVS_EX_FLATSB | Enables flat scroll bars |
| %LVS_EX_REGIONAL | Sets ListView region to icons and text |
| %LVS_EX_INFOTIP | Listview does InfoTips for you |
| %LVS_EX_UNDERLINEHOT | Hot items have underlined text |
| %LVS_EX_UNDERLINECOLD | Non-hot items have underlined text |
| %LVS_EX_MULTWORKAREAS | Will not auto-arrange until work areas defined |
| %LVS_EX_LABELTIP | Listview unfolds partly hidden labels |
| %LVS_EX_BORDERSELECT | Border selection style instead of highlight |
| %LVS_EX_DOUBLEBUFFER | Paints via double-buffering and reduces flicker |
| %LVS_EX_HIDELABELS | Hides labels in Icon and Small Icon mode |
| %LVS_EX_SINGLEROW | Display a single row |
| %LVS_EX_SNAPTOGRID | Icons automatically snap to grid |
| %LVS_EX_SIMPLESELECT | Changes overlay rendering to top right |

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col& [, options...]*

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

| | |
|----------|---|
| ASCEND | The items are arranged in ascending sequence. |
| DESCEND | The items are arranged in descending sequence. |
| ALPHANUM | The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string. |
| UCASE | The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string |
| NUMERIC | The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: |

| | |
|----------|---|
| | , , scientific notation, radix format, etc. |
| MMDDYYYY | A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| DDMMYYYY | A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYMMDD | A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYDDMM | A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item& [, col&]*

The string value specified by *item&/col&* is set to an unselected state for the LISTVIEW control. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL_ADD LISTVIEW](#), [CONTROL_SET COLOR](#), [CONTROL_SET FONT](#), [HEADER](#), [IMAGELIST](#)

LISTVIEW FIND statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a [LISTVIEW](#) control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
```

```

LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&

```

hDlg [Handle](#) of the [dialog](#) that owns the ListView.

hLst Handle of the [ImageList](#) to be used for graphical items.

hLV Handle of the ListView Control.

id& The [control identifier](#) assigned with [CONTROL_ADD_LISTVIEW](#).

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A
expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A
variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control [style](#) parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with [header](#) text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon

IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

- Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
- Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard [LISTBOX](#) control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col& TO datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either [pixels](#) or [dialog units](#), depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id& TO datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col& TO txtv\$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv\$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id& TO hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the [HEADER](#) statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id& TO datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id& TO datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id& [, item&] TO datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg, id&, item&, col& TO datav&*

A data item is tested to see if it is currently selected. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 ([true](#)) is

assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id& TO datav&*

Listview controls offer a number of optional additional style attributes which are unique and specific to a Listview. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col& TO txtv\$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv\$*. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item& TO datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every [DDI](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item& [, col&]*

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for

the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

| | |
|---------------|---------------|
| %LVSIL_NORMAL | Large icons |
| %LVSIL_SMALL | Small icons |
| %LVSIL_STATE | Status images |

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the [%LVS_SHAREIMAGELISTS](#) style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumrExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

Listview controls offer a number of optional additional style attributes which are unique and specific to a Listview. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

NumExpr defines the new style from any combination of the following extended styles:

| | |
|--------------------------|--|
| %LVS_EX_GRIDLINES | Grid lines added in report mode |
| %LVS_EX_SUBITEMIMAGES | Icons added to sub-items in report mode |
| %LVS_EX_CHECKBOXES | Enables checkboxes to items |
| %LVS_EX_TRACKSELECT | Enables hot track selection |
| %LVS_EX_HEADERDRAGDROP | Enables drag-drop reordering of columns in report mode |
| %LVS_EX_FULLROWSELECT | Selection highlights full row in report mode |
| %LVS_EX_ONECLICKACTIVATE | Notification sent on single click |
| %LVS_EX_TWOCLICKACTIVATE | Notification sent on double click |
| %LVS_EX_FLATSB | Enables flat scroll bars |
| %LVS_EX_REGIONAL | Sets Listview region to icons and text |
| %LVS_EX_INFOTIP | Listview does InfoTips for you |
| %LVS_EX_UNDERLINEHOT | Hot items have underlined text |
| %LVS_EX_UNDERLINECOLD | Non-hot items have underlined text |
| %LVS_EX_MULTWORKAREAS | Will not auto-arrange until work areas defined |
| %LVS_EX_LABELTIP | Listview unfolds partly hidden labels |
| %LVS_EX_BORDERSELECT | Border selection style instead of highlight |
| %LVS_EX_DOUBLEBUFFER | Paints via double-buffering and reduces flicker |
| %LVS_EX_HIDELABELS | Hides labels in Icon and Small Icon mode |
| %LVS_EX_SINGLEROW | Display a single row |
| %LVS_EX_SNAPTOGRID | Icons automatically snap to grid |
| %LVS_EX_SIMPLESELECT | Changes overlay rendering to top right |

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col& [, options...]*

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe

the sequence and the nature of the data in the sort-key column:

| | |
|----------|--|
| ASCEND | The items are arranged in ascending sequence. |
| DESCEND | The items are arranged in descending sequence. |
| ALPHANUM | The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string. |
| UCASE | The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string |
| NUMERIC | The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc. |
| MMDDYYYY | A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| DDMMYYYY | A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYMMDD | A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYDDMM | A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item& [, col&]*

The string value specified by *item&/col&* is set to an unselected state for the LISTVIEW control. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions

Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also

[Dynamic Dialog Tools](#), [CONTROL ADD LISTVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [HEADER](#), [IMAGELIST](#)

LISTVIEW FIND EXACT statement

Keyword Template

Purpose

Syntax
Remarks
See also
Example

LISTVIEW statement IMPROVED

Purpose Manipulate a [LISTVIEW](#) control in order to set/retrieve data.

Syntax

```

LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&

```

hDlg [Handle](#) of the [dialog](#) that owns the ListView.

hLst Handle of the [ImageList](#) to be used for graphical items.

hLV Handle of the ListView Control.

id& The [control identifier](#) assigned with [CONTROL ADD LISTVIEW](#).

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A
expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A

- variable to which result text is assigned.
- datav&* A [long integer](#) variable to which result data is assigned.
- Remarks** There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control [style](#) parameter. It may be changed from time to time with LISTVIEW SET MODE.
- Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
 - Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with [header](#) text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
 - Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
 - Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard [LISTBOX](#) control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of

the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col& TO datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either [pixels](#) or [dialog units](#), depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id& TO datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col& TO txtv\$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv\$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id& TO hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the [HEADER](#) statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id& TO datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id& TO datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are

currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id& [, item&] TO datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg, id&, item&, col& TO datav&*

A data item is tested to see if it is currently selected. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id& TO datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col& TO txtv\$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv\$*. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item& TO datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows ListView control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item& [, col&]*

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

| | |
|---------------|---------------|
| %LVSIL_NORMAL | Large icons |
| %LVSIL_SMALL | Small icons |
| %LVSIL_STATE | Status images |

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted

from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the [%LVS_SHAREIMAGELISTS](#) style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

NumExpr defines the new style from any combination of the following extended styles:

| | |
|--------------------------|--|
| %LVS_EX_GRIDLINES | Grid lines added in report mode |
| %LVS_EX_SUBITEMIMAGES | Icons added to sub-items in report mode |
| %LVS_EX_CHECKBOXES | Enables checkboxes to items |
| %LVS_EX_TRACKSELECT | Enables hot track selection |
| %LVS_EX_HEADERDRAGDROP | Enables drag-drop reordering of columns in report mode |
| %LVS_EX_FULLROWSELECT | Selection highlights full row in report mode |
| %LVS_EX_ONECLICKACTIVATE | Notification sent on single click |
| %LVS_EX_TWOCLICKACTIVATE | Notification sent on double click |
| %LVS_EX_FLATSB | Enables flat scroll bars |
| %LVS_EX_REGIONAL | Sets ListView region to icons and text |
| %LVS_EX_INFOTIP | Listview does InfoTips for you |
| %LVS_EX_UNDERLINEHOT | Hot items have underlined text |
| %LVS_EX_UNDERLINECOLD | Non-hot items have underlined text |
| %LVS_EX_MULTWORKAREAS | Will not auto-arrange until work areas defined |
| %LVS_EX_LABELTIP | Listview unfolds partly hidden labels |
| %LVS_EX_BORDERSELECT | Border selection style instead of highlight |
| %LVS_EX_DOUBLEBUFFER | Paints via double-buffering and reduces flicker |
| %LVS_EX_HIDELABELS | Hides labels in Icon and Small Icon mode |
| %LVS_EX_SINGLEROW | Display a single row |
| %LVS_EX_SNAPTOGRID | Icons automatically snap to grid |
| %LVS_EX_SIMPLESELECT | Changes overlay rendering to top right |

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use

LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col& [, options...]*

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

| | |
|----------|--|
| ASCEND | The items are arranged in ascending sequence. |
| DESCEND | The items are arranged in descending sequence. |
| ALPHANUM | The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string. |
| UCASE | The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string |
| NUMERIC | The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc. |
| MMDDYYYY | A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| DDMMYYYY | A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYMMDD | A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYDDMM | A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item& [, col&]*

The string value specified by *item&/col&* is set to an unselected state for the LISTVIEW control. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW_VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL_ADD_LISTVIEW](#), [CONTROL_SET_COLOR](#), [CONTROL_SET_FONT](#), [HEADER](#), [IMAGELIST](#)

LISTVIEW FIT CONTENT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a [LISTVIEW](#) control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
```

```
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&
```

| | |
|-------------------|---|
| <i>hDlg</i> | Handle of the dialog that owns the ListView. |
| <i>hLst</i> | Handle of the ImageList to be used for graphical items. |
| <i>hLV</i> | Handle of the ListView Control. |
| <i>id&</i> | The control identifier assigned with CONTROL ADD LISTVIEW . |
| <i>item&</i> | A data item number. First=1, second=2... |
| <i>col&</i> | A vertical column number. First=1, second=2... |
| <i>NumExpr</i> | A expression passed as a parameter. |
| <i>StrExpr</i> | A string expression passed as a parameter. |
| <i>txtv\$</i> | A variable to which result text is assigned. |
| <i>datav&</i> | A long integer variable to which result data is assigned. |
| Remarks | <p>There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.</p> <p>Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> <p>Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> <p>Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> <p>Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> |

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col& TO datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either [pixels](#) or [dialog units](#), depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id& TO datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col& TO txtv\$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv\$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id& TO hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the [HEADER](#) statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id& TO datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id& TO datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id& [, item&] TO datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg, id&, item&, col& TO datav&*

A data item is tested to see if it is currently selected. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id& TO datav&*

Listview controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col& TO txtv\$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv\$*. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item& TO datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER.

The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item& [, col&]*

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary

image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

| | |
|---------------|---------------|
| %LVSIL_NORMAL | Large icons |
| %LVSIL_SMALL | Small icons |
| %LVSIL_STATE | Status images |

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the [%LVS_SHAREIMAGELISTS](#) style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

NumExpr defines the new style from any combination of the following extended styles:

| | |
|--------------------------|--|
| %LVS_EX_GRIDLINES | Grid lines added in report mode |
| %LVS_EX_SUBITEMIMAGES | Icons added to sub-items in report mode |
| %LVS_EX_CHECKBOXES | Enables checkboxes to items |
| %LVS_EX_TRACKSELECT | Enables hot track selection |
| %LVS_EX_HEADERDRAGDROP | Enables drag-drop reordering of columns in report mode |
| %LVS_EX_FULLROWSELECT | Selection highlights full row in report mode |
| %LVS_EX_ONECLICKACTIVATE | Notification sent on single click |
| %LVS_EX_TWOCLICKACTIVATE | Notification sent on double click |
| %LVS_EX_FLATSB | Enables flat scroll bars |
| %LVS_EX_REGIONAL | Sets ListView region to icons and text |
| %LVS_EX_INFOTIP | Listview does InfoTips for you |
| %LVS_EX_UNDERLINEHOT | Hot items have underlined text |
| %LVS_EX_UNDERLINECOLD | Non-hot items have underlined text |

| | |
|-----------------------|---|
| %LVS_EX_MULTWORKAREAS | Will not auto-arrange until work areas defined |
| %LVS_EX_LABELTIP | Listview unfolds partly hidden labels |
| %LVS_EX_BORDERSELECT | Border selection style instead of highlight |
| %LVS_EX_DOUBLEBUFFER | Paints via double-buffering and reduces flicker |
| %LVS_EX_HIDELABELS | Hides labels in Icon and Small Icon mode |
| %LVS_EX_SINGLEROW | Display a single row |
| %LVS_EX_SNAPTOGRID | Icons automatically snap to grid |
| %LVS_EX_SIMPLESELECT | Changes overlay rendering to top right |

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col& [, options...]*

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

| | |
|----------|--|
| ASCEND | The items are arranged in ascending sequence. |
| DESCEND | The items are arranged in descending sequence. |
| ALPHANUM | The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string. |
| UCASE | The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string |
| NUMERIC | The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc. |
| MMDDYYYY | A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| DDMMYYYY | A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYMMDD | A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |

YYYYDDMM A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item& [, col&]*

The string value specified by *item&/col&* is set to an unselected state for the LISTVIEW control. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL_ADD LISTVIEW](#), [CONTROL_SET COLOR](#), [CONTROL_SET FONT](#), [HEADER](#), [IMAGELIST](#)

LISTVIEW FIT HEADER statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a [LISTVIEW](#) control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
```

```

LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&

```

hDlg [Handle](#) of the [dialog](#) that owns the ListView.

hLst Handle of the [ImageList](#) to be used for graphical items.

hLV Handle of the ListView Control.

id& The [control identifier](#) assigned with [CONTROL ADD LISTVIEW](#).

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A

variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control [style](#) parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with [header](#) text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard [LISTBOX](#) control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data

item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col& TO datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either [pixels](#) or [dialog units](#), depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id& TO datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col& TO txtv\$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv\$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id& TO hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the [HEADER](#) statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id& TO datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id& TO datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id& [, item&] TO datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg, id&, item&, col& TO datav&*

A data item is tested to see if it is currently selected. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id& TO datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col& TO txtv\$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv\$*. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item& TO datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER.

The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item& [, col&]*

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

| | |
|---------------|---------------|
| %LVSIL_NORMAL | Large icons |
| %LVSIL_SMALL | Small icons |
| %LVSIL_STATE | Status images |

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the [%LVS_SHAREIMAGELISTS](#) style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumrExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

Listview controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

NumExpr defines the new style from any combination of the following extended styles:

| | |
|-----------------------|---|
| %LVS_EX_GRIDLINES | Grid lines added in report mode |
| %LVS_EX_SUBITEMIMAGES | Icons added to sub-items in report mode |
| %LVS_EX_CHECKBOXES | Enables checkboxes to items |
| %LVS_EX_TRACKSELECT | Enables hot track selection |

| | |
|---------------------------|--|
| %LVS_EX_HEADERDRAGDROP | Enables drag-drop reordering of columns in report mode |
| %LVS_EX_FULLROWSELECT | Selection highlights full row in report mode |
| %LVS_EX_ONECLICKACTIVATE | Notification sent on single click |
| %LVS_EX_TWOCCLICKACTIVATE | Notification sent on double click |
| %LVS_EX_FLATSB | Enables flat scroll bars |
| %LVS_EX_REGIONAL | Sets ListView region to icons and text |
| %LVS_EX_INFOTIP | Listview does InfoTips for you |
| %LVS_EX_UNDERLINEHOT | Hot items have underlined text |
| %LVS_EX_UNDERLINECOLD | Non-hot items have underlined text |
| %LVS_EX_MULTWORKAREAS | Will not auto-arrange until work areas defined |
| %LVS_EX_LABELTIP | Listview unfolds partly hidden labels |
| %LVS_EX_BORDERSELECT | Border selection style instead of highlight |
| %LVS_EX_DOUBLEBUFFER | Paints via double-buffering and reduces flicker |
| %LVS_EX_HIDELABELS | Hides labels in Icon and Small Icon mode |
| %LVS_EX_SINGLEROW | Display a single row |
| %LVS_EX_SNAPTOGRID | Icons automatically snap to grid |
| %LVS_EX_SIMPLESELECT | Changes overlay rendering to top right |

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col& [, options...]*

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

| | |
|----------|---|
| ASCEND | The items are arranged in ascending sequence. |
| DESCEND | The items are arranged in descending sequence. |
| ALPHANUM | The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string. |
| UCASE | The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string |

| | |
|----------|--|
| NUMERIC | The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc. |
| MMDDYYYY | A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| DDMMYYYY | A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYMMDD | A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYDDMM | A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item& [, col&]*

The string value specified by *item&/col&* is set to an unselected state for the LISTVIEW control. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD LISTVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [HEADER](#), [IMAGELIST](#)

LISTVIEW GET COLUMN statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a [LISTVIEW](#) control in order to set/retrieve data.

Syntax
 LISTVIEW DELETE COLUMN *hDlg, id&, col&*
 LISTVIEW DELETE ITEM *hDlg, id&, item&*

```

LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&

```

hDlg [Handle](#) of the [dialog](#) that owns the ListView.

hLst Handle of the [ImageList](#) to be used for graphical items.

hLV Handle of the ListView Control.

id& The [control identifier](#) assigned with [CONTROL_ADD_LISTVIEW](#).

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A
expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A
variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control [style](#) parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with [header](#) text to describe each of them. Additional sub-items may be displayed in

each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

- Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
- Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard [LISTBOX](#) control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is

found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col& TO datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either [pixels](#) or [dialog units](#), depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id& TO datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col& TO txtv\$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv\$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id& TO hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the [HEADER](#) statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id& TO datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id& TO datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id& [, item&] TO datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg, id&, item&, col& TO datav&*

A data item is tested to see if it is currently selected. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id& TO datav&*

Listview controls offer a number of optional additional style attributes which are unique and specific to a Listview. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col& TO txtv\$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv\$*. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item& TO datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item& [, col&]*

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

| | |
|---------------|---------------|
| %LVSIL_NORMAL | Large icons |
| %LVSIL_SMALL | Small icons |
| %LVSIL_STATE | Status images |

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the [%LVS_SHAREIMAGELISTS](#) style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

Listview controls offer a number of optional additional style attributes which are unique and specific to a Listview. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

NumExpr defines the new style from any combination of the following extended styles:

| | |
|-------------------------|--|
| %LVS_EX_GRIDLINES | Grid lines added in report mode |
| %LVS_EX_SUBITEMIMAGES | Icons added to sub-items in report mode |
| %LVS_EX_CHECKBOXES | Enables checkboxes to items |
| %LVS_EX_TRACKSELECT | Enables hot track selection |
| % | Enables drag-drop reordering of columns in report mode |
| LVS_EX_HEADERDRAGDROP | mode |
| %LVS_EX_FULLROWSELECT | Selection highlights full row in report mode |
| % | Notification sent on single click |
| LVS_EX_ONECLICKACTIVATE | |
| % | Notification sent on double click |
| LVS_EX_TWOCLICKACTIVATE | |
| %LVS_EX_FLATSB | Enables flat scroll bars |
| %LVS_EX_REGIONAL | Sets Listview region to icons and text |
| %LVS_EX_INFOTIP | Listview does InfoTips for you |
| %LVS_EX_UNDERLINEHOT | Hot items have underlined text |
| %LVS_EX_UNDERLINECOLD | Non-hot items have underlined text |
| %LVS_EX_MULTWORKAREAS | Will not auto-arrange until work areas defined |
| %LVS_EX_LABELTIP | Listview unfolds partly hidden labels |
| %LVS_EX_BORDERSELECT | Border selection style instead of highlight |
| %LVS_EX_DOUBLEBUFFER | Paints via double-buffering and reduces flicker |
| %LVS_EX_HIDELABELS | Hides labels in Icon and Small Icon mode |
| %LVS_EX_SINGLEROW | Display a single row |
| %LVS_EX_SNAPTOGRID | Icons automatically snap to grid |
| %LVS_EX_SIMPLESELECT | Changes overlay rendering to top right |

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col& [, options...]*

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

| | |
|----------|--|
| ASCEND | The items are arranged in ascending sequence. |
| DESCEND | The items are arranged in descending sequence. |
| ALPHANUM | The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string. |
| UCASE | The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string |
| NUMERIC | The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc. |
| MMDDYYYY | A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| DDMMYYYY | A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYMMDD | A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYDDMM | A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item& [, col&]*

The string value specified by *item&/col&* is set to an unselected state for the LISTVIEW control. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions

Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also

[Dynamic Dialog Tools](#), [CONTROL ADD LISTVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [HEADER](#), [IMAGELIST](#)

LISTVIEW GET COUNT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a [LISTVIEW](#) control in order to set/retrieve data.

Syntax

```

LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&

```

hDlg [Handle](#) of the [dialog](#) that owns the ListView.

hLst Handle of the [ImageList](#) to be used for graphical items.

hLV Handle of the ListView Control.

id& The [control identifier](#) assigned with [CONTROL ADD LISTVIEW](#).

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A
expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control [style](#) parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with [header](#) text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard [LISTBOX](#) control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins

with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col& TO datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either [pixels](#) or [dialog units](#), depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id& TO datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col& TO txtv\$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv\$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id& TO hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the [HEADER](#) statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id& TO datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id& TO datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id& [, item&] TO datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned.

To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg, id&, item&, col& TO datav&*

A data item is tested to see if it is currently selected. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id& TO datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col& TO txtv\$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv\$*. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item& TO datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER.

The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every [DDI](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not

a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item& [, col&]*

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

| | |
|---------------|-------------|
| %LVSIL_NORMAL | Large icons |
| %LVSIL_SMALL | Small icons |

%LVSIL_STATE Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the [%LVS_SHAREIMAGELISTS](#) style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumrExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

NumExpr defines the new style from any combination of the following extended styles:

| | |
|--------------------------------|--|
| %LVS_EX_GRIDLINES | Grid lines added in report mode |
| %LVS_EX_SUBITEMIMAGES | Icons added to sub-items in report mode |
| %LVS_EX_CHECKBOXES | Enables checkboxes to items |
| %LVS_EX_TRACKSELECT | Enables hot track selection |
| % | Enables drag-drop reordering of columns in report mode |
| LVS_EX_HEADERDRAGDROP | mode |
| %LVS_EX_FULLROWSELECT | Selection highlights full row in report mode |
| % | Notification sent on single click |
| LVS_EX_ONECLICKACTIVATE | |
| % | Notification sent on double click |
| LVS_EX_TWOCLICKACTIVATE | |
| %LVS_EX_FLATSB | Enables flat scroll bars |
| %LVS_EX_REGIONAL | Sets ListView region to icons and text |
| %LVS_EX_INFOTIP | ListView does InfoTips for you |
| %LVS_EX_UNDERLINEHOT | Hot items have underlined text |
| %LVS_EX_UNDERLINECOLD | Non-hot items have underlined text |
| %LVS_EX_MULTWORKAREAS | Will not auto-arrange until work areas defined |
| %LVS_EX_LABELTIP | ListView unfolds partly hidden labels |
| %LVS_EX_BORDERSELECT | Border selection style instead of highlight |
| %LVS_EX_DOUBLEBUFFER | Paints via double-buffering and reduces flicker |
| %LVS_EX_HIDELABELS | Hides labels in Icon and Small Icon mode |
| %LVS_EX_SINGLEROW | Display a single row |
| %LVS_EX_SNAPTOGRID | Icons automatically snap to grid |
| %LVS_EX_SIMPLESELECT | Changes overlay rendering to top right |

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col& [, options...]*

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

| | |
|----------|--|
| ASCEND | The items are arranged in ascending sequence. |
| DESCEND | The items are arranged in descending sequence. |
| ALPHANUM | The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string. |
| UCASE | The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string |
| NUMERIC | The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc. |
| MMDDYYYY | A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| DDMMYYYY | A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYMMDD | A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYDDMM | A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item& [, col&]*

The string value specified by *item&/col&* is set to an unselected state for the LISTVIEW control. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the

optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL_ADD LISTVIEW](#), [CONTROL_SET COLOR](#), [CONTROL_SET FONT](#), [HEADER](#), [IMAGELIST](#)

LISTVIEW GET HEADER statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a [LISTVIEW](#) control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
```

```

LISTVIEW SET STYLEEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&

```

| | |
|-------------------|---|
| <i>hDlg</i> | Handle of the dialog that owns the ListView. |
| <i>hLst</i> | Handle of the ImageList to be used for graphical items. |
| <i>hLV</i> | Handle of the ListView Control. |
| <i>id&</i> | The control identifier assigned with CONTROL ADD LISTVIEW . |
| <i>item&</i> | A data item number. First=1, second=2... |
| <i>col&</i> | A vertical column number. First=1, second=2... |
| <i>NumExpr</i> | A expression passed as a parameter. |
| <i>StrExpr</i> | A string expression passed as a parameter. |
| <i>txtv\$</i> | A variable to which result text is assigned. |
| <i>datav&</i> | A long integer variable to which result data is assigned. |
| Remarks | <p>There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.</p> <p>Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> <p>Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> <p>Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> <p>Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> |

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column

numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col& TO datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either [pixels](#) or [dialog units](#), depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id& TO datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col& TO txtv\$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv\$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id& TO hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the [HEADER](#) statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id& TO datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id& TO datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id& [, item&] TO datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg, id&, item&, col& TO datav&*

A data item is tested to see if it is currently selected. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id& TO datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col& TO txtv\$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv\$*. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item& TO datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable

specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item& [, col&]*

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

| | |
|---------------|---------------|
| %LVSIL_NORMAL | Large icons |
| %LVSIL_SMALL | Small icons |
| %LVSIL_STATE | Status images |

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the [%LVS_SHAREIMAGELISTS](#) style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

NumExpr defines the new style from any combination of the following extended styles:

| | |
|--------------------------|--|
| %LVS_EX_GRIDLINES | Grid lines added in report mode |
| %LVS_EX_SUBITEMIMAGES | Icons added to sub-items in report mode |
| %LVS_EX_CHECKBOXES | Enables checkboxes to items |
| %LVS_EX_TRACKSELECT | Enables hot track selection |
| %LVS_EX_HEADERDRAGDROP | Enables drag-drop reordering of columns in report mode |
| %LVS_EX_FULLROWSELECT | Selection highlights full row in report mode |
| %LVS_EX_ONECLICKACTIVATE | Notification sent on single click |
| %LVS_EX_TWOCLICKACTIVATE | Notification sent on double click |
| %LVS_EX_FLATSB | Enables flat scroll bars |
| %LVS_EX_REGIONAL | Sets ListView region to icons and text |

| | |
|-----------------------|---|
| %LVS_EX_INFOTIP | Listview does InfoTips for you |
| %LVS_EX_UNDERLINEHOT | Hot items have underlined text |
| %LVS_EX_UNDERLINECOLD | Non-hot items have underlined text |
| %LVS_EX_MULTWORKAREAS | Will not auto-arrange until work areas defined |
| %LVS_EX_LABELTIP | Listview unfolds partly hidden labels |
| %LVS_EX_BORDERSELECT | Border selection style instead of highlight |
| %LVS_EX_DOUBLEBUFFER | Paints via double-buffering and reduces flicker |
| %LVS_EX_HIDELABELS | Hides labels in Icon and Small Icon mode |
| %LVS_EX_SINGLEROW | Display a single row |
| %LVS_EX_SNAPTOGRID | Icons automatically snap to grid |
| %LVS_EX_SIMPLESELECT | Changes overlay rendering to top right |

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col& [, options...]*

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

| | |
|----------|--|
| ASCEND | The items are arranged in ascending sequence. |
| DESCEND | The items are arranged in descending sequence. |
| ALPHANUM | The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string. |
| UCASE | The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string |
| NUMERIC | The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc. |
| MMDDYYYY | A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| DDMMYYYY | A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and |

| | |
|----------|---|
| | delimiters may be any character. |
| YYYYMMDD | A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYDDMM | A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item& [, col&]*

The string value specified by *item&/col&* is set to an unselected state for the LISTVIEW control. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL_ADD LISTVIEW](#), [CONTROL_SET COLOR](#), [CONTROL_SET FONT](#), [HEADER](#), [IMAGELIST](#)

LISTVIEW GET HEADERID statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a [LISTVIEW](#) control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
```

```

LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&

```

hDlg [Handle](#) of the [dialog](#) that owns the ListView.

hLst Handle of the [ImageList](#) to be used for graphical items.

hLV Handle of the ListView Control.

id& The [control identifier](#) assigned with [CONTROL ADD LISTVIEW](#).

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A
expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A
variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control [style](#) parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with [header](#) text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 3 List Mode - String data items are displayed as a list, top to bottom, one

item per line. This mode is very similar in appearance to a standard [LISTBOX](#) control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*)

is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col& TO datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either [pixels](#) or [dialog units](#), depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id& TO datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col& TO txtv\$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv\$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id& TO hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the [HEADER](#) statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id& TO datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id& TO datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id& [, item&] TO datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned.

To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg, id&, item&, col& TO datav&*

A data item is tested to see if it is currently selected. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id& TO datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This

special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col& TO txtv\$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv\$*. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item& TO datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item& [, col&]*

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If

NumExpr is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

| | |
|---------------|---------------|
| %LVSIL_NORMAL | Large icons |
| %LVSIL_SMALL | Small icons |
| %LVSIL_STATE | Status images |

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the [%LVS_SHAREIMAGELISTS](#) style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

Listview controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

NumExpr defines the new style from any combination of the following extended styles:

| | |
|------------------------------|--|
| %LVS_EX_GRIDLINES | Grid lines added in report mode |
| %LVS_EX_SUBITEMIMAGES | Icons added to sub-items in report mode |
| %LVS_EX_CHECKBOXES | Enables checkboxes to items |
| %LVS_EX_TRACKSELECT | Enables hot track selection |
| % LVS_EX_HEADERDRAGDROP | Enables drag-drop reordering of columns in report mode |
| %LVS_EX_FULLROWSELECT | Selection highlights full row in report mode |
| % LVS_EX_ONECLICKACTIVATE | Notification sent on single click |
| % LVS_EX_TWOCLICKACTIVATE | Notification sent on double click |
| %LVS_EX_FLATSB | Enables flat scroll bars |
| %LVS_EX_REGIONAL | Sets ListView region to icons and text |
| %LVS_EX_INFOTIP | Listview does InfoTips for you |
| %LVS_EX_UNDERLINEHOT | Hot items have underlined text |
| %LVS_EX_UNDERLINECOLD | Non-hot items have underlined text |
| %LVS_EX_MULTWORKAREAS | Will not auto-arrange until work areas defined |
| %LVS_EX_LABELTIP | Listview unfolds partly hidden labels |
| %LVS_EX_BORDERSELECT | Border selection style instead of highlight |
| %LVS_EX_DOUBLEBUFFER | Paints via double-buffering and reduces flicker |
| %LVS_EX_HIDELABELS | Hides labels in Icon and Small Icon mode |
| %LVS_EX_SINGLEROW | Display a single row |
| %LVS_EX_SNAPTOGRID | Icons automatically snap to grid |
| %LVS_EX_SIMPLESELECT | Changes overlay rendering to top right |

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col& [, options...]*

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

| | |
|----------|---|
| ASCEND | The items are arranged in ascending sequence. |
| DESCEND | The items are arranged in descending sequence. |
| ALPHANUM | The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string. |

| | |
|----------|--|
| UCASE | The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string |
| NUMERIC | The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc. |
| MMDDYYYY | A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| DDMMYYYY | A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYMMDD | A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYDDMM | A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item& [, col&]*

The string value specified by *item&/col&* is set to an unselected state for the LISTVIEW control. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD LISTVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [HEADER](#), [IMAGELIST](#)

LISTVIEW GET MODE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

| | |
|-------------------|---|
| Purpose | Manipulate a LISTVIEW control in order to set/retrieve data. |
| Syntax | <pre> LISTVIEW DELETE COLUMN <i>hDlg</i>, <i>id&</i>, <i>col&</i> LISTVIEW DELETE ITEM <i>hDlg</i>, <i>id&</i>, <i>item&</i> LISTVIEW FIND <i>hDlg</i>, <i>id&</i>, <i>item&</i>, <i>StrExpr</i> TO <i>datav&</i> LISTVIEW FIND EXACT <i>hDlg</i>, <i>id&</i>, <i>item&</i>, <i>StrExpr</i> TO <i>datav&</i> LISTVIEW FIT CONTENT <i>hDlg</i>, <i>id&</i>, <i>col&</i> LISTVIEW FIT HEADER <i>hDlg</i>, <i>id&</i>, <i>col&</i> LISTVIEW GET COLUMN <i>hDlg</i>, <i>id&</i>, <i>col&</i> TO <i>datav&</i> LISTVIEW GET COUNT <i>hDlg</i>, <i>id&</i> TO <i>datav&</i> LISTVIEW GET HEADER <i>hDlg</i>, <i>id&</i>, <i>col&</i> TO <i>txtv\$</i> LISTVIEW GET HEADERID <i>hDlg</i>, <i>id&</i> TO <i>hLV</i>, <i>idv&</i> LISTVIEW GET MODE <i>hDlg</i>, <i>id&</i> TO <i>datav&</i> LISTVIEW GET SELCOUNT <i>hDlg</i>, <i>id&</i> TO <i>datav&</i> LISTVIEW GET SELECT <i>hDlg</i>, <i>id&</i> [, <i>item&</i>] TO <i>datav&</i> LISTVIEW GET STATE <i>hDlg</i>, <i>id&</i>, <i>item&</i>, <i>col&</i> TO <i>datav&</i> LISTVIEW GET STYLEXX <i>hDlg</i>, <i>id&</i> TO <i>datav&</i> LISTVIEW GET TEXT <i>hDlg</i>, <i>id&</i>, <i>item&</i>, <i>col&</i> TO <i>txtv\$</i> LISTVIEW GET USER <i>hDlg</i>, <i>id&</i>, <i>item&</i> TO <i>datav&</i> LISTVIEW INSERT COLUMN <i>hDlg</i>, <i>id&</i>, <i>col&</i>, <i>StrExpr</i>, <i>ColWidth&</i>, <i>format&</i> LISTVIEW INSERT ITEM <i>hDlg</i>, <i>id&</i>, <i>item&</i>, <i>image&</i>, <i>StrExpr</i> LISTVIEW RESET <i>hDlg</i>, <i>id&</i> LISTVIEW SELECT <i>hDlg</i>, <i>id&</i>, <i>item&</i> [, <i>col&</i>] LISTVIEW SET COLUMN <i>hDlg</i>, <i>id&</i>, <i>col&</i>, <i>NumExpr</i> LISTVIEW SET HEADER <i>hDlg</i>, <i>id&</i>, <i>col&</i>, <i>StrExpr</i> LISTVIEW SET IMAGE <i>hDlg</i>, <i>id&</i>, <i>item&</i>, <i>NumExpr</i> LISTVIEW SET IMAGE2 <i>hDlg</i>, <i>id&</i>, <i>item&</i>, <i>NumExpr</i> LISTVIEW SET IMAGELIST <i>hDlg</i>, <i>id&</i>, <i>hLst</i>, <i>NumExpr</i> LISTVIEW SET MODE <i>hDlg</i>, <i>id&</i>, <i>NumExpr</i> LISTVIEW SET OVERLAY <i>hDlg</i>, <i>id&</i>, <i>item&</i>, <i>NumExpr</i> LISTVIEW SET STYLEXX <i>hDlg</i>, <i>id&</i>, <i>NumExpr</i> LISTVIEW SET TEXT <i>hDlg</i>, <i>id&</i>, <i>item&</i>, <i>col&</i>, <i>StrExpr</i> LISTVIEW SET USER <i>hDlg</i>, <i>id&</i>, <i>item&</i>, <i>NumExpr</i> LISTVIEW SORT <i>hDlg</i>, <i>id&</i>, <i>col&</i> [, <i>options...</i>] LISTVIEW UNSELECT <i>hDlg</i>, <i>id&</i>, <i>item&</i>, [<i>col&</i>] LISTVIEW VISIBLE <i>hDlg</i>, <i>id&</i>, <i>item&</i> </pre> |
| <i>hDlg</i> | Handle of the dialog that owns the ListView. |
| <i>hLst</i> | Handle of the ImageList to be used for graphical items. |
| <i>hLV</i> | Handle of the ListView Control. |
| <i>id&</i> | The control identifier assigned with CONTROL_ADD_LISTVIEW . |
| <i>item&</i> | A data item number. First=1, second=2... |
| <i>col&</i> | A vertical column number. First=1, second=2... |
| <i>NumExpr</i> | A expression passed as a parameter. |
| <i>StrExpr</i> | A string expression passed as a parameter. |
| <i>txtv\$</i> | A variable to which result text is assigned. |
| <i>datav&</i> | A long integer variable to which result data is assigned. |
| Remarks | <p>There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.</p> <p>Mode 0 Icon Mode - String data items are displayed left to right, wrapped to</p> |

multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

- Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with [header](#) text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
- Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
- Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard [LISTBOX](#) control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which

exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col& TO datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either [pixels](#) or [dialog units](#), depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id& TO datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col& TO txtv\$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv\$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id& TO hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the [HEADER](#) statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id& TO datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id& TO datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id& [, item&] TO datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to

facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg, id&, item&, col& TO datav&*

A data item is tested to see if it is currently selected. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id& TO datav&*

Listview controls offer a number of optional additional style attributes which are unique and specific to a Listview. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col& TO txtv\$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv\$*. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item& TO datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER.

The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item& [, col&]*

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

| | |
|---------------|---------------|
| %LVSIL_NORMAL | Large icons |
| %LVSIL_SMALL | Small icons |
| %LVSIL_STATE | Status images |

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the [%LVS_SHAREIMAGELISTS](#) style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

Listview controls offer a number of optional additional style attributes which are unique and specific to a Listview. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

NumExpr defines the new style from any combination of the following extended styles:

| | |
|--------------------------|--|
| %LVS_EX_GRIDLINES | Grid lines added in report mode |
| %LVS_EX_SUBITEMIMAGES | Icons added to sub-items in report mode |
| %LVS_EX_CHECKBOXES | Enables checkboxes to items |
| %LVS_EX_TRACKSELECT | Enables hot track selection |
| % | Enables drag-drop reordering of columns in report mode |
| LVS_EX_HEADERDRAGDROP | mode |
| %LVS_EX_FULLROWSELECT | Selection highlights full row in report mode |
| % | Notification sent on single click |
| LVS_EX_ONECLICKACTIVATE | |
| % | Notification sent on double click |
| LVS_EX_TWOCCLICKACTIVATE | |
| %LVS_EX_FLATSB | Enables flat scroll bars |
| %LVS_EX_REGIONAL | Sets Listview region to icons and text |
| %LVS_EX_INFOTIP | Listview does InfoTips for you |
| %LVS_EX_UNDERLINEHOT | Hot items have underlined text |
| %LVS_EX_UNDERLINECOLD | Non-hot items have underlined text |
| %LVS_EX_MULTWORKAREAS | Will not auto-arrange until work areas defined |
| %LVS_EX_LABELTIP | Listview unfolds partly hidden labels |
| %LVS_EX_BORDERSELECT | Border selection style instead of highlight |
| %LVS_EX_DOUBLEBUFFER | Paints via double-buffering and reduces flicker |
| %LVS_EX_HIDELABELS | Hides labels in Icon and Small Icon mode |
| %LVS_EX_SINGLEROW | Display a single row |
| %LVS_EX_SNAPTOGRID | Icons automatically snap to grid |
| %LVS_EX_SIMPLESELECT | Changes overlay rendering to top right |

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user

value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col& [, options...]*

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

| | |
|----------|--|
| ASCEND | The items are arranged in ascending sequence. |
| DESCEND | The items are arranged in descending sequence. |
| ALPHANUM | The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string. |
| UCASE | The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string |
| NUMERIC | The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc. |
| MMDDYYYY | A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| DDMMYYYY | A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYMMDD | A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYDDMM | A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item& [, col&]*

The string value specified by *item&/col&* is set to an unselected state for the LISTVIEW control. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions

Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD LISTVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [HEADER](#), [IMAGELIST](#)

LISTVIEW GET SELCOUNT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a [LISTVIEW](#) control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&
```

hDlg [Handle](#) of the [dialog](#) that owns the ListView.

hLst Handle of the [ImageList](#) to be used for graphical items.

hLV Handle of the ListView Control.

| | |
|-------------------|---|
| <i>id&</i> | The control identifier assigned with CONTROL ADD LISTVIEW . |
| <i>item&</i> | A data item number. First=1, second=2... |
| <i>col&</i> | A vertical column number. First=1, second=2... |
| <i>NumExpr</i> | A expression passed as a parameter. |
| <i>StrExpr</i> | A string expression passed as a parameter. |
| <i>txtv\$</i> | A variable to which result text is assigned. |
| <i>datav&</i> | A long integer variable to which result data is assigned. |
| Remarks | <p>There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.</p> <p>Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> <p>Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> <p>Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> <p>Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> |

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col& TO datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either [pixels](#) or [dialog units](#), depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id& TO datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col& TO txtv\$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv\$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id& TO hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the [HEADER](#) statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id& TO datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id& TO datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id& [, item&] TO datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg, id&, item&, col& TO datav&*

A data item is tested to see if it is currently selected. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id& TO datav&*

Listview controls offer a number of optional additional style attributes which are unique and specific to a Listview. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col& TO txtv\$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv\$*. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item& TO datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either

dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item& [, col&]*

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

| | |
|---------------|---------------|
| %LVSIL_NORMAL | Large icons |
| %LVSIL_SMALL | Small icons |
| %LVSIL_STATE | Status images |

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the [%LVS_SHAREIMAGELISTS](#) style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

Listview controls offer a number of optional additional style attributes which are unique and specific to a Listview. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

NumExpr defines the new style from any combination of the following extended styles:

| | |
|--------------------------|--|
| %LVS_EX_GRIDLINES | Grid lines added in report mode |
| %LVS_EX_SUBITEMIMAGES | Icons added to sub-items in report mode |
| %LVS_EX_CHECKBOXES | Enables checkboxes to items |
| %LVS_EX_TRACKSELECT | Enables hot track selection |
| %LVS_EX_HEADERDRAGDROP | Enables drag-drop reordering of columns in report mode |
| %LVS_EX_FULLROWSELECT | Selection highlights full row in report mode |
| %LVS_EX_ONECLICKACTIVATE | Notification sent on single click |
| %LVS_EX_TWOCLICKACTIVATE | Notification sent on double click |
| %LVS_EX_FLATSB | Enables flat scroll bars |
| %LVS_EX_REGIONAL | Sets Listview region to icons and text |
| %LVS_EX_INFOTIP | Listview does InfoTips for you |
| %LVS_EX_UNDERLINEHOT | Hot items have underlined text |
| %LVS_EX_UNDERLINECOLD | Non-hot items have underlined text |
| %LVS_EX_MULTWORKAREAS | Will not auto-arrange until work areas defined |
| %LVS_EX_LABELTIP | Listview unfolds partly hidden labels |
| %LVS_EX_BORDERSELECT | Border selection style instead of highlight |
| %LVS_EX_DOUBLEBUFFER | Paints via double-buffering and reduces flicker |

| | |
|----------------------|--|
| %LVS_EX_HIDELABELS | Hides labels in Icon and Small Icon mode |
| %LVS_EX_SINGLEROW | Display a single row |
| %LVS_EX_SNAPTOGRID | Icons automatically snap to grid |
| %LVS_EX_SIMPLESELECT | Changes overlay rendering to top right |

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col& [, options...]*

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

| | |
|----------|--|
| ASCEND | The items are arranged in ascending sequence. |
| DESCEND | The items are arranged in descending sequence. |
| ALPHANUM | The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string. |
| UCASE | The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string |
| NUMERIC | The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc. |
| MMDDYYYY | A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| DDMMYYYY | A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYMMDD | A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYDDMM | A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |

It is important to note that Windows may overwrite USER data when sorting your ListView

control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item& [, col&]*

The string value specified by *item&/col&* is set to an unselected state for the LISTVIEW control. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD LISTVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [HEADER](#), [IMAGELIST](#)

LISTVIEW GET SELECT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a [LISTVIEW](#) control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
```

```

LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&

```

hDlg [Handle](#) of the [dialog](#) that owns the ListView.

hLst Handle of the [ImageList](#) to be used for graphical items.

hLV Handle of the ListView Control.

id& The [control identifier](#) assigned with [CONTROL ADD LISTVIEW](#).

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A

variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control [style](#) parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with [header](#) text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard [LISTBOX](#) control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the

unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col& TO datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either [pixels](#) or [dialog units](#), depending upon which was used at creation. The value *col&* specifies the column number

(1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id& TO datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col& TO txtv\$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv\$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id& TO hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the [HEADER](#) statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id& TO datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id& TO datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id& [, item&] TO datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg, id&, item&, col& TO datav&*

A data item is tested to see if it is currently selected. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id& TO datav&*

Listview controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col& TO txtv\$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv\$*. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item& TO datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER.

The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item& [, col&]*

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&*

specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

| | |
|---------------|---------------|
| %LVSIL_NORMAL | Large icons |
| %LVSIL_SMALL | Small icons |
| %LVSIL_STATE | Status images |

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the [%LVS_SHAREIMAGELISTS](#) style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

NumExpr defines the new style from any combination of the following extended styles:

| | |
|------------------------|--|
| %LVS_EX_GRIDLINES | Grid lines added in report mode |
| %LVS_EX_SUBITEMIMAGES | Icons added to sub-items in report mode |
| %LVS_EX_CHECKBOXES | Enables checkboxes to items |
| %LVS_EX_TRACKSELECT | Enables hot track selection |
| %LVS_EX_HEADERDRAGDROP | Enables drag-drop reordering of columns in report mode |
| %LVS_EX_FULLROWSELECT | Selection highlights full row in report mode |

| | |
|---------------------------|---|
| %LVS_EX_ONECLICKACTIVATE | Notification sent on single click |
| %LVS_EX_TWOCCLICKACTIVATE | Notification sent on double click |
| %LVS_EX_FLATSB | Enables flat scroll bars |
| %LVS_EX_REGIONAL | Sets ListView region to icons and text |
| %LVS_EX_INFOTIP | Listview does InfoTips for you |
| %LVS_EX_UNDERLINEHOT | Hot items have underlined text |
| %LVS_EX_UNDERLINECOLD | Non-hot items have underlined text |
| %LVS_EX_MULTWORKAREAS | Will not auto-arrange until work areas defined |
| %LVS_EX_LABELTIP | Listview unfolds partly hidden labels |
| %LVS_EX_BORDERSELECT | Border selection style instead of highlight |
| %LVS_EX_DOUBLEBUFFER | Paints via double-buffering and reduces flicker |
| %LVS_EX_HIDELABELS | Hides labels in Icon and Small Icon mode |
| %LVS_EX_SINGLEROW | Display a single row |
| %LVS_EX_SNAPTOGRID | Icons automatically snap to grid |
| %LVS_EX_SIMPLESELECT | Changes overlay rendering to top right |

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col& [, options...]*

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

| | |
|----------|---|
| ASCEND | The items are arranged in ascending sequence. |
| DESCEND | The items are arranged in descending sequence. |
| ALPHANUM | The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string. |
| UCASE | The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string |
| NUMERIC | The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: |

| | |
|----------|---|
| | , , scientific notation, radix format, etc. |
| MMDDYYYY | A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| DDMMYYYY | A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYMMDD | A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYDDMM | A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item& [, col&]*

The string value specified by *item&/col&* is set to an unselected state for the LISTVIEW control. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL_ADD LISTVIEW](#), [CONTROL_SET COLOR](#), [CONTROL_SET FONT](#), [HEADER](#), [IMAGELIST](#)

LISTVIEW GET STATE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a [LISTVIEW](#) control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
```

```

LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&

```

hDlg [Handle](#) of the [dialog](#) that owns the ListView.

hLst Handle of the [ImageList](#) to be used for graphical items.

hLV Handle of the ListView Control.

id& The [control identifier](#) assigned with [CONTROL_ADD_LISTVIEW](#).

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A
expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A
variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control [style](#) parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with [header](#) text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon

IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

- Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
- Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard [LISTBOX](#) control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col& TO datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either [pixels](#) or [dialog units](#), depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id& TO datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col& TO txtv\$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv\$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id& TO hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the [HEADER](#) statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id& TO datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id& TO datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id& [, item&] TO datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg, id&, item&, col& TO datav&*

A data item is tested to see if it is currently selected. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 ([true](#)) is

assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id& TO datav&*

Listview controls offer a number of optional additional style attributes which are unique and specific to a Listview. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col& TO txtv\$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv\$*. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item& TO datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every [DDI](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item& [, col&]*

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for

the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

| | |
|---------------|---------------|
| %LVSIL_NORMAL | Large icons |
| %LVSIL_SMALL | Small icons |
| %LVSIL_STATE | Status images |

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the [%LVS_SHAREIMAGELISTS](#) style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumrExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

Listview controls offer a number of optional additional style attributes which are unique and specific to a Listview. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

NumExpr defines the new style from any combination of the following extended styles:

| | |
|--------------------------|--|
| %LVS_EX_GRIDLINES | Grid lines added in report mode |
| %LVS_EX_SUBITEMIMAGES | Icons added to sub-items in report mode |
| %LVS_EX_CHECKBOXES | Enables checkboxes to items |
| %LVS_EX_TRACKSELECT | Enables hot track selection |
| %LVS_EX_HEADERDRAGDROP | Enables drag-drop reordering of columns in report mode |
| %LVS_EX_FULLROWSELECT | Selection highlights full row in report mode |
| %LVS_EX_ONECLICKACTIVATE | Notification sent on single click |
| %LVS_EX_TWOCLICKACTIVATE | Notification sent on double click |
| %LVS_EX_FLATSB | Enables flat scroll bars |
| %LVS_EX_REGIONAL | Sets Listview region to icons and text |
| %LVS_EX_INFOTIP | Listview does InfoTips for you |
| %LVS_EX_UNDERLINEHOT | Hot items have underlined text |
| %LVS_EX_UNDERLINECOLD | Non-hot items have underlined text |
| %LVS_EX_MULTWORKAREAS | Will not auto-arrange until work areas defined |
| %LVS_EX_LABELTIP | Listview unfolds partly hidden labels |
| %LVS_EX_BORDERSELECT | Border selection style instead of highlight |
| %LVS_EX_DOUBLEBUFFER | Paints via double-buffering and reduces flicker |
| %LVS_EX_HIDELABELS | Hides labels in Icon and Small Icon mode |
| %LVS_EX_SINGLEROW | Display a single row |
| %LVS_EX_SNAPTOGRID | Icons automatically snap to grid |
| %LVS_EX_SIMPLESELECT | Changes overlay rendering to top right |

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col& [, options...]*

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe

the sequence and the nature of the data in the sort-key column:

| | |
|----------|--|
| ASCEND | The items are arranged in ascending sequence. |
| DESCEND | The items are arranged in descending sequence. |
| ALPHANUM | The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string. |
| UCASE | The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string |
| NUMERIC | The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc. |
| MMDDYYYY | A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| DDMMYYYY | A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYMMDD | A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYDDMM | A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item& [, col&]*

The string value specified by *item&/col&* is set to an unselected state for the LISTVIEW control. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions

Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also

[Dynamic Dialog Tools](#), [CONTROL ADD LISTVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [HEADER](#), [IMAGELIST](#)

LISTVIEW GET STYLEXX statement

Keyword Template

Purpose

Syntax
Remarks
See also
Example

LISTVIEW statement IMPROVED

Purpose Manipulate a [LISTVIEW](#) control in order to set/retrieve data.

Syntax

```

LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&

```

hDlg [Handle](#) of the [dialog](#) that owns the ListView.

hLst Handle of the [ImageList](#) to be used for graphical items.

hLV Handle of the ListView Control.

id& The [control identifier](#) assigned with [CONTROL ADD LISTVIEW](#).

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A
expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A

| | |
|-------------------|---|
| | variable to which result text is assigned. |
| <i>datav&</i> | A long integer variable to which result data is assigned. |
| Remarks | There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE. <ul style="list-style-type: none"> Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item. Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item. Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item. Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item. |

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of

the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col& TO datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either [pixels](#) or [dialog units](#), depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id& TO datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col& TO txtv\$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv\$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id& TO hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the [HEADER](#) statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id& TO datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id& TO datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are

currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id& [, item&] TO datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg, id&, item&, col& TO datav&*

A data item is tested to see if it is currently selected. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id& TO datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col& TO txtv\$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv\$*. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item& TO datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows ListView control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item& [, col&]*

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

| | |
|---------------|---------------|
| %LVSIL_NORMAL | Large icons |
| %LVSIL_SMALL | Small icons |
| %LVSIL_STATE | Status images |

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted

from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the [%LVS_SHAREIMAGELISTS](#) style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

NumExpr defines the new style from any combination of the following extended styles:

| | |
|--------------------------|--|
| %LVS_EX_GRIDLINES | Grid lines added in report mode |
| %LVS_EX_SUBITEMIMAGES | Icons added to sub-items in report mode |
| %LVS_EX_CHECKBOXES | Enables checkboxes to items |
| %LVS_EX_TRACKSELECT | Enables hot track selection |
| %LVS_EX_HEADERDRAGDROP | Enables drag-drop reordering of columns in report mode |
| %LVS_EX_FULLROWSELECT | Selection highlights full row in report mode |
| %LVS_EX_ONECLICKACTIVATE | Notification sent on single click |
| %LVS_EX_TWOCLICKACTIVATE | Notification sent on double click |
| %LVS_EX_FLATSB | Enables flat scroll bars |
| %LVS_EX_REGIONAL | Sets ListView region to icons and text |
| %LVS_EX_INFOTIP | Listview does InfoTips for you |
| %LVS_EX_UNDERLINEHOT | Hot items have underlined text |
| %LVS_EX_UNDERLINECOLD | Non-hot items have underlined text |
| %LVS_EX_MULTWORKAREAS | Will not auto-arrange until work areas defined |
| %LVS_EX_LABELTIP | Listview unfolds partly hidden labels |
| %LVS_EX_BORDERSELECT | Border selection style instead of highlight |
| %LVS_EX_DOUBLEBUFFER | Paints via double-buffering and reduces flicker |
| %LVS_EX_HIDELABELS | Hides labels in Icon and Small Icon mode |
| %LVS_EX_SINGLEROW | Display a single row |
| %LVS_EX_SNAPTOGRID | Icons automatically snap to grid |
| %LVS_EX_SIMPLESELECT | Changes overlay rendering to top right |

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use

LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col& [, options...]*

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

| | |
|----------|--|
| ASCEND | The items are arranged in ascending sequence. |
| DESCEND | The items are arranged in descending sequence. |
| ALPHANUM | The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string. |
| UCASE | The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string |
| NUMERIC | The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc. |
| MMDDYYYY | A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| DDMMYYYY | A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYMMDD | A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYDDMM | A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item& [, col&]*

The string value specified by *item&/col&* is set to an unselected state for the LISTVIEW control. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW_VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL_ADD_LISTVIEW](#), [CONTROL_SET_COLOR](#), [CONTROL_SET_FONT](#), [HEADER](#), [IMAGELIST](#)

LISTVIEW_GET_TEXT statement**Keyword Template**

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a [LISTVIEW](#) control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
```

```
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&
```

| | |
|-------------------|---|
| <i>hDlg</i> | Handle of the dialog that owns the ListView. |
| <i>hLst</i> | Handle of the ImageList to be used for graphical items. |
| <i>hLV</i> | Handle of the ListView Control. |
| <i>id&</i> | The control identifier assigned with CONTROL ADD LISTVIEW . |
| <i>item&</i> | A data item number. First=1, second=2... |
| <i>col&</i> | A vertical column number. First=1, second=2... |
| <i>NumExpr</i> | A expression passed as a parameter. |
| <i>StrExpr</i> | A string expression passed as a parameter. |
| <i>txtv\$</i> | A variable to which result text is assigned. |
| <i>datav&</i> | A long integer variable to which result data is assigned. |
| Remarks | <p>There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.</p> <p>Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> <p>Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> <p>Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> <p>Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> |

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col& TO datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either [pixels](#) or [dialog units](#), depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id& TO datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col& TO txtv\$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv\$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id& TO hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the [HEADER](#) statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id& TO datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id& TO datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id& [, item&] TO datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg, id&, item&, col& TO datav&*

A data item is tested to see if it is currently selected. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id& TO datav&*

Listview controls offer a number of optional additional style attributes which are unique and specific to a Listview. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col& TO txtv\$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv\$*. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item& TO datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER.

The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item& [, col&]*

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary

image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

| | |
|---------------|---------------|
| %LVSIL_NORMAL | Large icons |
| %LVSIL_SMALL | Small icons |
| %LVSIL_STATE | Status images |

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the [%LVS_SHAREIMAGELISTS](#) style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

NumExpr defines the new style from any combination of the following extended styles:

| | |
|--------------------------|--|
| %LVS_EX_GRIDLINES | Grid lines added in report mode |
| %LVS_EX_SUBITEMIMAGES | Icons added to sub-items in report mode |
| %LVS_EX_CHECKBOXES | Enables checkboxes to items |
| %LVS_EX_TRACKSELECT | Enables hot track selection |
| %LVS_EX_HEADERDRAGDROP | Enables drag-drop reordering of columns in report mode |
| %LVS_EX_FULLROWSELECT | Selection highlights full row in report mode |
| %LVS_EX_ONECLICKACTIVATE | Notification sent on single click |
| %LVS_EX_TWOCLICKACTIVATE | Notification sent on double click |
| %LVS_EX_FLATSB | Enables flat scroll bars |
| %LVS_EX_REGIONAL | Sets ListView region to icons and text |
| %LVS_EX_INFOTIP | Listview does InfoTips for you |
| %LVS_EX_UNDERLINEHOT | Hot items have underlined text |
| %LVS_EX_UNDERLINECOLD | Non-hot items have underlined text |

| | |
|-----------------------|---|
| %LVS_EX_MULTWORKAREAS | Will not auto-arrange until work areas defined |
| %LVS_EX_LABELTIP | Listview unfolds partly hidden labels |
| %LVS_EX_BORDERSELECT | Border selection style instead of highlight |
| %LVS_EX_DOUBLEBUFFER | Paints via double-buffering and reduces flicker |
| %LVS_EX_HIDELABELS | Hides labels in Icon and Small Icon mode |
| %LVS_EX_SINGLEROW | Display a single row |
| %LVS_EX_SNAPTOGRID | Icons automatically snap to grid |
| %LVS_EX_SIMPLESELECT | Changes overlay rendering to top right |

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col& [, options...]*

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

| | |
|----------|--|
| ASCEND | The items are arranged in ascending sequence. |
| DESCEND | The items are arranged in descending sequence. |
| ALPHANUM | The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string. |
| UCASE | The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string |
| NUMERIC | The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc. |
| MMDDYYYY | A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| DDMMYYYY | A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYMMDD | A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |

YYYYDDMM A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item& [, col&]*

The string value specified by *item&/col&* is set to an unselected state for the LISTVIEW control. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL_ADD LISTVIEW](#), [CONTROL_SET COLOR](#), [CONTROL_SET FONT](#), [HEADER](#), [IMAGELIST](#)

LISTVIEW GET USER statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a [LISTVIEW](#) control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
```

```

LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&

```

hDlg [Handle](#) of the [dialog](#) that owns the ListView.

hLst Handle of the [ImageList](#) to be used for graphical items.

hLV Handle of the ListView Control.

id& The [control identifier](#) assigned with [CONTROL ADD LISTVIEW](#).

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A

variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control [style](#) parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with [header](#) text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard [LISTBOX](#) control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data

item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col& TO datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either [pixels](#) or [dialog units](#), depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id& TO datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col& TO txtv\$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv\$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id& TO hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the [HEADER](#) statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id& TO datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id& TO datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id& [, item&] TO datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg, id&, item&, col& TO datav&*

A data item is tested to see if it is currently selected. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id& TO datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col& TO txtv\$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv\$*. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item& TO datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER.

The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item& [, col&]*

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

| | |
|---------------|---------------|
| %LVSIL_NORMAL | Large icons |
| %LVSIL_SMALL | Small icons |
| %LVSIL_STATE | Status images |

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the [%LVS_SHAREIMAGELISTS](#) style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumrExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

Listview controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

NumExpr defines the new style from any combination of the following extended styles:

| | |
|-----------------------|---|
| %LVS_EX_GRIDLINES | Grid lines added in report mode |
| %LVS_EX_SUBITEMIMAGES | Icons added to sub-items in report mode |
| %LVS_EX_CHECKBOXES | Enables checkboxes to items |
| %LVS_EX_TRACKSELECT | Enables hot track selection |

| | |
|--------------------------|--|
| %LVS_EX_HEADERDRAGDROP | Enables drag-drop reordering of columns in report mode |
| %LVS_EX_FULLROWSELECT | Selection highlights full row in report mode |
| %LVS_EX_ONECLICKACTIVATE | Notification sent on single click |
| %LVS_EX_TWOCLICKACTIVATE | Notification sent on double click |
| %LVS_EX_FLATSB | Enables flat scroll bars |
| %LVS_EX_REGIONAL | Sets ListView region to icons and text |
| %LVS_EX_INFOTIP | Listview does InfoTips for you |
| %LVS_EX_UNDERLINEHOT | Hot items have underlined text |
| %LVS_EX_UNDERLINECOLD | Non-hot items have underlined text |
| %LVS_EX_MULTWORKAREAS | Will not auto-arrange until work areas defined |
| %LVS_EX_LABELTIP | Listview unfolds partly hidden labels |
| %LVS_EX_BORDERSELECT | Border selection style instead of highlight |
| %LVS_EX_DOUBLEBUFFER | Paints via double-buffering and reduces flicker |
| %LVS_EX_HIDELABELS | Hides labels in Icon and Small Icon mode |
| %LVS_EX_SINGLEROW | Display a single row |
| %LVS_EX_SNAPTOGRID | Icons automatically snap to grid |
| %LVS_EX_SIMPLESELECT | Changes overlay rendering to top right |

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col& [, options...]*

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

| | |
|----------|---|
| ASCEND | The items are arranged in ascending sequence. |
| DESCEND | The items are arranged in descending sequence. |
| ALPHANUM | The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string. |
| UCASE | The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string |

| | |
|----------|--|
| NUMERIC | The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc. |
| MMDDYYYY | A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| DDMMYYYY | A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYMMDD | A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYDDMM | A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item& [, col&]*

The string value specified by *item&/col&* is set to an unselected state for the LISTVIEW control. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD LISTVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [HEADER](#), [IMAGELIST](#)

LISTVIEW INSERT COLUMN statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a [LISTVIEW](#) control in order to set/retrieve data.

Syntax
LISTVIEW DELETE COLUMN *hDlg, id&, col&*
LISTVIEW DELETE ITEM *hDlg, id&, item&*

```

LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&

```

hDlg [Handle](#) of the [dialog](#) that owns the ListView.

hLst Handle of the [ImageList](#) to be used for graphical items.

hLV Handle of the ListView Control.

id& The [control identifier](#) assigned with [CONTROL_ADD_LISTVIEW](#).

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A
expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A
variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control [style](#) parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with [header](#) text to describe each of them. Additional sub-items may be displayed in

each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

- Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
- Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard [LISTBOX](#) control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is

found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col& TO datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either [pixels](#) or [dialog units](#), depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id& TO datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col& TO txtv\$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv\$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id& TO hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the [HEADER](#) statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id& TO datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id& TO datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id& [, item&] TO datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg, id&, item&, col& TO datav&*

A data item is tested to see if it is currently selected. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id& TO datav&*

Listview controls offer a number of optional additional style attributes which are unique and specific to a Listview. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col& TO txtv\$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv\$*. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item& TO datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item& [, col&]*

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

| | |
|---------------|---------------|
| %LVSIL_NORMAL | Large icons |
| %LVSIL_SMALL | Small icons |
| %LVSIL_STATE | Status images |

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the [%LVS_SHAREIMAGELISTS](#) style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

Listview controls offer a number of optional additional style attributes which are unique and specific to a Listview. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

NumExpr defines the new style from any combination of the following extended styles:

| | |
|-------------------------|--|
| %LVS_EX_GRIDLINES | Grid lines added in report mode |
| %LVS_EX_SUBITEMIMAGES | Icons added to sub-items in report mode |
| %LVS_EX_CHECKBOXES | Enables checkboxes to items |
| %LVS_EX_TRACKSELECT | Enables hot track selection |
| % | Enables drag-drop reordering of columns in report mode |
| LVS_EX_HEADERDRAGDROP | |
| %LVS_EX_FULLROWSELECT | Selection highlights full row in report mode |
| % | Notification sent on single click |
| LVS_EX_ONECLICKACTIVATE | |
| % | Notification sent on double click |
| LVS_EX_TWOCLICKACTIVATE | |
| %LVS_EX_FLATSB | Enables flat scroll bars |
| %LVS_EX_REGIONAL | Sets Listview region to icons and text |
| %LVS_EX_INFOTIP | Listview does InfoTips for you |
| %LVS_EX_UNDERLINEHOT | Hot items have underlined text |
| %LVS_EX_UNDERLINECOLD | Non-hot items have underlined text |
| %LVS_EX_MULTWORKAREAS | Will not auto-arrange until work areas defined |
| %LVS_EX_LABELTIP | Listview unfolds partly hidden labels |
| %LVS_EX_BORDERSELECT | Border selection style instead of highlight |
| %LVS_EX_DOUBLEBUFFER | Paints via double-buffering and reduces flicker |
| %LVS_EX_HIDELABELS | Hides labels in Icon and Small Icon mode |
| %LVS_EX_SINGLEROW | Display a single row |
| %LVS_EX_SNAPTOGRID | Icons automatically snap to grid |
| %LVS_EX_SIMPLESELECT | Changes overlay rendering to top right |

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col& [, options...]*

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

| | |
|----------|--|
| ASCEND | The items are arranged in ascending sequence. |
| DESCEND | The items are arranged in descending sequence. |
| ALPHANUM | The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string. |
| UCASE | The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string |
| NUMERIC | The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc. |
| MMDDYYYY | A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| DDMMYYYY | A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYMMDD | A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYDDMM | A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item& [, col&]*

The string value specified by *item&/col&* is set to an unselected state for the LISTVIEW control. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions

Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also

[Dynamic Dialog Tools](#), [CONTROL ADD LISTVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [HEADER](#), [IMAGELIST](#)

LISTVIEW INSERT ITEM statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a [LISTVIEW](#) control in order to set/retrieve data.

Syntax

```

LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&

```

hDlg [Handle](#) of the [dialog](#) that owns the ListView.

hLst Handle of the [ImageList](#) to be used for graphical items.

hLV Handle of the ListView Control.

id& The [control identifier](#) assigned with [CONTROL ADD LISTVIEW](#).

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A
expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control [style](#) parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with [header](#) text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard [LISTBOX](#) control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins

with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col& TO datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either [pixels](#) or [dialog units](#), depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id& TO datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col& TO txtv\$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv\$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id& TO hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the [HEADER](#) statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id& TO datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id& TO datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id& [, item&] TO datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned.

To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg, id&, item&, col& TO datav&*

A data item is tested to see if it is currently selected. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id& TO datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col& TO txtv\$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv\$*. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item& TO datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER.

The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every [DDI](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not

a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item& [, col&]*

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

| | |
|---------------|-------------|
| %LVSIL_NORMAL | Large icons |
| %LVSIL_SMALL | Small icons |

%LVSIL_STATE Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the [%LVS_SHAREIMAGELISTS](#) style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumrExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

NumExpr defines the new style from any combination of the following extended styles:

| | |
|--------------------------------|--|
| %LVS_EX_GRIDLINES | Grid lines added in report mode |
| %LVS_EX_SUBITEMIMAGES | Icons added to sub-items in report mode |
| %LVS_EX_CHECKBOXES | Enables checkboxes to items |
| %LVS_EX_TRACKSELECT | Enables hot track selection |
| % | Enables drag-drop reordering of columns in report mode |
| LVS_EX_HEADERDRAGDROP | mode |
| %LVS_EX_FULLROWSELECT | Selection highlights full row in report mode |
| % | Notification sent on single click |
| LVS_EX_ONECLICKACTIVATE | |
| % | Notification sent on double click |
| LVS_EX_TWOCLICKACTIVATE | |
| %LVS_EX_FLATSB | Enables flat scroll bars |
| %LVS_EX_REGIONAL | Sets ListView region to icons and text |
| %LVS_EX_INFOTIP | ListView does InfoTips for you |
| %LVS_EX_UNDERLINEHOT | Hot items have underlined text |
| %LVS_EX_UNDERLINECOLD | Non-hot items have underlined text |
| %LVS_EX_MULTWORKAREAS | Will not auto-arrange until work areas defined |
| %LVS_EX_LABELTIP | ListView unfolds partly hidden labels |
| %LVS_EX_BORDERSELECT | Border selection style instead of highlight |
| %LVS_EX_DOUBLEBUFFER | Paints via double-buffering and reduces flicker |
| %LVS_EX_HIDELABELS | Hides labels in Icon and Small Icon mode |
| %LVS_EX_SINGLEROW | Display a single row |
| %LVS_EX_SNAPTOGRID | Icons automatically snap to grid |
| %LVS_EX_SIMPLESELECT | Changes overlay rendering to top right |

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col& [, options...]*

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

| | |
|----------|--|
| ASCEND | The items are arranged in ascending sequence. |
| DESCEND | The items are arranged in descending sequence. |
| ALPHANUM | The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string. |
| UCASE | The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string |
| NUMERIC | The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc. |
| MMDDYYYY | A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| DDMMYYYY | A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYMMDD | A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYDDMM | A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item& [, col&]*

The string value specified by *item&/col&* is set to an unselected state for the LISTVIEW control. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the

optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL_ADD LISTVIEW](#), [CONTROL_SET COLOR](#), [CONTROL_SET FONT](#), [HEADER](#), [IMAGELIST](#)

LISTVIEW RESET statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a [LISTVIEW](#) control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
```

```

LISTVIEW SET STYLEEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&

```

| | |
|-------------------|---|
| <i>hDlg</i> | Handle of the dialog that owns the ListView. |
| <i>hLst</i> | Handle of the ImageList to be used for graphical items. |
| <i>hLV</i> | Handle of the ListView Control. |
| <i>id&</i> | The control identifier assigned with CONTROL ADD LISTVIEW . |
| <i>item&</i> | A data item number. First=1, second=2... |
| <i>col&</i> | A vertical column number. First=1, second=2... |
| <i>NumExpr</i> | A expression passed as a parameter. |
| <i>StrExpr</i> | A string expression passed as a parameter. |
| <i>txtv\$</i> | A variable to which result text is assigned. |
| <i>datav&</i> | A long integer variable to which result data is assigned. |
| Remarks | <p>There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.</p> <p>Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> <p>Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> <p>Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> <p>Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> |

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column

numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col& TO datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either [pixels](#) or [dialog units](#), depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id& TO datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col& TO txtv\$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv\$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id& TO hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the [HEADER](#) statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id& TO datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id& TO datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id& [, item&] TO datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg, id&, item&, col& TO datav&*

A data item is tested to see if it is currently selected. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id& TO datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col& TO txtv\$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv\$*. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item& TO datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable

specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item& [, col&]*

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

| | |
|---------------|---------------|
| %LVSIL_NORMAL | Large icons |
| %LVSIL_SMALL | Small icons |
| %LVSIL_STATE | Status images |

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the [%LVS_SHAREIMAGELISTS](#) style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

NumExpr defines the new style from any combination of the following extended styles:

| | |
|--------------------------|--|
| %LVS_EX_GRIDLINES | Grid lines added in report mode |
| %LVS_EX_SUBITEMIMAGES | Icons added to sub-items in report mode |
| %LVS_EX_CHECKBOXES | Enables checkboxes to items |
| %LVS_EX_TRACKSELECT | Enables hot track selection |
| %LVS_EX_HEADERDRAGDROP | Enables drag-drop reordering of columns in report mode |
| %LVS_EX_FULLROWSELECT | Selection highlights full row in report mode |
| %LVS_EX_ONECLICKACTIVATE | Notification sent on single click |
| %LVS_EX_TWOCLICKACTIVATE | Notification sent on double click |
| %LVS_EX_FLATSB | Enables flat scroll bars |
| %LVS_EX_REGIONAL | Sets ListView region to icons and text |

| | |
|-----------------------|---|
| %LVS_EX_INFOTIP | Listview does InfoTips for you |
| %LVS_EX_UNDERLINEHOT | Hot items have underlined text |
| %LVS_EX_UNDERLINECOLD | Non-hot items have underlined text |
| %LVS_EX_MULTWORKAREAS | Will not auto-arrange until work areas defined |
| %LVS_EX_LABELTIP | Listview unfolds partly hidden labels |
| %LVS_EX_BORDERSELECT | Border selection style instead of highlight |
| %LVS_EX_DOUBLEBUFFER | Paints via double-buffering and reduces flicker |
| %LVS_EX_HIDELABELS | Hides labels in Icon and Small Icon mode |
| %LVS_EX_SINGLEROW | Display a single row |
| %LVS_EX_SNAPTOGRID | Icons automatically snap to grid |
| %LVS_EX_SIMPLESELECT | Changes overlay rendering to top right |

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col& [, options...]*

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

| | |
|----------|--|
| ASCEND | The items are arranged in ascending sequence. |
| DESCEND | The items are arranged in descending sequence. |
| ALPHANUM | The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string. |
| UCASE | The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string |
| NUMERIC | The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc. |
| MMDDYYYY | A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| DDMMYYYY | A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and |

| | |
|----------|---|
| | delimiters may be any character. |
| YYYYMMDD | A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYDDMM | A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item& [, col&]*

The string value specified by *item&/col&* is set to an unselected state for the LISTVIEW control. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL_ADD LISTVIEW](#), [CONTROL_SET COLOR](#), [CONTROL_SET FONT](#), [HEADER](#), [IMAGELIST](#)

LISTVIEW SELECT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a [LISTVIEW](#) control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
```

```

LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&

```

hDlg [Handle](#) of the [dialog](#) that owns the ListView.

hLst Handle of the [ImageList](#) to be used for graphical items.

hLV Handle of the ListView Control.

id& The [control identifier](#) assigned with [CONTROL ADD LISTVIEW](#).

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A
expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A
variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control [style](#) parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with [header](#) text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 3 List Mode - String data items are displayed as a list, top to bottom, one

item per line. This mode is very similar in appearance to a standard [LISTBOX](#) control. In this mode, it's often convenient to think of the item number as a row number. If a small icon [IMAGELIST](#) is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*)

is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col& TO datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either [pixels](#) or [dialog units](#), depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id& TO datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col& TO txtv\$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv\$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id& TO hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the [HEADER](#) statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id& TO datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id& TO datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id& [, item&] TO datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg, id&, item&, col& TO datav&*

A data item is tested to see if it is currently selected. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id& TO datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This

special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col& TO txtv\$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv\$*. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item& TO datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item& [, col&]*

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If

NumExpr is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

| | |
|---------------|---------------|
| %LVSIL_NORMAL | Large icons |
| %LVSIL_SMALL | Small icons |
| %LVSIL_STATE | Status images |

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the [%LVS_SHAREIMAGELISTS](#) style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

Listview controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

NumExpr defines the new style from any combination of the following extended styles:

| | |
|------------------------------|--|
| %LVS_EX_GRIDLINES | Grid lines added in report mode |
| %LVS_EX_SUBITEMIMAGES | Icons added to sub-items in report mode |
| %LVS_EX_CHECKBOXES | Enables checkboxes to items |
| %LVS_EX_TRACKSELECT | Enables hot track selection |
| % LVS_EX_HEADERDRAGDROP | Enables drag-drop reordering of columns in report mode |
| %LVS_EX_FULLROWSELECT | Selection highlights full row in report mode |
| % LVS_EX_ONECLICKACTIVATE | Notification sent on single click |
| % LVS_EX_TWOCLICKACTIVATE | Notification sent on double click |
| %LVS_EX_FLATSB | Enables flat scroll bars |
| %LVS_EX_REGIONAL | Sets ListView region to icons and text |
| %LVS_EX_INFOTIP | Listview does InfoTips for you |
| %LVS_EX_UNDERLINEHOT | Hot items have underlined text |
| %LVS_EX_UNDERLINECOLD | Non-hot items have underlined text |
| %LVS_EX_MULTWORKAREAS | Will not auto-arrange until work areas defined |
| %LVS_EX_LABELTIP | Listview unfolds partly hidden labels |
| %LVS_EX_BORDERSELECT | Border selection style instead of highlight |
| %LVS_EX_DOUBLEBUFFER | Paints via double-buffering and reduces flicker |
| %LVS_EX_HIDELABELS | Hides labels in Icon and Small Icon mode |
| %LVS_EX_SINGLEROW | Display a single row |
| %LVS_EX_SNAPTOGRID | Icons automatically snap to grid |
| %LVS_EX_SIMPLESELECT | Changes overlay rendering to top right |

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col& [, options...]*

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

| | |
|----------|---|
| ASCEND | The items are arranged in ascending sequence. |
| DESCEND | The items are arranged in descending sequence. |
| ALPHANUM | The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string. |

| | |
|----------|--|
| UCASE | The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string |
| NUMERIC | The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc. |
| MMDDYYYY | A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| DDMMYYYY | A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYMMDD | A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYDDMM | A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item& [, col&]*

The string value specified by *item&/col&* is set to an unselected state for the LISTVIEW control. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD LISTVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [HEADER](#), [IMAGELIST](#)

LISTVIEW SET COLUMN statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

| | |
|-------------------|---|
| Purpose | Manipulate a LISTVIEW control in order to set/retrieve data. |
| Syntax | <pre> LISTVIEW DELETE COLUMN <i>hDlg</i>, <i>id&</i>, <i>col&</i> LISTVIEW DELETE ITEM <i>hDlg</i>, <i>id&</i>, <i>item&</i> LISTVIEW FIND <i>hDlg</i>, <i>id&</i>, <i>item&</i>, <i>StrExpr</i> TO <i>datav&</i> LISTVIEW FIND EXACT <i>hDlg</i>, <i>id&</i>, <i>item&</i>, <i>StrExpr</i> TO <i>datav&</i> LISTVIEW FIT CONTENT <i>hDlg</i>, <i>id&</i>, <i>col&</i> LISTVIEW FIT HEADER <i>hDlg</i>, <i>id&</i>, <i>col&</i> LISTVIEW GET COLUMN <i>hDlg</i>, <i>id&</i>, <i>col&</i> TO <i>datav&</i> LISTVIEW GET COUNT <i>hDlg</i>, <i>id&</i> TO <i>datav&</i> LISTVIEW GET HEADER <i>hDlg</i>, <i>id&</i>, <i>col&</i> TO <i>txtv\$</i> LISTVIEW GET HEADERID <i>hDlg</i>, <i>id&</i> TO <i>hLV</i>, <i>idv&</i> LISTVIEW GET MODE <i>hDlg</i>, <i>id&</i> TO <i>datav&</i> LISTVIEW GET SELCOUNT <i>hDlg</i>, <i>id&</i> TO <i>datav&</i> LISTVIEW GET SELECT <i>hDlg</i>, <i>id&</i> [, <i>item&</i>] TO <i>datav&</i> LISTVIEW GET STATE <i>hDlg</i>, <i>id&</i>, <i>item&</i>, <i>col&</i> TO <i>datav&</i> LISTVIEW GET STYLEXX <i>hDlg</i>, <i>id&</i> TO <i>datav&</i> LISTVIEW GET TEXT <i>hDlg</i>, <i>id&</i>, <i>item&</i>, <i>col&</i> TO <i>txtv\$</i> LISTVIEW GET USER <i>hDlg</i>, <i>id&</i>, <i>item&</i> TO <i>datav&</i> LISTVIEW INSERT COLUMN <i>hDlg</i>, <i>id&</i>, <i>col&</i>, <i>StrExpr</i>, <i>ColWidth&</i>, <i>format&</i> LISTVIEW INSERT ITEM <i>hDlg</i>, <i>id&</i>, <i>item&</i>, <i>image&</i>, <i>StrExpr</i> LISTVIEW RESET <i>hDlg</i>, <i>id&</i> LISTVIEW SELECT <i>hDlg</i>, <i>id&</i>, <i>item&</i> [, <i>col&</i>] LISTVIEW SET COLUMN <i>hDlg</i>, <i>id&</i>, <i>col&</i>, <i>NumExpr</i> LISTVIEW SET HEADER <i>hDlg</i>, <i>id&</i>, <i>col&</i>, <i>StrExpr</i> LISTVIEW SET IMAGE <i>hDlg</i>, <i>id&</i>, <i>item&</i>, <i>NumExpr</i> LISTVIEW SET IMAGE2 <i>hDlg</i>, <i>id&</i>, <i>item&</i>, <i>NumExpr</i> LISTVIEW SET IMAGELIST <i>hDlg</i>, <i>id&</i>, <i>hLst</i>, <i>NumExpr</i> LISTVIEW SET MODE <i>hDlg</i>, <i>id&</i>, <i>NumExpr</i> LISTVIEW SET OVERLAY <i>hDlg</i>, <i>id&</i>, <i>item&</i>, <i>NumExpr</i> LISTVIEW SET STYLEXX <i>hDlg</i>, <i>id&</i>, <i>NumExpr</i> LISTVIEW SET TEXT <i>hDlg</i>, <i>id&</i>, <i>item&</i>, <i>col&</i>, <i>StrExpr</i> LISTVIEW SET USER <i>hDlg</i>, <i>id&</i>, <i>item&</i>, <i>NumExpr</i> LISTVIEW SORT <i>hDlg</i>, <i>id&</i>, <i>col&</i> [, <i>options...</i>] LISTVIEW UNSELECT <i>hDlg</i>, <i>id&</i>, <i>item&</i>, [<i>col&</i>] LISTVIEW VISIBLE <i>hDlg</i>, <i>id&</i>, <i>item&</i> </pre> |
| <i>hDlg</i> | Handle of the dialog that owns the ListView. |
| <i>hLst</i> | Handle of the ImageList to be used for graphical items. |
| <i>hLV</i> | Handle of the ListView Control. |
| <i>id&</i> | The control identifier assigned with CONTROL_ADD_LISTVIEW . |
| <i>item&</i> | A data item number. First=1, second=2... |
| <i>col&</i> | A vertical column number. First=1, second=2... |
| <i>NumExpr</i> | A expression passed as a parameter. |
| <i>StrExpr</i> | A string expression passed as a parameter. |
| <i>txtv\$</i> | A variable to which result text is assigned. |
| <i>datav&</i> | A long integer variable to which result data is assigned. |
| Remarks | <p>There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.</p> <p>Mode 0 Icon Mode - String data items are displayed left to right, wrapped to</p> |

multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

- Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with [header](#) text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
- Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
- Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard [LISTBOX](#) control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which

exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col& TO datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either [pixels](#) or [dialog units](#), depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id& TO datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col& TO txtv\$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv\$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id& TO hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the [HEADER](#) statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id& TO datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id& TO datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id& [, item&] TO datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to

facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg, id&, item&, col& TO datav&*

A data item is tested to see if it is currently selected. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id& TO datav&*

Listview controls offer a number of optional additional style attributes which are unique and specific to a Listview. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col& TO txtv\$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv\$*. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item& TO datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER.

The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item& [, col&]*

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

| | |
|---------------|---------------|
| %LVSIL_NORMAL | Large icons |
| %LVSIL_SMALL | Small icons |
| %LVSIL_STATE | Status images |

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the [%LVS_SHAREIMAGELISTS](#) style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

Listview controls offer a number of optional additional style attributes which are unique and specific to a Listview. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

NumExpr defines the new style from any combination of the following extended styles:

| | |
|--------------------------|--|
| %LVS_EX_GRIDLINES | Grid lines added in report mode |
| %LVS_EX_SUBITEMIMAGES | Icons added to sub-items in report mode |
| %LVS_EX_CHECKBOXES | Enables checkboxes to items |
| %LVS_EX_TRACKSELECT | Enables hot track selection |
| % | Enables drag-drop reordering of columns in report mode |
| LVS_EX_HEADERDRAGDROP | mode |
| %LVS_EX_FULLROWSELECT | Selection highlights full row in report mode |
| % | Notification sent on single click |
| LVS_EX_ONECLICKACTIVATE | |
| % | Notification sent on double click |
| LVS_EX_TWOCCLICKACTIVATE | |
| %LVS_EX_FLATSB | Enables flat scroll bars |
| %LVS_EX_REGIONAL | Sets Listview region to icons and text |
| %LVS_EX_INFOTIP | Listview does InfoTips for you |
| %LVS_EX_UNDERLINEHOT | Hot items have underlined text |
| %LVS_EX_UNDERLINECOLD | Non-hot items have underlined text |
| %LVS_EX_MULTWORKAREAS | Will not auto-arrange until work areas defined |
| %LVS_EX_LABELTIP | Listview unfolds partly hidden labels |
| %LVS_EX_BORDERSELECT | Border selection style instead of highlight |
| %LVS_EX_DOUBLEBUFFER | Paints via double-buffering and reduces flicker |
| %LVS_EX_HIDELABELS | Hides labels in Icon and Small Icon mode |
| %LVS_EX_SINGLEROW | Display a single row |
| %LVS_EX_SNAPTOGRID | Icons automatically snap to grid |
| %LVS_EX_SIMPLESELECT | Changes overlay rendering to top right |

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user

value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col& [, options...]*

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

| | |
|----------|--|
| ASCEND | The items are arranged in ascending sequence. |
| DESCEND | The items are arranged in descending sequence. |
| ALPHANUM | The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string. |
| UCASE | The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string |
| NUMERIC | The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc. |
| MMDDYYYY | A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| DDMMYYYY | A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYMMDD | A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYDDMM | A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item& [, col&]*

The string value specified by *item&/col&* is set to an unselected state for the LISTVIEW control. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions

Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD LISTVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [HEADER](#), [IMAGELIST](#)

LISTVIEW SET HEADER statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a [LISTVIEW](#) control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&
```

hDlg [Handle](#) of the [dialog](#) that owns the ListView.

hLst Handle of the [ImageList](#) to be used for graphical items.

hLV Handle of the ListView Control.

| | |
|-------------------|---|
| <i>id&</i> | The control identifier assigned with CONTROL ADD LISTVIEW . |
| <i>item&</i> | A data item number. First=1, second=2... |
| <i>col&</i> | A vertical column number. First=1, second=2... |
| <i>NumExpr</i> | A expression passed as a parameter. |
| <i>StrExpr</i> | A string expression passed as a parameter. |
| <i>txtv\$</i> | A variable to which result text is assigned. |
| <i>datav&</i> | A long integer variable to which result data is assigned. |
| Remarks | <p>There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.</p> <p>Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> <p>Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> <p>Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> <p>Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> |

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col& TO datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either [pixels](#) or [dialog units](#), depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id& TO datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col& TO txtv\$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv\$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id& TO hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the [HEADER](#) statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id& TO datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id& TO datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id& [, item&] TO datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg, id&, item&, col& TO datav&*

A data item is tested to see if it is currently selected. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id& TO datav&*

Listview controls offer a number of optional additional style attributes which are unique and specific to a Listview. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col& TO txtv\$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv\$*. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item& TO datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either

dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item& [, col&]*

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

| | |
|---------------|---------------|
| %LVSIL_NORMAL | Large icons |
| %LVSIL_SMALL | Small icons |
| %LVSIL_STATE | Status images |

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the [%LVS_SHAREIMAGELISTS](#) style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

Listview controls offer a number of optional additional style attributes which are unique and specific to a Listview. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

NumExpr defines the new style from any combination of the following extended styles:

| | |
|--------------------------|--|
| %LVS_EX_GRIDLINES | Grid lines added in report mode |
| %LVS_EX_SUBITEMIMAGES | Icons added to sub-items in report mode |
| %LVS_EX_CHECKBOXES | Enables checkboxes to items |
| %LVS_EX_TRACKSELECT | Enables hot track selection |
| %LVS_EX_HEADERDRAGDROP | Enables drag-drop reordering of columns in report mode |
| %LVS_EX_FULLROWSELECT | Selection highlights full row in report mode |
| %LVS_EX_ONECLICKACTIVATE | Notification sent on single click |
| %LVS_EX_TWOCLICKACTIVATE | Notification sent on double click |
| %LVS_EX_FLATSB | Enables flat scroll bars |
| %LVS_EX_REGIONAL | Sets Listview region to icons and text |
| %LVS_EX_INFOTIP | Listview does InfoTips for you |
| %LVS_EX_UNDERLINEHOT | Hot items have underlined text |
| %LVS_EX_UNDERLINECOLD | Non-hot items have underlined text |
| %LVS_EX_MULTWORKAREAS | Will not auto-arrange until work areas defined |
| %LVS_EX_LABELTIP | Listview unfolds partly hidden labels |
| %LVS_EX_BORDERSELECT | Border selection style instead of highlight |
| %LVS_EX_DOUBLEBUFFER | Paints via double-buffering and reduces flicker |

| | |
|----------------------|--|
| %LVS_EX_HIDELABELS | Hides labels in Icon and Small Icon mode |
| %LVS_EX_SINGLEROW | Display a single row |
| %LVS_EX_SNAPTOGRID | Icons automatically snap to grid |
| %LVS_EX_SIMPLESELECT | Changes overlay rendering to top right |

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col& [, options...]*

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

| | |
|----------|--|
| ASCEND | The items are arranged in ascending sequence. |
| DESCEND | The items are arranged in descending sequence. |
| ALPHANUM | The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string. |
| UCASE | The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string |
| NUMERIC | The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc. |
| MMDDYYYY | A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| DDMMYYYY | A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYMMDD | A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYDDMM | A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |

It is important to note that Windows may overwrite USER data when sorting your ListView

control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item& [, col&]*

The string value specified by *item&/col&* is set to an unselected state for the LISTVIEW control. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD LISTVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [HEADER](#), [IMAGELIST](#)

LISTVIEW SET IMAGE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a [LISTVIEW](#) control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
```

```

LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&

```

hDlg [Handle](#) of the [dialog](#) that owns the ListView.

hLst Handle of the [ImageList](#) to be used for graphical items.

hLV Handle of the ListView Control.

id& The [control identifier](#) assigned with [CONTROL ADD LISTVIEW](#).

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A

variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks

There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control [style](#) parameter. It may be changed from time to time with LISTVIEW SET MODE.

- Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
- Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with [header](#) text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
- Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
- Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard [LISTBOX](#) control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the

unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col& TO datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either [pixels](#) or [dialog units](#), depending upon which was used at creation. The value *col&* specifies the column number

(1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id& TO datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col& TO txtv\$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv\$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id& TO hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the [HEADER](#) statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id& TO datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id& TO datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id& [, item&] TO datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg, id&, item&, col& TO datav&*

A data item is tested to see if it is currently selected. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id& TO datav&*

Listview controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col& TO txtv\$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv\$*. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item& TO datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER.

The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item& [, col&]*

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&*

specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

| | |
|---------------|---------------|
| %LVSIL_NORMAL | Large icons |
| %LVSIL_SMALL | Small icons |
| %LVSIL_STATE | Status images |

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the [%LVS_SHAREIMAGELISTS](#) style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

NumExpr defines the new style from any combination of the following extended styles:

| | |
|------------------------|--|
| %LVS_EX_GRIDLINES | Grid lines added in report mode |
| %LVS_EX_SUBITEMIMAGES | Icons added to sub-items in report mode |
| %LVS_EX_CHECKBOXES | Enables checkboxes to items |
| %LVS_EX_TRACKSELECT | Enables hot track selection |
| %LVS_EX_HEADERDRAGDROP | Enables drag-drop reordering of columns in report mode |
| %LVS_EX_FULLROWSELECT | Selection highlights full row in report mode |

| | |
|---------------------------|---|
| %LVS_EX_ONECLICKACTIVATE | Notification sent on single click |
| %LVS_EX_TWOCCLICKACTIVATE | Notification sent on double click |
| %LVS_EX_FLATSB | Enables flat scroll bars |
| %LVS_EX_REGIONAL | Sets ListView region to icons and text |
| %LVS_EX_INFOTIP | Listview does InfoTips for you |
| %LVS_EX_UNDERLINEHOT | Hot items have underlined text |
| %LVS_EX_UNDERLINECOLD | Non-hot items have underlined text |
| %LVS_EX_MULTWORKAREAS | Will not auto-arrange until work areas defined |
| %LVS_EX_LABELTIP | Listview unfolds partly hidden labels |
| %LVS_EX_BORDERSELECT | Border selection style instead of highlight |
| %LVS_EX_DOUBLEBUFFER | Paints via double-buffering and reduces flicker |
| %LVS_EX_HIDELABELS | Hides labels in Icon and Small Icon mode |
| %LVS_EX_SINGLEROW | Display a single row |
| %LVS_EX_SNAPTOGRID | Icons automatically snap to grid |
| %LVS_EX_SIMPLESELECT | Changes overlay rendering to top right |

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col& [, options...]*

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

| | |
|----------|---|
| ASCEND | The items are arranged in ascending sequence. |
| DESCEND | The items are arranged in descending sequence. |
| ALPHANUM | The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string. |
| UCASE | The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string |
| NUMERIC | The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: |

| | |
|----------|---|
| | , , scientific notation, radix format, etc. |
| MMDDYYYY | A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| DDMMYYYY | A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYMMDD | A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYDDMM | A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item& [, col&]*

The string value specified by *item&/col&* is set to an unselected state for the LISTVIEW control. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL_ADD LISTVIEW](#), [CONTROL_SET COLOR](#), [CONTROL_SET FONT](#), [HEADER](#), [IMAGELIST](#)

LISTVIEW SET IMAGE2 statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a [LISTVIEW](#) control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
```

```

LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&

```

hDlg [Handle](#) of the [dialog](#) that owns the ListView.

hLst Handle of the [ImageList](#) to be used for graphical items.

hLV Handle of the ListView Control.

id& The [control identifier](#) assigned with [CONTROL_ADD_LISTVIEW](#).

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A
expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A
variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control [style](#) parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with [header](#) text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon

IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

- Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
- Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard [LISTBOX](#) control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col& TO datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either [pixels](#) or [dialog units](#), depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id& TO datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col& TO txtv\$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv\$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id& TO hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the [HEADER](#) statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id& TO datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id& TO datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id& [, item&] TO datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg, id&, item&, col& TO datav&*

A data item is tested to see if it is currently selected. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 ([true](#)) is

assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id& TO datav&*

Listview controls offer a number of optional additional style attributes which are unique and specific to a Listview. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col& TO txtv\$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv\$*. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item& TO datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every [DDI](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item& [, col&]*

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for

the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

| | |
|---------------|---------------|
| %LVSIL_NORMAL | Large icons |
| %LVSIL_SMALL | Small icons |
| %LVSIL_STATE | Status images |

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the [%LVS_SHAREIMAGELISTS](#) style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumrExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

Listview controls offer a number of optional additional style attributes which are unique and specific to a Listview. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

NumExpr defines the new style from any combination of the following extended styles:

| | |
|--------------------------|--|
| %LVS_EX_GRIDLINES | Grid lines added in report mode |
| %LVS_EX_SUBITEMIMAGES | Icons added to sub-items in report mode |
| %LVS_EX_CHECKBOXES | Enables checkboxes to items |
| %LVS_EX_TRACKSELECT | Enables hot track selection |
| %LVS_EX_HEADERDRAGDROP | Enables drag-drop reordering of columns in report mode |
| %LVS_EX_FULLROWSELECT | Selection highlights full row in report mode |
| %LVS_EX_ONECLICKACTIVATE | Notification sent on single click |
| %LVS_EX_TWOCLICKACTIVATE | Notification sent on double click |
| %LVS_EX_FLATSB | Enables flat scroll bars |
| %LVS_EX_REGIONAL | Sets Listview region to icons and text |
| %LVS_EX_INFOTIP | Listview does InfoTips for you |
| %LVS_EX_UNDERLINEHOT | Hot items have underlined text |
| %LVS_EX_UNDERLINECOLD | Non-hot items have underlined text |
| %LVS_EX_MULTWORKAREAS | Will not auto-arrange until work areas defined |
| %LVS_EX_LABELTIP | Listview unfolds partly hidden labels |
| %LVS_EX_BORDERSELECT | Border selection style instead of highlight |
| %LVS_EX_DOUBLEBUFFER | Paints via double-buffering and reduces flicker |
| %LVS_EX_HIDELABELS | Hides labels in Icon and Small Icon mode |
| %LVS_EX_SINGLEROW | Display a single row |
| %LVS_EX_SNAPTOGRID | Icons automatically snap to grid |
| %LVS_EX_SIMPLESELECT | Changes overlay rendering to top right |

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col& [, options...]*

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe

the sequence and the nature of the data in the sort-key column:

| | |
|----------|--|
| ASCEND | The items are arranged in ascending sequence. |
| DESCEND | The items are arranged in descending sequence. |
| ALPHANUM | The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string. |
| UCASE | The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string |
| NUMERIC | The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc. |
| MMDDYYYY | A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| DDMMYYYY | A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYMMDD | A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYDDMM | A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item& [, col&]*

The string value specified by *item&/col&* is set to an unselected state for the LISTVIEW control. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions

Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also

[Dynamic Dialog Tools](#), [CONTROL ADD LISTVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [HEADER](#), [IMAGELIST](#)

LISTVIEW SET IMAGELIST statement

Keyword Template

Purpose

Syntax
Remarks
See also
Example

LISTVIEW statement IMPROVED

Purpose Manipulate a [LISTVIEW](#) control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&
```

hDlg [Handle](#) of the [dialog](#) that owns the ListView.

hLst Handle of the [ImageList](#) to be used for graphical items.

hLV Handle of the ListView Control.

id& The [control identifier](#) assigned with [CONTROL ADD LISTVIEW](#).

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A
expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A

- variable to which result text is assigned.
- datav&* A [long integer](#) variable to which result data is assigned.
- Remarks** There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control [style](#) parameter. It may be changed from time to time with LISTVIEW SET MODE.
- Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
 - Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with [header](#) text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
 - Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
 - Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard [LISTBOX](#) control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of

the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col& TO datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either [pixels](#) or [dialog units](#), depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id& TO datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col& TO txtv\$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv\$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id& TO hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the [HEADER](#) statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id& TO datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id& TO datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are

currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id& [, item&] TO datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg, id&, item&, col& TO datav&*

A data item is tested to see if it is currently selected. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id& TO datav&*

Listview controls offer a number of optional additional style attributes which are unique and specific to a Listview. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col& TO txtv\$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv\$*. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item& TO datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item& [, col&]*

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

| | |
|---------------|---------------|
| %LVSIL_NORMAL | Large icons |
| %LVSIL_SMALL | Small icons |
| %LVSIL_STATE | Status images |

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted

from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the [%LVS_SHAREIMAGELISTS](#) style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

NumExpr defines the new style from any combination of the following extended styles:

| | |
|--------------------------|--|
| %LVS_EX_GRIDLINES | Grid lines added in report mode |
| %LVS_EX_SUBITEMIMAGES | Icons added to sub-items in report mode |
| %LVS_EX_CHECKBOXES | Enables checkboxes to items |
| %LVS_EX_TRACKSELECT | Enables hot track selection |
| %LVS_EX_HEADERDRAGDROP | Enables drag-drop reordering of columns in report mode |
| %LVS_EX_FULLROWSELECT | Selection highlights full row in report mode |
| %LVS_EX_ONECLICKACTIVATE | Notification sent on single click |
| %LVS_EX_TWOCLICKACTIVATE | Notification sent on double click |
| %LVS_EX_FLATSB | Enables flat scroll bars |
| %LVS_EX_REGIONAL | Sets ListView region to icons and text |
| %LVS_EX_INFOTIP | Listview does InfoTips for you |
| %LVS_EX_UNDERLINEHOT | Hot items have underlined text |
| %LVS_EX_UNDERLINECOLD | Non-hot items have underlined text |
| %LVS_EX_MULTWORKAREAS | Will not auto-arrange until work areas defined |
| %LVS_EX_LABELTIP | Listview unfolds partly hidden labels |
| %LVS_EX_BORDERSELECT | Border selection style instead of highlight |
| %LVS_EX_DOUBLEBUFFER | Paints via double-buffering and reduces flicker |
| %LVS_EX_HIDELABELS | Hides labels in Icon and Small Icon mode |
| %LVS_EX_SINGLEROW | Display a single row |
| %LVS_EX_SNAPTOGRID | Icons automatically snap to grid |
| %LVS_EX_SIMPLESELECT | Changes overlay rendering to top right |

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use

LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col& [, options...]*

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

| | |
|----------|--|
| ASCEND | The items are arranged in ascending sequence. |
| DESCEND | The items are arranged in descending sequence. |
| ALPHANUM | The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string. |
| UCASE | The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string |
| NUMERIC | The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc. |
| MMDDYYYY | A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| DDMMYYYY | A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYMMDD | A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYDDMM | A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item& [, col&]*

The string value specified by *item&/col&* is set to an unselected state for the LISTVIEW control. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW_VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL_ADD_LISTVIEW](#), [CONTROL_SET_COLOR](#), [CONTROL_SET_FONT](#), [HEADER](#), [IMAGELIST](#)

LISTVIEW SET MODE statement**Keyword Template**

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a [LISTVIEW](#) control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
```

```
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&
```

| | |
|-------------------|---|
| <i>hDlg</i> | Handle of the dialog that owns the ListView. |
| <i>hLst</i> | Handle of the ImageList to be used for graphical items. |
| <i>hLV</i> | Handle of the ListView Control. |
| <i>id&</i> | The control identifier assigned with CONTROL ADD LISTVIEW . |
| <i>item&</i> | A data item number. First=1, second=2... |
| <i>col&</i> | A vertical column number. First=1, second=2... |
| <i>NumExpr</i> | A expression passed as a parameter. |
| <i>StrExpr</i> | A string expression passed as a parameter. |
| <i>txtv\$</i> | A variable to which result text is assigned. |
| <i>datav&</i> | A long integer variable to which result data is assigned. |
| Remarks | <p>There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.</p> <p>Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> <p>Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> <p>Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> <p>Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> |

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col& TO datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either [pixels](#) or [dialog units](#), depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id& TO datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col& TO txtv\$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv\$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id& TO hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the [HEADER](#) statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id& TO datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id& TO datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id& [, item&] TO datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg, id&, item&, col& TO datav&*

A data item is tested to see if it is currently selected. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id& TO datav&*

Listview controls offer a number of optional additional style attributes which are unique and specific to a Listview. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col& TO txtv\$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv\$*. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item& TO datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER.

The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item& [, col&]*

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary

image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

| | |
|---------------|---------------|
| %LVSIL_NORMAL | Large icons |
| %LVSIL_SMALL | Small icons |
| %LVSIL_STATE | Status images |

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the [%LVS_SHAREIMAGELISTS](#) style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

NumExpr defines the new style from any combination of the following extended styles:

| | |
|--------------------------|--|
| %LVS_EX_GRIDLINES | Grid lines added in report mode |
| %LVS_EX_SUBITEMIMAGES | Icons added to sub-items in report mode |
| %LVS_EX_CHECKBOXES | Enables checkboxes to items |
| %LVS_EX_TRACKSELECT | Enables hot track selection |
| %LVS_EX_HEADERDRAGDROP | Enables drag-drop reordering of columns in report mode |
| %LVS_EX_FULLROWSELECT | Selection highlights full row in report mode |
| %LVS_EX_ONECLICKACTIVATE | Notification sent on single click |
| %LVS_EX_TWOCLICKACTIVATE | Notification sent on double click |
| %LVS_EX_FLATSB | Enables flat scroll bars |
| %LVS_EX_REGIONAL | Sets ListView region to icons and text |
| %LVS_EX_INFOTIP | Listview does InfoTips for you |
| %LVS_EX_UNDERLINEHOT | Hot items have underlined text |
| %LVS_EX_UNDERLINECOLD | Non-hot items have underlined text |

| | |
|-----------------------|---|
| %LVS_EX_MULTWORKAREAS | Will not auto-arrange until work areas defined |
| %LVS_EX_LABELTIP | Listview unfolds partly hidden labels |
| %LVS_EX_BORDERSELECT | Border selection style instead of highlight |
| %LVS_EX_DOUBLEBUFFER | Paints via double-buffering and reduces flicker |
| %LVS_EX_HIDELABELS | Hides labels in Icon and Small Icon mode |
| %LVS_EX_SINGLEROW | Display a single row |
| %LVS_EX_SNAPTOGRID | Icons automatically snap to grid |
| %LVS_EX_SIMPLESELECT | Changes overlay rendering to top right |

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col& [, options...]*

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

| | |
|----------|--|
| ASCEND | The items are arranged in ascending sequence. |
| DESCEND | The items are arranged in descending sequence. |
| ALPHANUM | The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string. |
| UCASE | The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string |
| NUMERIC | The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc. |
| MMDDYYYY | A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| DDMMYYYY | A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYMMDD | A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |

YYYYDDMM A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item& [, col&]*

The string value specified by *item&/col&* is set to an unselected state for the LISTVIEW control. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL_ADD LISTVIEW](#), [CONTROL_SET COLOR](#), [CONTROL_SET FONT](#), [HEADER](#), [IMAGELIST](#)

LISTVIEW SET OVERLAY statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a [LISTVIEW](#) control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
```

```

LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&

```

hDlg [Handle](#) of the [dialog](#) that owns the ListView.

hLst Handle of the [ImageList](#) to be used for graphical items.

hLV Handle of the ListView Control.

id& The [control identifier](#) assigned with [CONTROL ADD LISTVIEW](#).

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A
expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A
variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control [style](#) parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with [header](#) text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard [LISTBOX](#) control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data

item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col& TO datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either [pixels](#) or [dialog units](#), depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id& TO datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col& TO txtv\$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv\$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id& TO hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the [HEADER](#) statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id& TO datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id& TO datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id& [, item&] TO datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg, id&, item&, col& TO datav&*

A data item is tested to see if it is currently selected. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id& TO datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col& TO txtv\$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv\$*. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item& TO datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER.

The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item& [, col&]*

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

| | |
|---------------|---------------|
| %LVSIL_NORMAL | Large icons |
| %LVSIL_SMALL | Small icons |
| %LVSIL_STATE | Status images |

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the [%LVS_SHAREIMAGELISTS](#) style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumrExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

Listview controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

NumExpr defines the new style from any combination of the following extended styles:

| | |
|-----------------------|---|
| %LVS_EX_GRIDLINES | Grid lines added in report mode |
| %LVS_EX_SUBITEMIMAGES | Icons added to sub-items in report mode |
| %LVS_EX_CHECKBOXES | Enables checkboxes to items |
| %LVS_EX_TRACKSELECT | Enables hot track selection |

| | |
|--------------------------|--|
| %LVS_EX_HEADERDRAGDROP | Enables drag-drop reordering of columns in report mode |
| %LVS_EX_FULLROWSELECT | Selection highlights full row in report mode |
| %LVS_EX_ONECLICKACTIVATE | Notification sent on single click |
| %LVS_EX_TWOCLICKACTIVATE | Notification sent on double click |
| %LVS_EX_FLATSB | Enables flat scroll bars |
| %LVS_EX_REGIONAL | Sets ListView region to icons and text |
| %LVS_EX_INFOTIP | Listview does InfoTips for you |
| %LVS_EX_UNDERLINEHOT | Hot items have underlined text |
| %LVS_EX_UNDERLINECOLD | Non-hot items have underlined text |
| %LVS_EX_MULTWORKAREAS | Will not auto-arrange until work areas defined |
| %LVS_EX_LABELTIP | Listview unfolds partly hidden labels |
| %LVS_EX_BORDERSELECT | Border selection style instead of highlight |
| %LVS_EX_DOUBLEBUFFER | Paints via double-buffering and reduces flicker |
| %LVS_EX_HIDELABELS | Hides labels in Icon and Small Icon mode |
| %LVS_EX_SINGLEROW | Display a single row |
| %LVS_EX_SNAPTOGRID | Icons automatically snap to grid |
| %LVS_EX_SIMPLESELECT | Changes overlay rendering to top right |

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col& [, options...]*

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

| | |
|----------|---|
| ASCEND | The items are arranged in ascending sequence. |
| DESCEND | The items are arranged in descending sequence. |
| ALPHANUM | The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string. |
| UCASE | The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string |

| | |
|----------|--|
| NUMERIC | The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc. |
| MMDDYYYY | A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| DDMMYYYY | A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYMMDD | A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYDDMM | A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item& [, col&]*

The string value specified by *item&/col&* is set to an unselected state for the LISTVIEW control. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD LISTVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [HEADER](#), [IMAGELIST](#)

LISTVIEW SET STYLEXX statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a [LISTVIEW](#) control in order to set/retrieve data.

Syntax
LISTVIEW DELETE COLUMN *hDlg, id&, col&*
LISTVIEW DELETE ITEM *hDlg, id&, item&*

```

LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&

```

hDlg [Handle](#) of the [dialog](#) that owns the ListView.

hLst Handle of the [ImageList](#) to be used for graphical items.

hLV Handle of the ListView Control.

id& The [control identifier](#) assigned with [CONTROL_ADD_LISTVIEW](#).

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A
expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A
variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control [style](#) parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with [header](#) text to describe each of them. Additional sub-items may be displayed in

each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

- Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
- Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard [LISTBOX](#) control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is

found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col& TO datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either [pixels](#) or [dialog units](#), depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id& TO datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col& TO txtv\$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv\$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id& TO hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the [HEADER](#) statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id& TO datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id& TO datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id& [, item&] TO datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg, id&, item&, col& TO datav&*

A data item is tested to see if it is currently selected. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id& TO datav&*

Listview controls offer a number of optional additional style attributes which are unique and specific to a Listview. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col& TO txtv\$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv\$*. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item& TO datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item& [, col&]*

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

| | |
|---------------|---------------|
| %LVSIL_NORMAL | Large icons |
| %LVSIL_SMALL | Small icons |
| %LVSIL_STATE | Status images |

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the [%LVS_SHAREIMAGELISTS](#) style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

Listview controls offer a number of optional additional style attributes which are unique and specific to a Listview. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

NumExpr defines the new style from any combination of the following extended styles:

| | |
|-------------------------|--|
| %LVS_EX_GRIDLINES | Grid lines added in report mode |
| %LVS_EX_SUBITEMIMAGES | Icons added to sub-items in report mode |
| %LVS_EX_CHECKBOXES | Enables checkboxes to items |
| %LVS_EX_TRACKSELECT | Enables hot track selection |
| % | Enables drag-drop reordering of columns in report mode |
| LVS_EX_HEADERDRAGDROP | |
| %LVS_EX_FULLROWSELECT | Selection highlights full row in report mode |
| % | Notification sent on single click |
| LVS_EX_ONECLICKACTIVATE | |
| % | Notification sent on double click |
| LVS_EX_TWOCLICKACTIVATE | |
| %LVS_EX_FLATSB | Enables flat scroll bars |
| %LVS_EX_REGIONAL | Sets Listview region to icons and text |
| %LVS_EX_INFOTIP | Listview does InfoTips for you |
| %LVS_EX_UNDERLINEHOT | Hot items have underlined text |
| %LVS_EX_UNDERLINECOLD | Non-hot items have underlined text |
| %LVS_EX_MULTWORKAREAS | Will not auto-arrange until work areas defined |
| %LVS_EX_LABELTIP | Listview unfolds partly hidden labels |
| %LVS_EX_BORDERSELECT | Border selection style instead of highlight |
| %LVS_EX_DOUBLEBUFFER | Paints via double-buffering and reduces flicker |
| %LVS_EX_HIDELABELS | Hides labels in Icon and Small Icon mode |
| %LVS_EX_SINGLEROW | Display a single row |
| %LVS_EX_SNAPTOGRID | Icons automatically snap to grid |
| %LVS_EX_SIMPLESELECT | Changes overlay rendering to top right |

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col& [, options...]*

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

| | |
|----------|--|
| ASCEND | The items are arranged in ascending sequence. |
| DESCEND | The items are arranged in descending sequence. |
| ALPHANUM | The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string. |
| UCASE | The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string |
| NUMERIC | The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc. |
| MMDDYYYY | A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| DDMMYYYY | A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYMMDD | A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYDDMM | A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item& [, col&]*

The string value specified by *item&/col&* is set to an unselected state for the LISTVIEW control. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions

Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also

[Dynamic Dialog Tools](#), [CONTROL ADD LISTVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [HEADER](#), [IMAGELIST](#)

LISTVIEW SET TEXT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a [LISTVIEW](#) control in order to set/retrieve data.

Syntax

```

LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&

```

hDlg [Handle](#) of the [dialog](#) that owns the ListView.

hLst Handle of the [ImageList](#) to be used for graphical items.

hLV Handle of the ListView Control.

id& The [control identifier](#) assigned with [CONTROL ADD LISTVIEW](#).

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A
expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control [style](#) parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with [header](#) text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard [LISTBOX](#) control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins

with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col& TO datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either [pixels](#) or [dialog units](#), depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id& TO datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col& TO txtv\$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv\$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id& TO hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the [HEADER](#) statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id& TO datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id& TO datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id& [, item&] TO datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned.

To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg, id&, item&, col& TO datav&*

A data item is tested to see if it is currently selected. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id& TO datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col& TO txtv\$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv\$*. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item& TO datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER.

The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every [DDI](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not

a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item& [, col&]*

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

| | |
|---------------|-------------|
| %LVSIL_NORMAL | Large icons |
| %LVSIL_SMALL | Small icons |

%LVSIL_STATE Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the [%LVS_SHAREIMAGELISTS](#) style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumrExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

NumExpr defines the new style from any combination of the following extended styles:

| | |
|---------------------------------|--|
| %LVS_EX_GRIDLINES | Grid lines added in report mode |
| %LVS_EX_SUBITEMIMAGES | Icons added to sub-items in report mode |
| %LVS_EX_CHECKBOXES | Enables checkboxes to items |
| %LVS_EX_TRACKSELECT | Enables hot track selection |
| % | Enables drag-drop reordering of columns in report mode |
| LVS_EX_HEADERDRAGDROP | mode |
| %LVS_EX_FULLROWSELECT | Selection highlights full row in report mode |
| % | Notification sent on single click |
| LVS_EX_ONECLICKACTIVATE | |
| % | Notification sent on double click |
| LVS_EX_TWOCCLICKACTIVATE | |
| %LVS_EX_FLATSB | Enables flat scroll bars |
| %LVS_EX_REGIONAL | Sets ListView region to icons and text |
| %LVS_EX_INFOTIP | ListView does InfoTips for you |
| %LVS_EX_UNDERLINEHOT | Hot items have underlined text |
| %LVS_EX_UNDERLINECOLD | Non-hot items have underlined text |
| %LVS_EX_MULTWORKAREAS | Will not auto-arrange until work areas defined |
| %LVS_EX_LABELTIP | ListView unfolds partly hidden labels |
| %LVS_EX_BORDERSELECT | Border selection style instead of highlight |
| %LVS_EX_DOUBLEBUFFER | Paints via double-buffering and reduces flicker |
| %LVS_EX_HIDELABELS | Hides labels in Icon and Small Icon mode |
| %LVS_EX_SINGLEROW | Display a single row |
| %LVS_EX_SNAPTOGRID | Icons automatically snap to grid |
| %LVS_EX_SIMPLESELECT | Changes overlay rendering to top right |

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col& [, options...]*

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

| | |
|----------|--|
| ASCEND | The items are arranged in ascending sequence. |
| DESCEND | The items are arranged in descending sequence. |
| ALPHANUM | The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string. |
| UCASE | The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string |
| NUMERIC | The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc. |
| MMDDYYYY | A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| DDMMYYYY | A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYMMDD | A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYDDMM | A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item& [, col&]*

The string value specified by *item&/col&* is set to an unselected state for the LISTVIEW control. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the

optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL_ADD LISTVIEW](#), [CONTROL_SET COLOR](#), [CONTROL_SET FONT](#), [HEADER](#), [IMAGELIST](#)

LISTVIEW SET USER statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a [LISTVIEW](#) control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
```

```

LISTVIEW SET STYLEEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&

```

| | |
|-------------------|---|
| <i>hDlg</i> | Handle of the dialog that owns the ListView. |
| <i>hLst</i> | Handle of the ImageList to be used for graphical items. |
| <i>hLV</i> | Handle of the ListView Control. |
| <i>id&</i> | The control identifier assigned with CONTROL ADD LISTVIEW . |
| <i>item&</i> | A data item number. First=1, second=2... |
| <i>col&</i> | A vertical column number. First=1, second=2... |
| <i>NumExpr</i> | A expression passed as a parameter. |
| <i>StrExpr</i> | A string expression passed as a parameter. |
| <i>txtv\$</i> | A variable to which result text is assigned. |
| <i>datav&</i> | A long integer variable to which result data is assigned. |
| Remarks | <p>There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.</p> <p>Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> <p>Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> <p>Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> <p>Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> |

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column

numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col& TO datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either [pixels](#) or [dialog units](#), depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id& TO datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col& TO txtv\$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv\$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id& TO hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the [HEADER](#) statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id& TO datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id& TO datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id& [, item&] TO datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg, id&, item&, col& TO datav&*

A data item is tested to see if it is currently selected. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id& TO datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col& TO txtv\$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv\$*. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item& TO datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable

specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item& [, col&]*

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

| | |
|---------------|---------------|
| %LVSIL_NORMAL | Large icons |
| %LVSIL_SMALL | Small icons |
| %LVSIL_STATE | Status images |

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the [%LVS_SHAREIMAGELISTS](#) style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

NumExpr defines the new style from any combination of the following extended styles:

| | |
|--------------------------|--|
| %LVS_EX_GRIDLINES | Grid lines added in report mode |
| %LVS_EX_SUBITEMIMAGES | Icons added to sub-items in report mode |
| %LVS_EX_CHECKBOXES | Enables checkboxes to items |
| %LVS_EX_TRACKSELECT | Enables hot track selection |
| %LVS_EX_HEADERDRAGDROP | Enables drag-drop reordering of columns in report mode |
| %LVS_EX_FULLROWSELECT | Selection highlights full row in report mode |
| %LVS_EX_ONECLICKACTIVATE | Notification sent on single click |
| %LVS_EX_TWOCLICKACTIVATE | Notification sent on double click |
| %LVS_EX_FLATSB | Enables flat scroll bars |
| %LVS_EX_REGIONAL | Sets ListView region to icons and text |

| | |
|-----------------------|---|
| %LVS_EX_INFOTIP | Listview does InfoTips for you |
| %LVS_EX_UNDERLINEHOT | Hot items have underlined text |
| %LVS_EX_UNDERLINECOLD | Non-hot items have underlined text |
| %LVS_EX_MULTWORKAREAS | Will not auto-arrange until work areas defined |
| %LVS_EX_LABELTIP | Listview unfolds partly hidden labels |
| %LVS_EX_BORDERSELECT | Border selection style instead of highlight |
| %LVS_EX_DOUBLEBUFFER | Paints via double-buffering and reduces flicker |
| %LVS_EX_HIDELABELS | Hides labels in Icon and Small Icon mode |
| %LVS_EX_SINGLEROW | Display a single row |
| %LVS_EX_SNAPTOGRID | Icons automatically snap to grid |
| %LVS_EX_SIMPLESELECT | Changes overlay rendering to top right |

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col& [, options...]*

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

| | |
|----------|--|
| ASCEND | The items are arranged in ascending sequence. |
| DESCEND | The items are arranged in descending sequence. |
| ALPHANUM | The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string. |
| UCASE | The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string |
| NUMERIC | The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc. |
| MMDDYYYY | A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| DDMMYYYY | A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and |

| | |
|----------|---|
| | delimiters may be any character. |
| YYYYMMDD | A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYDDMM | A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item& [, col&]*

The string value specified by *item&/col&* is set to an unselected state for the LISTVIEW control. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL_ADD LISTVIEW](#), [CONTROL_SET COLOR](#), [CONTROL_SET FONT](#), [HEADER](#), [IMAGELIST](#)

LISTVIEW SORT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a [LISTVIEW](#) control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
```

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LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&

```

hDlg [Handle](#) of the [dialog](#) that owns the ListView.

hLst Handle of the [ImageList](#) to be used for graphical items.

hLV Handle of the ListView Control.

id& The [control identifier](#) assigned with [CONTROL ADD LISTVIEW](#).

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A
expression passed as a parameter.

StrExpr A [string expression](#) passed as a parameter.

txtv\$ A
variable to which result text is assigned.

datav& A [long integer](#) variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control [style](#) parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with [header](#) text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 3 List Mode - String data items are displayed as a list, top to bottom, one

item per line. This mode is very similar in appearance to a standard [LISTBOX](#) control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*)

is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col& TO datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either [pixels](#) or [dialog units](#), depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id& TO datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col& TO txtv\$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv\$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id& TO hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the [HEADER](#) statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id& TO datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id& TO datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id& [, item&] TO datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned.

To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg, id&, item&, col& TO datav&*

A data item is tested to see if it is currently selected. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id& TO datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This

special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col& TO txtv\$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv\$*. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item& TO datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item& [, col&]*

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If

NumExpr is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

| | |
|---------------|---------------|
| %LVSIL_NORMAL | Large icons |
| %LVSIL_SMALL | Small icons |
| %LVSIL_STATE | Status images |

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the [%LVS_SHAREIMAGELISTS](#) style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

Listview controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

NumExpr defines the new style from any combination of the following extended styles:

| | |
|------------------------------|--|
| %LVS_EX_GRIDLINES | Grid lines added in report mode |
| %LVS_EX_SUBITEMIMAGES | Icons added to sub-items in report mode |
| %LVS_EX_CHECKBOXES | Enables checkboxes to items |
| %LVS_EX_TRACKSELECT | Enables hot track selection |
| % LVS_EX_HEADERDRAGDROP | Enables drag-drop reordering of columns in report mode |
| %LVS_EX_FULLROWSELECT | Selection highlights full row in report mode |
| % LVS_EX_ONECLICKACTIVATE | Notification sent on single click |
| % LVS_EX_TWOCLICKACTIVATE | Notification sent on double click |
| %LVS_EX_FLATSB | Enables flat scroll bars |
| %LVS_EX_REGIONAL | Sets ListView region to icons and text |
| %LVS_EX_INFOTIP | Listview does InfoTips for you |
| %LVS_EX_UNDERLINEHOT | Hot items have underlined text |
| %LVS_EX_UNDERLINECOLD | Non-hot items have underlined text |
| %LVS_EX_MULTWORKAREAS | Will not auto-arrange until work areas defined |
| %LVS_EX_LABELTIP | Listview unfolds partly hidden labels |
| %LVS_EX_BORDERSELECT | Border selection style instead of highlight |
| %LVS_EX_DOUBLEBUFFER | Paints via double-buffering and reduces flicker |
| %LVS_EX_HIDELABELS | Hides labels in Icon and Small Icon mode |
| %LVS_EX_SINGLEROW | Display a single row |
| %LVS_EX_SNAPTOGRID | Icons automatically snap to grid |
| %LVS_EX_SIMPLESELECT | Changes overlay rendering to top right |

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col& [, options...]*

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

| | |
|----------|---|
| ASCEND | The items are arranged in ascending sequence. |
| DESCEND | The items are arranged in descending sequence. |
| ALPHANUM | The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string. |

| | |
|----------|--|
| UCASE | The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string |
| NUMERIC | The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc. |
| MMDDYYYY | A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| DDMMYYYY | A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYMMDD | A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYDDMM | A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item& [, col&]*

The string value specified by *item&/col&* is set to an unselected state for the LISTVIEW control. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD LISTVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [HEADER](#), [IMAGELIST](#)

LISTVIEW UNSELECT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

| | |
|----------------|---|
| Purpose | Manipulate a LISTVIEW control in order to set/retrieve data. |
| Syntax | <pre> LISTVIEW DELETE COLUMN <i>hDlg</i>, <i>id</i>&, <i>col</i>& LISTVIEW DELETE ITEM <i>hDlg</i>, <i>id</i>&, <i>item</i>& LISTVIEW FIND <i>hDlg</i>, <i>id</i>&, <i>item</i>&, <i>StrExpr</i> TO <i>datav</i>& LISTVIEW FIND EXACT <i>hDlg</i>, <i>id</i>&, <i>item</i>&, <i>StrExpr</i> TO <i>datav</i>& LISTVIEW FIT CONTENT <i>hDlg</i>, <i>id</i>&, <i>col</i>& LISTVIEW FIT HEADER <i>hDlg</i>, <i>id</i>&, <i>col</i>& LISTVIEW GET COLUMN <i>hDlg</i>, <i>id</i>&, <i>col</i>& TO <i>datav</i>& LISTVIEW GET COUNT <i>hDlg</i>, <i>id</i>& TO <i>datav</i>& LISTVIEW GET HEADER <i>hDlg</i>, <i>id</i>&, <i>col</i>& TO <i>txtv</i>\$ LISTVIEW GET HEADERID <i>hDlg</i>, <i>id</i>& TO <i>hLV</i>, <i>idv</i>& LISTVIEW GET MODE <i>hDlg</i>, <i>id</i>& TO <i>datav</i>& LISTVIEW GET SELCOUNT <i>hDlg</i>, <i>id</i>& TO <i>datav</i>& LISTVIEW GET SELECT <i>hDlg</i>, <i>id</i>& [, <i>item</i>&] TO <i>datav</i>& LISTVIEW GET STATE <i>hDlg</i>, <i>id</i>&, <i>item</i>&, <i>col</i>& TO <i>datav</i>& LISTVIEW GET STYLEXX <i>hDlg</i>, <i>id</i>& TO <i>datav</i>& LISTVIEW GET TEXT <i>hDlg</i>, <i>id</i>&, <i>item</i>&, <i>col</i>& TO <i>txtv</i>\$ LISTVIEW GET USER <i>hDlg</i>, <i>id</i>&, <i>item</i>& TO <i>datav</i>& LISTVIEW INSERT COLUMN <i>hDlg</i>, <i>id</i>&, <i>col</i>&, <i>StrExpr</i>, <i>ColWidth</i>&, <i>format</i>& LISTVIEW INSERT ITEM <i>hDlg</i>, <i>id</i>&, <i>item</i>&, <i>image</i>&, <i>StrExpr</i> LISTVIEW RESET <i>hDlg</i>, <i>id</i>& LISTVIEW SELECT <i>hDlg</i>, <i>id</i>&, <i>item</i>& [, <i>col</i>&] LISTVIEW SET COLUMN <i>hDlg</i>, <i>id</i>&, <i>col</i>&, <i>NumExpr</i> LISTVIEW SET HEADER <i>hDlg</i>, <i>id</i>&, <i>col</i>&, <i>StrExpr</i> LISTVIEW SET IMAGE <i>hDlg</i>, <i>id</i>&, <i>item</i>&, <i>NumExpr</i> LISTVIEW SET IMAGE2 <i>hDlg</i>, <i>id</i>&, <i>item</i>&, <i>NumExpr</i> LISTVIEW SET IMAGELIST <i>hDlg</i>, <i>id</i>&, <i>hLst</i>, <i>NumExpr</i> LISTVIEW SET MODE <i>hDlg</i>, <i>id</i>&, <i>NumExpr</i> LISTVIEW SET OVERLAY <i>hDlg</i>, <i>id</i>&, <i>item</i>&, <i>NumExpr</i> LISTVIEW SET STYLEXX <i>hDlg</i>, <i>id</i>&, <i>NumExpr</i> LISTVIEW SET TEXT <i>hDlg</i>, <i>id</i>&, <i>item</i>&, <i>col</i>&, <i>StrExpr</i> LISTVIEW SET USER <i>hDlg</i>, <i>id</i>&, <i>item</i>&, <i>NumExpr</i> LISTVIEW SORT <i>hDlg</i>, <i>id</i>&, <i>col</i>& [, <i>options</i>...] LISTVIEW UNSELECT <i>hDlg</i>, <i>id</i>&, <i>item</i>&, [<i>col</i>&] LISTVIEW VISIBLE <i>hDlg</i>, <i>id</i>&, <i>item</i>& </pre> |
| <i>hDlg</i> | Handle of the dialog that owns the ListView. |
| <i>hLst</i> | Handle of the ImageList to be used for graphical items. |
| <i>hLV</i> | Handle of the ListView Control. |
| <i>id</i> & | The control identifier assigned with CONTROL_ADD_LISTVIEW . |
| <i>item</i> & | A data item number. First=1, second=2... |
| <i>col</i> & | A vertical column number. First=1, second=2... |
| <i>NumExpr</i> | A expression passed as a parameter. |
| <i>StrExpr</i> | A string expression passed as a parameter. |
| <i>txtv</i> \$ | A variable to which result text is assigned. |
| <i>datav</i> & | A long integer variable to which result data is assigned. |
| Remarks | <p>There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.</p> <p>Mode 0 Icon Mode - String data items are displayed left to right, wrapped to</p> |

multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

- Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with [header](#) text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
- Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
- Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard [LISTBOX](#) control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which

exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col& TO datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either [pixels](#) or [dialog units](#), depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id& TO datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col& TO txtv\$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv\$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id& TO hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the [HEADER](#) statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id& TO datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id& TO datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id& [, item&] TO datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to

facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg, id&, item&, col& TO datav&*

A data item is tested to see if it is currently selected. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id& TO datav&*

Listview controls offer a number of optional additional style attributes which are unique and specific to a Listview. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col& TO txtv\$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv\$*. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item& TO datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER.

The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item& [, col&]*

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

| | |
|---------------|---------------|
| %LVSIL_NORMAL | Large icons |
| %LVSIL_SMALL | Small icons |
| %LVSIL_STATE | Status images |

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the [%LVS_SHAREIMAGELISTS](#) style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

Listview controls offer a number of optional additional style attributes which are unique and specific to a Listview. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

NumExpr defines the new style from any combination of the following extended styles:

| | |
|--------------------------|--|
| %LVS_EX_GRIDLINES | Grid lines added in report mode |
| %LVS_EX_SUBITEMIMAGES | Icons added to sub-items in report mode |
| %LVS_EX_CHECKBOXES | Enables checkboxes to items |
| %LVS_EX_TRACKSELECT | Enables hot track selection |
| % | Enables drag-drop reordering of columns in report mode |
| LVS_EX_HEADERDRAGDROP | mode |
| %LVS_EX_FULLROWSELECT | Selection highlights full row in report mode |
| % | Notification sent on single click |
| LVS_EX_ONECLICKACTIVATE | |
| % | Notification sent on double click |
| LVS_EX_TWOCCLICKACTIVATE | |
| %LVS_EX_FLATSB | Enables flat scroll bars |
| %LVS_EX_REGIONAL | Sets Listview region to icons and text |
| %LVS_EX_INFOTIP | Listview does InfoTips for you |
| %LVS_EX_UNDERLINEHOT | Hot items have underlined text |
| %LVS_EX_UNDERLINECOLD | Non-hot items have underlined text |
| %LVS_EX_MULTWORKAREAS | Will not auto-arrange until work areas defined |
| %LVS_EX_LABELTIP | Listview unfolds partly hidden labels |
| %LVS_EX_BORDERSELECT | Border selection style instead of highlight |
| %LVS_EX_DOUBLEBUFFER | Paints via double-buffering and reduces flicker |
| %LVS_EX_HIDELABELS | Hides labels in Icon and Small Icon mode |
| %LVS_EX_SINGLEROW | Display a single row |
| %LVS_EX_SNAPTOGRID | Icons automatically snap to grid |
| %LVS_EX_SIMPLESELECT | Changes overlay rendering to top right |

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user

value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col& [, options...]*

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

| | |
|----------|--|
| ASCEND | The items are arranged in ascending sequence. |
| DESCEND | The items are arranged in descending sequence. |
| ALPHANUM | The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string. |
| UCASE | The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string |
| NUMERIC | The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc. |
| MMDDYYYY | A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| DDMMYYYY | A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYMMDD | A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYDDMM | A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item& [, col&]*

The string value specified by *item&/col&* is set to an unselected state for the LISTVIEW control. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions

Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD LISTVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [HEADER](#), [IMAGELIST](#)

LISTVIEW VISIBLE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a [LISTVIEW](#) control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&
```

hDlg [Handle](#) of the [dialog](#) that owns the ListView.

hLst Handle of the [ImageList](#) to be used for graphical items.

hLV Handle of the ListView Control.

| | |
|-------------------|---|
| <i>id&</i> | The control identifier assigned with CONTROL ADD LISTVIEW . |
| <i>item&</i> | A data item number. First=1, second=2... |
| <i>col&</i> | A vertical column number. First=1, second=2... |
| <i>NumExpr</i> | A expression passed as a parameter. |
| <i>StrExpr</i> | A string expression passed as a parameter. |
| <i>txtv\$</i> | A variable to which result text is assigned. |
| <i>datav&</i> | A long integer variable to which result data is assigned. |
| Remarks | <p>There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.</p> <p>Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> <p>Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> <p>Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> <p>Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.</p> |

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr TO datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col& TO datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either [pixels](#) or [dialog units](#), depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id& TO datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col& TO txtv\$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv\$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id& TO hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the [HEADER](#) statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id& TO datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id& TO datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id& [, item&] TO datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg, id&, item&, col& TO datav&*

A data item is tested to see if it is currently selected. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 ([true](#)) is assigned to the variable specified by *datav&*. Otherwise, 0 ([false](#)) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id& TO datav&*

Listview controls offer a number of optional additional style attributes which are unique and specific to a Listview. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col& TO txtv\$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv\$*. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item& TO datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either

dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item& [, col&]*

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

| | |
|---------------|---------------|
| %LVSIL_NORMAL | Large icons |
| %LVSIL_SMALL | Small icons |
| %LVSIL_STATE | Status images |

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the [%LVS_SHAREIMAGELISTS](#) style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

Listview controls offer a number of optional additional style attributes which are unique and specific to a Listview. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

NumExpr defines the new style from any combination of the following extended styles:

| | |
|--------------------------|--|
| %LVS_EX_GRIDLINES | Grid lines added in report mode |
| %LVS_EX_SUBITEMIMAGES | Icons added to sub-items in report mode |
| %LVS_EX_CHECKBOXES | Enables checkboxes to items |
| %LVS_EX_TRACKSELECT | Enables hot track selection |
| %LVS_EX_HEADERDRAGDROP | Enables drag-drop reordering of columns in report mode |
| %LVS_EX_FULLROWSELECT | Selection highlights full row in report mode |
| %LVS_EX_ONECLICKACTIVATE | Notification sent on single click |
| %LVS_EX_TWOCLICKACTIVATE | Notification sent on double click |
| %LVS_EX_FLATSB | Enables flat scroll bars |
| %LVS_EX_REGIONAL | Sets Listview region to icons and text |
| %LVS_EX_INFOTIP | Listview does InfoTips for you |
| %LVS_EX_UNDERLINEHOT | Hot items have underlined text |
| %LVS_EX_UNDERLINECOLD | Non-hot items have underlined text |
| %LVS_EX_MULTWORKAREAS | Will not auto-arrange until work areas defined |
| %LVS_EX_LABELTIP | Listview unfolds partly hidden labels |
| %LVS_EX_BORDERSELECT | Border selection style instead of highlight |
| %LVS_EX_DOUBLEBUFFER | Paints via double-buffering and reduces flicker |

| | |
|----------------------|--|
| %LVS_EX_HIDELABELS | Hides labels in Icon and Small Icon mode |
| %LVS_EX_SINGLEROW | Display a single row |
| %LVS_EX_SNAPTOGRID | Icons automatically snap to grid |
| %LVS_EX_SIMPLESELECT | Changes overlay rendering to top right |

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col& [, options...]*

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

| | |
|----------|--|
| ASCEND | The items are arranged in ascending sequence. |
| DESCEND | The items are arranged in descending sequence. |
| ALPHANUM | The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string. |
| UCASE | The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string |
| NUMERIC | The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc. |
| MMDDYYYY | A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| DDMMYYYY | A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYMMDD | A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |
| YYYYDDMM | A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character. |

It is important to note that Windows may overwrite USER data when sorting your ListView

control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item& [, col&]*

The string value specified by *item&/col&* is set to an unselected state for the LISTVIEW control. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD LISTVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [HEADER](#), [IMAGELIST](#)

LO function

LO function

Purpose Extract the least significant (low-order) portion of an value.

Syntax `result = LO(DataType, value)`

Remarks The value returned by LO is unsigned if *DataType* is [BYTE](#), [WORD](#), or [DWORD](#), and signed if *DataType* is [INTEGER](#) or [LONG](#). *value* may be up to twice the size of the data type specified by *DataType*. In the following example, *n* may be up to a 16-bit value (twice the size of a BYTE):

```
b = LO(BYTE,n)
```

Restrictions LO replaces LOBYT, LOWRD, and LOINT. Note that those functions are no longer supported, so update your code to use the new syntax.

See also [HI](#), [MAK](#)

LOC function

LOC function

Purpose Determine the current [seek](#) position in an [open](#) disk [file](#).

Syntax `qResult&& = LOC([#] filename&)`

Remarks LOC is provided for compatibility with older BASICs. It is recommended that code is modified to use the [SEEK function](#) instead. The Number symbol (#) is optional, but recommended for clarity.

See also [FILEATTR](#), [SEEK function](#), [SEEK statement](#)

LOCAL statement

LOCAL statement

Purpose Declare local [variables](#) inside a [Sub](#), [Function](#), [Method](#), or [Property](#). Local variables retain

their values only until the end of the procedure.

| | |
|---------------------|--|
| Syntax | <pre>LOCAL variable[()] [AS type] [, variable[()]] [...] LOCAL variable[()] [, variable[()]] [, ...] AS type</pre> |
| Remarks | <p>The LOCAL statement is valid only inside a Sub, Function, Method, or Property. Local variables lose their values when the procedure ends. Storage space for local variables is allocated on the stack, and each local variable is initialized to zero (or, for variables, an empty string) each time the enclosing procedure is called.</p> <p>To declare an array as a local variable, use an empty set of parentheses in the variable list: You can then use the DIM statement to dimension the array.</p> <pre>LOCAL MyArray%() LOCAL StringArray() AS STRING</pre> <p>The LOCAL statement may, optionally, accept a list of variables, all of which are defined by the type descriptor keyword that follows them. For example:</p> <pre>LOCAL aaa, bbb, ccc AS INTEGER LOCAL vptr, aptr() AS LONG PTR</pre> |
| Restrictions | DEFtype has no effect on variables defined by a LOCAL statement. |
| See also | DIM , GLOBAL , INSTANCE , STATIC , THREADED |
| Example | <pre>Test% = 100 ShowText "Before: " + STR\$(Test%) CALL Locals ShowText "After: " + STR\$(Test%) SUB Locals LOCAL Test% Test% = 0 ShowText "In SUB: " + STR\$(Test%) END SUB</pre> |
| Result | <pre>Before: 100 In SUB: 0 After: 100</pre> |

LOCK statement

LOCK statement

| | |
|----------------|---|
| Purpose | Lock part or all of an open file , to prevent other processes from accessing it. |
| Syntax | LOCK [#] <i>filenum&</i> [, { <i>record&&</i> <i>startbyte&&</i> TO <i>endbyte&&</i> }] |
| Remarks | <p>LOCK prevents another process from accessing a record, range of records, byte, or range of bytes in a file opened as file number <i>filenum&</i>.</p> <p>If the file was opened in random-access mode, <i>record&&</i>, <i>startbyte&&</i>, and <i>endbyte&&</i> specify record numbers. When used with binary mode files, <i>record&&</i>, <i>startbyte&&</i>, and <i>endbyte&&</i> specify byte positions, starting from either zero or one (the default).</p> <p>If a record is specified, only that record (or byte) is locked. Otherwise, a range of records (or bytes) is locked, from <i>startbyte&&</i> to <i>endbyte&&</i>.</p> <p>If no records are specified, or if the file was opened in sequential mode, the entire file is locked.</p> <p>All records (or bytes) to be locked must be subsequently unlocked using the UNLOCK statement. Multiple locks may be placed on a file, and locks may be unlocked in any order. However, the parameters used for each UNLOCK statement must exactly match those used for the previous corresponding LOCK statement.</p> |

All locked records (or bytes) must be unlocked using the UNLOCK statement

before the file can be closed.

If a lock attempt fails, PowerBASIC sets the [ERR](#) system variable to reflect a run-time [Error 70](#) ("Permission denied"), or [Error 75](#) ("Path/file access error").

See also [OPEN](#), [UNLOCK](#)

Example

```
OPEN "PATIENTS.DAT" FOR RANDOM AS #1 LEN = 1024
' determine the record number to retrieve
LOCK #1, recnum
GET #1, recnum
' process the record here
PUT #1, recnum
UNLOCK #1, recnum
CLOSE #1
```

LOF function

LOF function

Purpose Return the length of an [open disk file](#).

Syntax `y&& = LOF([#] filename&)`

Remarks *filename*& is the [file number](#) with which the file was opened. LOF returns the size of the indicated file in [bytes](#), in the [Quad-integer](#) range 0 to 2⁶³-1. The Number symbol (#) is optional, but recommended for clarity.

See also [FILEATTR](#), [LOC](#), [SEEK function](#), [SEEK statement](#)

Example

```
OPEN "RECIPES.DAT" FOR BINARY AS #1
x&& = LOF(1)
CLOSE #1
```

LOG function

LOG, LOG2 and LOG10 functions

Purpose LOG returns the natural (base *e*) logarithm of its argument. LOG2 returns the base 2 logarithm. LOG10 returns the common (base 10) logarithm.

Syntax

```
y = LOG(numeric_expression)
y = LOG2(numeric_expression)
y = LOG10(numeric_expression)
```

Remarks A logarithm of a number is the power to which the base would have to be raised to yield the number. Thus:

$$\text{logarithm (base } b) \text{ of } n = x \text{ if } b^x = n$$

and:

$$(base)^{\log(n)} = n$$

The [EXP](#) functions complement the LOG functions. For example, if $s = \text{LOG}(t)$, then $t = \text{EXP}(s)$.

By definition, the logarithm (any base) of 1 is 0. LOG returns the natural logarithm (base *e*, where $e = 2.718282\dots$) of its argument. LOG2 and LOG10 return the logarithm for base 2 and 10, respectively.

numeric_expression must be a value greater than zero.

LOG, LOG2, and LOG10 return [Extended-precision](#) values.

See also [EXP](#), [EXP2](#), [EXP10](#), [SQR](#), [Arithmetic Operators](#)

LOG2 function

LOG, LOG2 and LOG10 functions

| | |
|-----------------|---|
| Purpose | LOG returns the natural (base <i>e</i>) logarithm of its argument. LOG2 returns the base 2 logarithm. LOG10 returns the common (base 10) logarithm. |
| Syntax | <pre> y = LOG(<i>numeric_expression</i>) y = LOG2(<i>numeric_expression</i>) y = LOG10(<i>numeric_expression</i>) </pre> |
| Remarks | <p>A logarithm of a number is the power to which the base would have to be raised to yield the number. Thus:</p> $\text{logarithm (base } b \text{) of } n = x \text{ if } b^x = n$ <p>and:</p> $(\text{base})^{\log(n)} = n$ <p>The EXP functions complement the LOG functions. For example, if $s = \text{LOG}(t)$, then $t = \text{EXP}(s)$.</p> <p>By definition, the logarithm (any base) of 1 is 0. LOG returns the natural logarithm (base <i>e</i>, where $e = 2.718282\dots$) of its argument. LOG2 and LOG10 return the logarithm for base 2 and 10, respectively.</p> <p><i>numeric_expression</i> must be a value greater than zero.</p> <p>LOG, LOG2, and LOG10 return Extended-precision values.</p> |
| See also | EXP , EXP2 , EXP10 , SQR , Arithmetic Operators |

LOG10 function

LOG, LOG2 and LOG10 functions

| | |
|-----------------|---|
| Purpose | LOG returns the natural (base <i>e</i>) logarithm of its argument. LOG2 returns the base 2 logarithm. LOG10 returns the common (base 10) logarithm. |
| Syntax | <pre> y = LOG(<i>numeric_expression</i>) y = LOG2(<i>numeric_expression</i>) y = LOG10(<i>numeric_expression</i>) </pre> |
| Remarks | <p>A logarithm of a number is the power to which the base would have to be raised to yield the number. Thus:</p> $\text{logarithm (base } b \text{) of } n = x \text{ if } b^x = n$ <p>and:</p> $(\text{base})^{\log(n)} = n$ <p>The EXP functions complement the LOG functions. For example, if $s = \text{LOG}(t)$, then $t = \text{EXP}(s)$.</p> <p>By definition, the logarithm (any base) of 1 is 0. LOG returns the natural logarithm (base <i>e</i>, where $e = 2.718282\dots$) of its argument. LOG2 and LOG10 return the logarithm for base 2 and 10, respectively.</p> <p><i>numeric_expression</i> must be a value greater than zero.</p> <p>LOG, LOG2, and LOG10 return Extended-precision values.</p> |
| See also | EXP , EXP2 , EXP10 , SQR , Arithmetic Operators |

LPRINT statement

LPRINT statement

Purpose Output (device-dependent) text and data to a [printer](#) device.

Syntax LPRINT [*expression*] [SPC(*n*)] [TAB(*n*)] [,] [;]

Remarks The LPRINT functionality is identical to the traditional PRINT statement, except that the data is sent directly to a line printer rather than to a display. A line printer is one which will accept standard [ASCII](#) text and associated control codes, such as [\\$CR](#), [\\$LF](#), and [\\$FF](#).

PowerBASIC inserts a carriage return and linefeed at the end of each printed line. A semi-colon between expressions is an optional delimiter which leaves the printer column position unchanged. A comma moves the printer position to the next column of 14 positions each. A trailing semi-colon suppresses the final CR/LF. If TAB(*n*) is less than the current printer position, output is placed at the requested position on the following line.

Before you execute an LPRINT statement, you must explicitly connect to the intended line printer using the [LPRINT ATTACH](#) statement. If the connection to the device is unsuccessful, all LPRINT statements are ignored until a valid printer device has been attached. LPRINT communicates directly with the attached device, bypassing the Windows operating system and printer driver. Therefore, any settings such as "work offline" in your printer properties dialog will be ignored.

Once all the data has been sent to the printer, detach the printer so other applications can use it., with the [LPRINT CLOSE](#) statement

Host-based (Windows-only) printers use proprietary control protocols so, sending print data to them with LPRINT is unlikely to produce any output at all. PowerBASIC supports host-based printers through

and related statements.

See also [LPRINT ATTACH](#), [LPRINT CLOSE](#), [LPRINT FLUSH](#), [LPRINT FORMFEED](#), [LPRINT\\$](#), [XPRINT](#), [XPRINT ATTACH](#)

Example

```
' Typical LPRINT printing strategy
ERRCLEAR
LPRINT ATTACH "LPT2"      ' Use LPT2 device
IF ISFALSE ERR AND ISTRUE LEN(LPRINT$) THEN
  LPRINT "This is your line-printer talking"
  LPRINT FORMFEED        ' Issue a formfeed
  LPRINT FLUSH            ' flush the buffer
  LPRINT CLOSE            ' detach the printer
END IF
```

LPRINT ATTACH statement

LPRINT ATTACH statement

Purpose Connect to a [line-printer](#) device for use with [LPRINT](#).

Syntax LPRINT ATTACH *device\$*

Remarks LPRINT ATTACH attempts a direct connection to the specified [line] printer device. A line printer is one that will accept standard [ASCII](#) text and any device-specific control codes, such as CR, LF, and FF.

A line printer is named by the port to which it is attached (LPT1, etc.) because the data is sent directly to the port, not through a device driver. That is, LPRINT communicates directly with the attached line printer device, bypassing the spooler and printer driver. Therefore, any settings such as "work offline" in the Printer Properties dialog will be

ignored.

Once the printer is attached by LPRINT ATTACH, print data can be sent to it with the LPRINT statement.

LPRINT ATTACH allows you to change the printer device used by LPRINT operation. When executed, the current connection (if any) is closed and the new connection is established. No colon is used in the device name. For example, to connect to *LPT2*:

```
LPRINT ATTACH "LPT2"
```

or to a printer on a network server:

```
LPRINT ATTACH "\\SERVER\HPLJ5"
```

device\$ must be a valid device name and cannot exceed 32 characters in length. In some circumstances, such as with the Novell network client, LPRINT ATTACH with a UNC name may be rejected, and the LPRINT ATTACH will be unsuccessful, and a subsequent [LPRINT\\$](#) test will return an empty string.

If LPRINT ATTACH is not successful, an [Error 68](#) ("Device unavailable") is generated and LPRINT\$ returns a nul (empty)

. If no LPRINT ATTACH is ever executed (successful or not), PowerBASIC will attempt to connect to the line printer at LPT1. Once any LPRINT ATTACH is attempted, no default to LPT1 will be presumed.

Care must be used with line printers in Windows, since if there is no available printer attached to the port, program execution may be suspended, with no errors. So, it is wise to use LPRINT ATTACH to explicitly connect the intended printer device, and test for the successful connection by the examination of LPRINT\$ and [ERR](#). For example:

```
ERRCLEAR
LPRINT ATTACH "LPT3"
IF ERR OR LPRINT$ = "" THEN PRINT "Connection failed"
```

Once all the data has been sent to the printer, detach the printer so other applications can use it., with the [LPRINT CLOSE](#) statement

Note: The Win32 API call *EnumPrinters* can give you a list of all valid printers and print devices, or you can enumerate the list of printers with the [PRINTERCOUNT](#) and [PRINTERS\\$](#) functions.

| | |
|---------------------|--|
| Restrictions | If <i>device\$</i> is an empty string, the current connection (if any) is detached. This is equivalent to the LPRINT CLOSE statement. |
| See also | LPRINT , LPRINT CLOSE , LPRINT FLUSH , LPRINT FORMFEED , LPRINT\$, XPRINT , XPRINT ATTACH |
| Example | <pre>' Typical LPRINT printing strategy ERRCLEAR LPRINT ATTACH "LPT2" ' Use LPT2 device IF (ERR<>0) OR (LEN(LPRINT\$)) THEN LPRINT "This is your line-printer talking" LPRINT FORMFEED ' Issue a formfeed LPRINT FLUSH ' flush the buffer LPRINT CLOSE ' detach the printer END IF</pre> |

LPRINT CLOSE statement

LPRINT CLOSE statement

| | |
|----------------|---|
| Purpose | Disconnect the current printer device. |
| Syntax | LPRINT CLOSE |
| Remarks | LPRINT CLOSE detaches the currently selected printer connection (established with the |

[LPRINT ATTACH](#) statement) from [LPRINT](#) operations, allowing the spooler subsystem to commence print operations. Once a connection is closed, [LPRINT\\$](#) will return an empty printer device name string until a new connection is established.

LPRINT CLOSE is equivalent to using LPRINT ATTACH with an empty printer device name string.

Restrictions LPRINT CLOSE is an essential step in the print process. To ensure the printer device is available to other applications, printers should always be closed when not in use. Failing to close a connection may cause significant delays before printing commences. In some cases, some or all of the print data may be lost.

See also [LPRINT](#), [LPRINT ATTACH](#), [LPRINT FLUSH](#), [LPRINT FORMFEED](#), [LPRINT\\$](#), [XPRINT](#), [XPRINT ATTACH](#)

Example

```
' Typical LPRINT printing strategy
ERRCLEAR
LPRINT ATTACH "LPT2" ' Use LPT2 device
IF ISTRUE ERR OR ISFALSE LEN(LPRINT$) THEN
  LPRINT "This is your line-printer talking"
  LPRINT FORMFEED      ' Issue a formfeed
  LPRINT FLUSH         ' flush the buffer
  LPRINT CLOSE        ' detach the printer
END IF
```

LPRINT FLUSH statement

LPRINT FLUSH statement

Purpose Flush any remaining [print data](#) to a [printer](#) device and signal the start of the print process.

Syntax LPRINT FLUSH

Remarks LPRINT FLUSH forces the operating system to flush any buffered data and begin printing. Use LPRINT FLUSH to ensure print data is submitted to the printer as soon as possible, rather than waiting for any timeout period to elapse first. Depending upon the printer and its drivers, printing may begin immediately, or it may be delayed until execution of an [LPRINT CLOSE](#) statement.

Typically, an LPRINT FLUSH statement is preceded with a [FORMFEED](#) statement, so ensure that the print job is ejected normally from the printer device.

See also [LPRINT](#), [LPRINT ATTACH](#), [LPRINT CLOSE](#), [LPRINT FORMFEED](#), [LPRINT\\$](#), [XPRINT](#), [XPRINT ATTACH](#)

Example

```
' Typical LPRINT printing strategy
ERRCLEAR
LPRINT ATTACH "LPT2" ' Use LPT2 device
IF ISTRUE ERR OR ISFALSE LEN(LPRINT$) THEN
  LPRINT "This is your line-printer talking"
  LPRINT FORMFEED      ' Issue a formfeed
  LPRINT FLUSH         ' flush the buffer
  LPRINT CLOSE        ' detach the printer
END IF
```

LPRINT FORMFEED statement

LPRINT FORMFEED statement

Purpose Send a formfeed (page eject) character to an attached [printer](#) device.

Syntax LPRINT FORMFEED

| | |
|-----------------|--|
| Remarks | For direct connections, LPRINT FORMFEED sends a form-feed character (ASCII character 12, \$FF, or CHR\$(12)) to the attached line printer device, to ensure the current page will be ejected. For host-based connections, PowerBASIC signals to the printing subsystem to perform the page eject operation. Typically, an LPRINT FORMFEED is performed before a LPRINT FLUSH and LPRINT CLOSE . |
| See also | LPRINT , LPRINT ATTACH , LPRINT CLOSE , LPRINT FLUSH , LPRINT\$, XPRINT , XPRINT ATTACH |
| Example | <pre>' Typical LPRINT printing strategy ERRCLEAR LPRINT ATTACH "LPT2" ' Use LPT2 device IF ISTRUE ERR OR ISFALSE LEN(LPRINT\$) THEN LPRINT "This is your line-printer talking" LPRINT FORMFEED ' Issue a formfeed LPRINT FLUSH ' flush the buffer LPRINT CLOSE ' detach the printer END IF</pre> |

LPRINT\$ function

LPRINT\$ function

| | |
|-----------------|---|
| Purpose | Return the name of the printer device used for operations. |
| Syntax | <i>device\$</i> = LPRINT\$ |
| Remarks | LPRINT\$ returns the name of the currently attached printer device used by the LPRINT statement. If there is no attached device, an empty string is returned. LPRINT\$ is primarily used to detect if an LPRINT ATTACH operation was successful. |
| See also | LPRINT , LPRINT ATTACH , LPRINT CLOSE , LPRINT FLUSH , LPRINT FORMFEED , XPRINT , XPRINT ATTACH |
| Example | <pre>ERRCLEAR LPRINT ATTACH "LPT3" IF ERR <> 0 OR LPRINT\$ = "" THEN PRINT "Printer connection failed"</pre> |

LSET statement

LSET statement

| | |
|----------------|---|
| Purpose | Left-align a string within the space of another string or User-Defined Type . |
| Syntax | LSET [ABS] <i>result_var</i> = <i>string_expression</i> [USING <i>ustring_expression</i>] |
| Remarks | LSET left-aligns a string into the space of another string or variable of a User-Defined Type. |
| ABS | If ABS is specified, or <i>ustring_expression</i> is null (empty), LSET leaves the padding positions unchanged from their original content, rather than replacing them with spaces. |
| USING | If <i>string_expression</i> is shorter than <i>result_var</i> , LSET left-justifies <i>string_expression</i> within <i>result_var</i> , and pads remaining character positions on the right side using the first character in <i>ustring_expression</i> or spaces if not specified or is null (empty). If <i>string_expression</i> is longer than <i>result_var</i> , LSET truncates <i>string_expression</i> from the |

right until it fits in *result_var*.

LSET can be used to assign the content of a User-Defined Type to a User-Defined Type variable of a different class, or assign a [dynamic string](#) to a User-Defined Type. For example:

```
LSET MyType = STRING$(LEN(MyType), 0)
LSET MyType = a$
```

[RSET](#) works similarly, but performs right-justification; CSET performs center-justification.

See also [CSET](#), [CSET\\$](#), [GET](#), [LET](#), [LET \(with Types\)](#), [LSET\\$](#), [PUT](#), [RESET](#), [RSET](#), [RSET\\$](#), [STRINSERT\\$](#), [TYPE SET](#)

Example

```
a$ = "SuperBASIC=SuperBASIC"
LSET ABS a$ = "PowerBASIC"
' result: "PowerBASIC=SuperBASIC"

LSET a$ = "PowerBASIC" USING "*"
' result: "PowerBASIC*****"
```

LSET\$ function

LSET\$ function

Purpose Return a
containing a left-justified (padded) string.

Syntax `result_var = LSET$(string_expression, strlen& [USING ustring_expression])`

Remarks LSET\$ left-aligns the string [string_expression](#) into a string of *strlen&* characters.

USING If *ustring_expression* is null (empty) or is not specified, LSET\$ pads *string_expression* with space characters. Otherwise, LSET\$ pads the string with the first character of *ustring_expression*.

If *string_expression* is shorter than *strlen&*, LSET\$ left-justifies *string_expression* within *result_var*, padding the right side as described above; otherwise, LSET\$ returns the left-most *strlen&* bytes of *string_expression*.

See also [CSET](#), [CSET\\$](#), [GET](#), [LET](#), [LSET](#), [PUT](#), [RESET](#), [RSET](#), [RSET\\$](#), [STRINSERT\\$](#), [TYPE SET](#)

Example

```
a$ = LSET$("PowerBASIC", 20)
' result: "PowerBASIC          "

a$ = LSET$("PowerBASIC",20 USING "*")
' result: "PowerBASIC*****"
```

LTRIM\$ function

LTRIM\$ function

Purpose Return a copy of a
, with leading characters or strings removed.

Syntax `x$ = LTRIM$(MainString [, [ANY] MatchString])`

Remarks *MainString* is the [string expression](#) from which to remove characters, and *MatchString* is the string expression containing the characters to remove.

If *MatchString* is not specified, LTRIM\$ removes leading spaces. LTRIM\$ returns a substring of *MainString*, from the first non-*MatchString* (or non-space) to the end of the string. If *MatchString* (or a space) is not present at the beginning of *MainString*, all of *MainString*

is returned.

If the ANY keyword is included, *MatchString* specifies a list of single characters to be searched for individually. A match on any one of these as a leading character will cause the character to be removed from the result.

LTRIM\$ is case sensitive.

See also [CLIP\\$](#), [EXTRACT\\$](#), [INSTR](#), [LEFT\\$](#), [MID\\$](#), [REMOVE\\$](#), [REPLACE](#), [RIGHT\\$](#), [RTRIM\\$](#), [SHRINK\\$](#), [STRDELETE\\$](#), [STRINSERT\\$](#), [STRREVERSE\\$](#), [TALLY](#), [TRIM\\$](#), [UNWRAP\\$](#), [VERIFY](#)

Example A\$ = "0123ABC3210"
 A\$ = LTRIM\$(A\$, ANY "0123456789")

Result ABC3210

MACRO/END MACRO block

MACRO/END MACRO block

Purpose Define a single or multi-line text substitution block.

Syntax **Single line macro:**
 MACRO *macroname* [(*prm1*, *prm2*, ...)] = *replacementtext*

Multi-line macro:
 MACRO *macroname* [(*prm1*, *prm2*, ...)]
 [MACROTEMP *ident1* [, *ident2*, ...]]
 DIM *ident1* AS *type* [, *ident2* AS *type*, ...]]
 {*replacementtext*}
 [EXIT MACRO]
 {*replacementtext*}
 END MACRO

Macro function:
 MACRO FUNCTION *macroname* [(*prm1*, *prm2*, ...)]
 [MACROTEMP *ident1* [, *ident2*, ...]]
 DIM *ident1* AS *type* [, *ident2* AS *type*, ...]]
 {*replacementtext*}
 [EXIT MACRO]
 {*replacementtext*}
 END MACRO = *returnexpression*

Remarks Macro is a powerful text substitution construct that may take a single-line or multi-line format. It generates absolutely no executable code unless it is referenced, and effectively allows the programmer to design a part of the PowerBASIC language to his/her own needs and requirements. For example, a simple single-line macro can allow PowerBASIC to emulate the CONST syntax used in Visual Basic - see the box-out below for more information.

A macro must always be defined before it is referenced, and the parameter count must always match the definition. When a macro is referenced, the occurrence of the name is replaced by the defined replacement text, expanded with parameter substitution. The first line of a MACRO definition is termed the macro prototype, and this line may not be split into multiple logical lines with the underscore (_) [line continuation](#) character. Likewise, the END MACRO = *returnexpression* may not be split with underscores either. A Macro also cannot end with a line continuation character.

Macros may be nested, and may forward-reference other macros. However, care should be exercised to avoid circular references.

A single-line macro or a macro function may be referenced at any source code position which, when expanded, will be syntactically correct (also see the Restrictions section

below). Consider the following simplistic example:

```
MACRO concatenate(prm1,prm2) = prm1 & $SPC & prm2
' more code here
A$ = concatenate("Hello","World")
```

During compilation, PowerBASIC would internally expand this code to become:

```
A$ = "Hello" & $SPC & "World"
```

A multi-line macro, while more powerful in terms of coding, may be referenced only in the "statement" position, which is the first position on a line. That single reference is internally expanded into multiple lines of inline code to perform a complex task. For example:

```
MACRO Display6times(prm1)
CALL Display(prm1) : CALL Display(prm1)
CALL Display(prm1) : CALL Display(prm1)
CALL Display(prm1) : CALL Display(prm1)
END MACRO
' more code here
Display6times("This is very cool...")
```

The single-line MACRO offers a cunning way to retain the CONST syntax used in MSBASIC and Visual Basic in your PowerBASIC code, while maintaining the low overhead advantage of PowerBASIC. For example:

```
MACRO CONST = MACRO
' more code here
CONST Version = 1&
CONST AppTitle = "My Application"
' more code here
a$ = AppTitle & " v" & FORMAT$(Version)
```

During compilation, the CONST keyword is replaced by the MACRO keyword, dynamically creating a new macro that, in turn, defines a [numeric or string literal](#). When the real macro name is referenced in the code, the literal is substituted directly.

MACROTEMP The MACROTEMP statement may be used to specify a list of one or more identifiers, each of which is automatically made unique to each expansion of a multi-line macro. This is done by internally appending the digits 0001, 0002, etc, to the identifier upon each expansion of the macro.

A text identifier may represent a [variable](#), [label](#), or any other word, which expands appropriately to avoid a duplicate name conflict in your code.

MACROTEMP just creates a symbol name. If this symbol is a variable name, the variable must still be formally declared with an appropriate [DIM](#) (or [LOCAL](#)) statement. For example:

```
MACRO CopyUntilNul(ptr1,ptr2)
MACROTEMP LoopPoint, ByteVar
DIM ByteVar AS BYTE
LoopPoint:
ByteVar = @ptr1
@ptr2 = ByteVar
INCR ptr1
INCR ptr2
IF ByteVar <> 0 THEN LoopPoint
END MACRO
```

Using that MACRO definition, the code "CopyUntilNul(Source, Dest)" would expand to something like this:

```
DIM ByteVar0001 AS BYTE
LoopPoint0001:
ByteVar0001 = @Source
@Dest = ByteVar0001
INCR Source
```

```
INCR Dest
IF ByteVar0001 <> 0 THEN LoopPoint0001
```

If the MACROTEMP statement were not used, serious naming conflicts would occur most any time that a macro was expanded more than once in a program. MACROTEMP statements may appear 0, 1, or more times in a macro definition, but they must always precede any other text in the macro.

MACROTEMP statements should be used with any label in a macro that may be expanded more than once in a program, and with any variable that should not be shared with any other expansion of the macro.

EXIT MACRO EXIT MACRO may be used to terminate execution of code in the current macro expansion. It is functionally identical to the *imaginary* concept of [GOTO](#) END-MACRO.

END MACRO A macro function block can return a value with the END MACRO = *returnexpression* statement.

Restrictions A macro definition may contain replacement text up to approximately 4000 characters. Macros may specify up to 240 parameters, which may occupy up to approximately 2000 bytes total expanded space per macro.

Macro Function substitutions are limited to an expanded total of approximately 16000 characters per line of original source code.

Macro parameters are substituted directly, so whitespace characters in the passed macro parameters may cause unexpected problems if the expanded code is syntactically incorrect with the additional whitespace. For example, this can be important when specifying [UDT](#) variables as macro parameters. Consider the following code:

```
TYPE MyType
  lCount AS LONG
  szText AS ASCIIZ * 256
END TYPE

MACRO PresetUDT(u)
  u.lCount = 1
  u.szText = SPACE$(256)
END MACRO

FUNCTION PBMAIN
  DIM x AS MyType
  PresetUDT(x)
  PresetUDT(x ) ' This line causes an Error 526
END FUNCTION
```

In the code above, the second macro expansion fails to compile because the trailing space in the passed macro parameter becomes part of the expanded code. In this situation, this additional space character breaks the syntax of the UDT variable reference within the expanded macro, triggering a compile-time [Error 526](#) ("Period not allowed"). If we examine how the two expanded macro statements would appear, the problem becomes immediately obvious:

```
x.lCount = 1
^
x.szText = SPACE$(256)
^
```

(Please note that the caret symbols (^) above have been added purely to illustrate the exact position of the problem)

When using single-line macros that contain numeric expressions, use parentheses around the macro body to guard against unexpected order of precedence problems when the macro is used within an expression. For example, consider the following macro and expansion:

```
MACRO Calculate(p1, p2, p3) = (p1 * p2) \ p3
' more code here
```

```
x = Calculate(a,b,c) ^ 3
```

When this macro is expanded, the expression would be calculated as follows:

```
x = (a * b) \ c ^ 3
```

However, if the macro body was enclosed in parentheses:

```
MACRO Calculate(p1, p2, p3) = ((p1 * p2) \ p3)
```

...then the expanded expression would be calculated thus:

```
x = ((a * b) \ c) ^ 3
```

MACRO prototypes (those beginning with the MACRO keyword) and END MACRO = *returnexpression* lines must be constructed on a single line of source code. That is, they may not be split across multiple lines of source code with line continuation characters, since these interfere with the text substitution process. For example, the following prototype is invalid:

```
MACRO FUNCTION MyMacro1(sParam1, sParam2, sParam3, sParam4)
```

If a macro expands directly to a Function call, the macro can be called using the [SUB](#)-style syntax, automatically discarding the function return value. For example:

```
MACRO sm(Msg) = SendMessage(a, Msg, b, c)
```

...can be called like this (if the return value is not required):

```
sm(x)
```

A macro cannot expand directly to a REMark, because [REM](#) and `'` are processed before the macro is assigned. So, MACRO hello = REM winds up as an invalid, blank macro.

Finally, it should be noted that the [Integrated Debugger](#) appears to step over macro references as if they were conventional BASIC statements. This occurs because macro expansion takes place during the compilation process and the original source code is not affected or altered by the compile-time expansion.

See also

[EXIT](#), [FUNCTION/END FUNCTION](#), [METHOD](#), [PROPERTY](#), [SUB/END SUB](#)

Example

```
' Single-line macro:
MACRO muldivide(p1, p2, p3) = ((p1 * p2) / p3)
' more code here
x = muldivide(3,3,2) + 10

' Multi-line macro and macro function example:
MACRO FUNCTION HowDidIGetHere
  MACROTEMP i, a
  DIM i AS LONG, a$
  FOR i = CALLSTKCOUNT TO 1 STEP -1
    A$ = A$ + CALLSTK$(i) + ", "
  NEXT
END MACRO = RTRIM$(A$, ANY ", ")

MACRO DisplayText(txt)
  #IF %DEF(%PB_CC32)
    PRINT txt
  #ELSE
    MSGBOX txt
  #ENDIF
END MACRO

SUB Testing2(r AS LONG,z AS ASCIIZ)
  DisplayText(HowDidIGetHere)
END SUB

SUB testing1(z AS ASCIIZ)
  DisplayText(HowDidIGetHere)
  CALL Testing2(1,z)
END SUB
```

```

FUNCTION PBMAIN
    DisplayText(HowDidIGetHere)
    CALL Testing1("This is a test")
END FUNCTION

' Useful Macro functions
MACRO Pi = 3.141592653589793##
MACRO DegreesToRadians(dpDegrees) = (dpDegrees * 0.0174532925199433##)
MACRO RadiansToDegrees(dpRadians) = (dpRadians * 57.29577951308232##)

```

MAK function

MAK function

| | |
|---------------------|--|
| Purpose | Create an value of a specified data type. |
| Syntax | <code>resultvar = MAK(datatype, loworderval, highorderval)</code> |
| Remarks | Create an integral class value of a specified data type (WORD , DWORD , , INTEGER , LONG , QUAD) from a low-order and a high-order part. The complements to this function are the HI and LO functions, which may be used to split a single 32-bit value into two 16-bit components. |
| Restrictions | MAK supercedes the MAKWRD, MAKDWD, and MAKPTR functions. Those functions are no longer supported, so update your code to use the new syntax. |
| See also | HI , LO |
| Example | <code>dwResult = MAK(DWORD, x??, y??)</code> |

MAT statement

MAT statement

| | |
|----------------|--|
| Purpose | To simplify Matrix Algebra calculations. |
| Syntax | <pre> MAT a1() = CON 'Set all elements of a1() to one MAT a1() = CON(expr) 'Set all elements of a1() to value of expr MAT a1() = IDN 'Establish a1() as an identity matrix MAT a1() = ZER 'Set all elements of a1() to zero MAT a1() = a2() + a3() 'Addition MAT a1() = a2() 'Assignment MAT a1() = INV(a2()) 'Inversion MAT a1() = (expr) * a2() 'Scalar Multiplication MAT a1() = a2() - a3() 'Subtraction MAT a1() = a2() * a3() 'Multiplication MAT a1() = TRN(a2()) 'Transposition </pre> |
| Remarks | <p>Array names with the MAT statements may optionally include a set of empty parentheses. The following are both equally valid, but the inclusion of the parentheses improves clarity of the code:</p> <pre> MAT a1 = CON MAT a1() = CON </pre> <p>MAT CON, IDN ZER + - = and TRN operations are valid with Byte, Word, Double-word, Integer, Long-integer, Quad-integer, Single-precision, Double-precision and Extended-precision arrays.</p> <p>Matrix * and INV operations support all</p> |

types.

It is the programmer's responsibility to ensure that arrays used with MAT are of the appropriate size and type. All operations involving two or more arrays require that they be of exactly the same size and type, without exception. Failure to adhere causes undefined results. In the interest of execution speed, no error checking is performed at run-time.

Every scalar value denoted here as 'expr' must be enclosed in parentheses. Although Matrix operations tend to imply a [two-dimensional array](#), unless otherwise noted (such as with MAT IDN, *, TRN), MAT may be used with arrays of one to eight dimensions. It is permissible to specify one array for multiple MAT parameters.

Example

```
MAT array1() = IDN
```

This establishes *array1* as an identity matrix, with all diagonal elements as 1 and all others as zero. This produces undefined results if *array1* is not a "square" matrix.

```
MAT array1() = (expr) * array2()
```

Each element of *array2* is multiplied by the scalar value of the *expr*, then assigned to *array1*.

```
MAT array1() = TRN(array2())
```

Transposes the row and columns from *array2* to *array1*. Arrays must be equivalent: *array1*(5,2) and *array2*(2,5). Only a square matrix may be transposed to itself.

```
MAT array1() = INV(array2())
```

Inverts the array from *array2* to *array1*. Only a square matrix may be inverted. Proof: If *array1* is then multiplied by *array2*, the resulting "*array3*" will be equal to an Identify Matrix, (MAT *array3* = *array1* * *array2* ' *array3* should now be equal to "MAT *array3* IDN").

```
MAT a() = b() * c()
```

Array multiplication occurs as follows:

```
' Row Column assumption:
```

```
'   array [a]l,n = [b]l,m * [c]m,n
```

```
FOR i = 1 TO l           ' Row   [a]l = Row   [b]l
  FOR j = 1 TO n         ' Column [a]n = Column [c]n
    a(i,j) = 0#         ' # if Double-precision
    FOR k = 1 TO m       ' Column [b]m = Row   [c]m
      a(i,j) = a(i,j) + b(l,k) * c(k,j)
    NEXT
  NEXT
NEXT
```

MAX function

MAX function

Purpose Return the argument with the largest (maximum) value.

Syntax
 $y = \text{MAX}(\text{arg} [, \text{arg}] \dots)$
 $y\& = \text{MAX}\&(\text{arg}\& [, \text{arg}\&] \dots)$
 $y\$ = \text{MAX}\$(\text{arg}\$ [, \text{arg}\$] \dots)$

Remarks These functions take any number of arguments and return the argument with the largest (maximum) value. MAX handles arguments of any

type.

MAX& handles arguments which evaluate to [Long-integers](#) (MAX& is more efficient than MAX).

MAX\$ handles

arguments.

If any arguments of MAX& are outside of the range of Long-integers, the result is

undefined. Any

arguments of MAX& will be rounded to Long-integers before the comparison begins. MAX% is recognized as a valid synonym for MAX&.

See also [CHOOSE](#), [CHOOSE&](#), [CHOOSE\\$](#), [IIF](#), [IIF&](#), [IIF\\$](#), [MIN](#), [MIN&](#), [MIN\\$](#), [SWITCH](#), [SWITCH&](#), [SWITCH\\$](#)

Example

```
x% = MAX&(A, B, C, D)
x$ = MAX$("abacadabra", "cad", A$, B$(4), C$+D$+LEFT$(E$,5))
x## = MAX(1.1@@, A%/B!, C#(x)^D, E##, SIN(F&))
```

MCASE\$ function

MCASE\$ function

Purpose Return a mixed case version of its argument.

Syntax `s$ = MCASE$(string_expression [,ANSI | OEM])`

Remarks MCASE\$ returns a string equivalent to *string_expression*, except that the first letter of each word is capitalized, while the remaining characters are forced to lowercase. A word is considered to be a consecutive series of letters. The optional [ANSI](#) or [OEM](#) parameter specifies whether the conversion is made using the ANSI charset for the system, or the original IBM OEM charset. If no charset is specified, PowerBASIC for Windows uses the system ANSI charset, while [PB/CC](#) uses the IBM OEM charset. Only "International" characters in the range of [CHR\\$\(128\)](#) to [CHR\\$\(255\)](#) are affected by this parameter.

The OEM charset is based upon the original IBM OEM charset to ensure compatibility with programs written for all previous versions of the PowerBASIC compiler.

See also [LCASE\\$](#), [UCASE\\$](#)

Example `x$ = MCASE$("Cats aren't AL.WAYS good.")`

Result `Cats Aren'T Al.Ways Good.`

ME pseudo-variable

Keyword Template

Purpose

Syntax

Remarks

See also

Example

ME pseudo-variable

Purpose A pseudo [object](#) variable to reference the current object.

Syntax `ME.Method1(param)`

Remarks ME is a pseudo-variable, which PowerBASIC automatically defines in every [Method](#) and [Property](#). It is treated as a reference to the current object. Using ME, it's possible to call any other Method or Property which is a member of the class: `var = ME.Method1(param)`

ME can also be assigned to an appropriate object variable, or used as a [Sub/Function](#)/Method/Property parameter.

See also [CLASS](#), [INTERFACE \(Direct\)](#), [INTERFACE \(IDBind\)](#), [METHOD](#), [PROPERTY](#), [What is an object, anyway?](#)

MEMORY COPY statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

MEMORY statement **New!**

Purpose Copy, Swap, or Fill blocks of memory.

Syntax `MEMORY COPY Source&, Dest&, Count&`
`MEMORY SWAP Source&, Dest&, Count&`
`MEMORY FILL Dest&, Count&, BYTE|WORD|DWORD IntegralExpr`
`MEMORY FILL Dest&, Count&, StrgExpr`

Remarks The MEMORY statement may be used to copy, swap, or fill a block of memory with very high efficiency. PowerBASIC will automatically take into account the possibility that the source and destination blocks overlap and avoid corruption from that fact.

In the first form, *Count&* [bytes](#) of memory at the address specified by *Source&* is copied to the address specified by *Dest&*. In the second form, *Count&* bytes of memory at the address specified by *Source&* is exchanged with the data at the address specified by *Dest&*.

In the third form, *Count&* bytes of memory at *Dest&* are filled with one or more copies of the BYTE, WORD, or DWORD value specified by the value of *IntegralExpr*.

In the fourth form, *Count&* bytes of memory at *Dest&* are filled with one or more copies of the [string](#) *StrgExpr*.

See also [GLOBALMEM](#), [PEEK\\$](#), [POKE\\$](#), [STRPTR](#), [VARPTR](#)

MEMORY FILL statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

MEMORY statement **New!**

Purpose Copy, Swap, or Fill blocks of memory.

Syntax `MEMORY COPY Source&, Dest&, Count&`

```
MEMORY SWAP Source&, Dest&, Count&
MEMORY FILL Dest&, Count&, BYTE|WORD|DWORD IntegralExpr
MEMORY FILL Dest&, Count&, StrgExpr
```

- Remarks** The MEMORY statement may be used to copy, swap, or fill a block of memory with very high efficiency. PowerBASIC will automatically take into account the possibility that the source and destination blocks overlap and avoid corruption from that fact.
- In the first form, *Count&* [bytes](#) of memory at the address specified by *Source&* is copied to the address specified by *Dest&*. In the second form, *Count&* bytes of memory at the address specified by *Source&* is exchanged with the data at the address specified by *Dest&*.
- In the third form, *Count&* bytes of memory at *Dest&* are filled with one or more copies of the BYTE, WORD, or DWORD value specified by the value of *IntegralExpr*.
- In the fourth form, *Count&* bytes of memory at *Dest&* are filled with one or more copies of the [string](#) *StrgExpr*.
- See also** [GLOBALMEM](#), [PEEK\\$](#), [POKE\\$](#), [STRPTR](#), [VARPTR](#)

MEMORY SWAP statement

Keyword Template

- Purpose
- Syntax
- Remarks
- See also
- Example

MEMORY statement New!

- Purpose** Copy, Swap, or Fill blocks of memory.
- Syntax**
- ```
MEMORY COPY Source&, Dest&, Count&
MEMORY SWAP Source&, Dest&, Count&
MEMORY FILL Dest&, Count&, BYTE|WORD|DWORD IntegralExpr
MEMORY FILL Dest&, Count&, StrgExpr
```
- Remarks** The MEMORY statement may be used to copy, swap, or fill a block of memory with very high efficiency. PowerBASIC will automatically take into account the possibility that the source and destination blocks overlap and avoid corruption from that fact.
- In the first form, *Count&* [bytes](#) of memory at the address specified by *Source&* is copied to the address specified by *Dest&*. In the second form, *Count&* bytes of memory at the address specified by *Source&* is exchanged with the data at the address specified by *Dest&*.
- In the third form, *Count&* bytes of memory at *Dest&* are filled with one or more copies of the BYTE, WORD, or DWORD value specified by the value of *IntegralExpr*.
- In the fourth form, *Count&* bytes of memory at *Dest&* are filled with one or more copies of the [string](#) *StrgExpr*.
- See also** [GLOBALMEM](#), [PEEK\\$](#), [POKE\\$](#), [STRPTR](#), [VARPTR](#)

## MENU ADD POPUP statement

# MENU ADD POPUP statement IMPROVED

|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>       | Add a popup child <a href="#">menu</a> to an existing menu.                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Syntax</b>        | <code>MENU ADD POPUP, hMenu, txt\$, hPopup [AS id], state&amp; [, AT [BYCMD] position&amp;]</code>                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Remarks</b>       | A popup menu is a small window that "pops up" when a menu item is highlighted. This allows nesting, and gives the user an opportunity to choose from "sub-menu" items.                                                                                                                                                                                                                                                                                                                                           |
| <i>hMenu</i>         | <a href="#">Handle</a> of the <a href="#">parent</a> menu which holds the popup.                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <i>txt\$</i>         | Text displayed in the parent menu. An ampersand (&) may be used in the text to make the following letter into a control accelerator (hot-key). The letter appears underscored to signify that it is an accelerator.                                                                                                                                                                                                                                                                                              |
| <i>hPopup</i>        | Handle of the child popup menu to be added.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <i>id</i>            | If the option AS ID is included, <i>id</i> is a unique numeric identifier for this popup menu. <i>id</i> may be used later with a BYCMD option to reference this popup. <i>id</i> is an integral numeric value in the range of -32768 to +32767.                                                                                                                                                                                                                                                                 |
| <i>state&amp;</i>    | The initial state of the menu item. It can be one of the following: <ul style="list-style-type: none"> <li>% MFS_DISABLED      Disable the item so that it cannot be selected.</li> <li>% MFS_ENABLED      Enable the item so that it can be selected.</li> </ul>                                                                                                                                                                                                                                                |
| <i>position&amp;</i> | Indicates the position in the parent menu where the popup child menu is to be inserted. If the BYCMD option is used, the popup menu is inserted prior to the menu item ID specified by <i>position&amp;</i> . Otherwise, the popup menu is inserted at the physical <i>position&amp;</i> within the parent menu, where <i>position&amp;</i> = 1 for the first position, <i>position&amp;</i> = 2 for the second, and so on. If position is not specified then the popup menu is appended to the end of the menu. |
| <b>See also</b>      | <a href="#">Dynamic Dialog Tools</a> , <a href="#">ACCEL ATTACH</a> , <a href="#">Menus</a> , <a href="#">MENU ADD STRING</a> , <a href="#">MENU ATTACH</a> , <a href="#">MENU CONTEXT</a> , <a href="#">MENU DELETE</a> , <a href="#">MENU DRAW BAR</a> , <a href="#">MENU GET STATE</a> , <a href="#">MENU GET TEXT</a> , <a href="#">MENU NEW BAR</a> , <a href="#">MENU NEW POPUP</a> , <a href="#">MENU SET STATE</a> , <a href="#">MENU SET TEXT</a>                                                       |
| <b>Example</b>       | See <a href="#">Menu Example</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

## MENU ADD STRING statement

# MENU ADD STRING statement

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Add a separator to an existing <a href="#">menu</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Syntax</b>  | <code>MENU ADD STRING, hMenu, txt\$, id&amp;, state&amp; [, AT [BYCMD] position&amp;] [, CALL callback]</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Remarks</b> | A string may contain an optional command accelerator key, and also describe an equivalent keyboard accelerator combination.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <i>hMenu</i>   | <a href="#">Handle</a> of the <a href="#">parent</a> menu to which the string should be added.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <i>txt\$</i>   | Text to display in the parent menu. An ampersand (&) may be used in the string to make the following letter into a command accelerator (hot-key). The letter is underscored to signify that it is an accelerator. To create a horizontal separator instead of a text string, set <i>txt\$</i> = "-", <i>id&amp;</i> = 0, <i>state&amp;</i> = 0.<br><br>Keyboard accelerators, as described in the <a href="#">ACCEL ATTACH</a> statement, can be indicated in the text of a menu item, for the reference of the user. To include a keyboard accelerator description in a menu string, separate it from the menu item text with a <a href="#">\$TAB {CHRS(9)}</a> |

character. For example:

```
MENU ADD STRING, hMenu, "Cu&t" & $TAB & "CTRL+X", id&, mstate&
```

*id&*

The unique

identifier for the menu item. When a menu item is selected, *id&* is sent to the parent dialog [Callback](#) Function to notify the dialog which option was selected.

*state&*

The initial state of the menu item. It can be one or more of the following, combined together with the [OR](#) operator to form a bitmask:

|               |                                                                                                        |
|---------------|--------------------------------------------------------------------------------------------------------|
| %             | Place a checkmark next to the item.                                                                    |
| MFS_CHECKED   |                                                                                                        |
| %             | The default menu item, displayed in bold. Only one item may be the default.                            |
| MFS_DEFAULT   |                                                                                                        |
| %             | Disable the menu item so that it cannot be selected.                                                   |
| MFS_DISABLED  |                                                                                                        |
| %             | Enable the menu item so that it can be selected.                                                       |
| MFS_ENABLED   |                                                                                                        |
| %             | Disable the menu item so that it cannot be selected, and draw it in a "grayed" state to indicate this. |
| MFS_GRAYED    |                                                                                                        |
| %MFS_HILITE   | Highlight the menu item.                                                                               |
| %             | Do not place a checkmark next to the item.                                                             |
| MFS_UNCHECKED |                                                                                                        |
| ED            |                                                                                                        |
| %             | Item is not highlighted.                                                                               |
| MFS_UNHILITE  |                                                                                                        |

A state value of zero (0) provides %mfs\_enabled, %mfs\_unchecked, and %mfs\_unhilitate.

*position&*

Optional position in the parent menu, where the menu item should be inserted. If the BYCMD option is used, the menu item is inserted prior to the menu item ID specified by *position&*. Otherwise, the menu item is inserted at the physical *position&* within the parent menu, where *position&* = 1 for the first position, *position&* = 2 for the second, and so on. If position is not specified then the popup menu is appended to the end of the menu.

*callback*

Optional name of a Callback Function that will be called when the menu item is selected. This callback will be ignored when used with [MENU CONTEXT](#) as it returns the id of the selected menu item.

Restrictions

The application must call the [MENU DRAW BAR](#) statement whenever a menu changes, whether or not the menu is in a displayed dialog.

See also

[Dynamic Dialog Tools](#), [ACCEL ATTACH](#), [Menus](#), [MENU ADD POPUP](#), [MENU ATTACH](#), [MENU CONTEXT](#), [MENU DELETE](#), [MENU DRAW BAR](#), [MENU GET STATE](#), [MENU GET TEXT](#), [MENU NEW BAR](#), [MENU NEW POPUP](#), [MENU SET STATE](#), [MENU SET TEXT](#)

Example

See [Menu Example](#).

## MENU ATTACH statement

# MENU ATTACH statement

**Purpose** Attach a [menu](#) to a given [dialog](#).

**Syntax** `MENU ATTACH hMenu, hDlg`

**Remarks** Attaches a menu to a dialog, replacing any existing menu. The dialog is redrawn to accommodate the new menu.

*hMenu* [Handle](#) of the menu to be attached.

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>hDlg</i>     | Handle of the dialog which holds the menu.                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>See also</b> | <a href="#">Dynamic Dialog Tools</a> , <a href="#">ACCEL ATTACH</a> , <a href="#">Menus</a> , <a href="#">MENU ADD POPUP</a> , <a href="#">MENU ADD STRING</a> , <a href="#">MENU DELETE</a> , <a href="#">MENU DRAW BAR</a> , <a href="#">MENU GET STATE</a> , <a href="#">MENU GET TEXT</a> , <a href="#">MENU NEW BAR</a> , <a href="#">MENU NEW POPUP</a> , <a href="#">MENU SET STATE</a> , <a href="#">MENU SET TEXT</a> |
| <b>Example</b>  | See <a href="#">Menu Example</a> .                                                                                                                                                                                                                                                                                                                                                                                             |

## MENU CONTEXT statement

# Keyword Template

**Purpose**  
**Syntax**  
**Remarks**  
**See also**  
**Example**

## MENU CONTEXT statement New!

|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>                | Create a floating context <a href="#">menu</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Syntax</b>                 | <code>MENU CONTEXT <i>hContext</i>, <i>x&amp;</i>, <i>y&amp;</i>, <i>flags&amp;</i> TO <i>CmdVar</i></code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Remarks</b>                | A context menu is a floating popup menu which is shown until the user makes a selection or dismisses it. It can appear anywhere on the screen.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <i>hContext</i>               | Handle of a menu created with <a href="#">MENU NEW POPUP</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <i>x&amp;</i> , <i>y&amp;</i> | The parameters <i>x&amp;</i> and <i>y&amp;</i> specify the location of the context menu, in <a href="#">pixels</a> , relative to the upper left corner of the <a href="#">desktop</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <i>flags&amp;</i>             | May be combined, as appropriate, to specify the characteristics of the context menu. <ul style="list-style-type: none"> <li>% TPM_LEFTBUTT ON Tracks the left button.</li> <li>% TPM_RIGHTBUTT ON Tracks the right button.</li> <li>% TPM_LEFTALIGN Left side of the menu is aligned with <i>x&amp;</i>.</li> <li>% TPM_CENTERALIGN Centers horizontally with <i>x&amp;</i>.</li> <li>% TPM_RIGHTALIGN Right side of the menu is aligned with <i>x&amp;</i>.</li> <li>% TPM_TOPALIGN Top of the menu is aligned with <i>y&amp;</i>.</li> <li>% TPM_VCENTERALIGN Centers vertically with <i>y&amp;</i>.</li> <li>% TPM_BOTTOMALIGN Bottom of the menu is aligned with <i>y&amp;</i>.</li> </ul> |

**CmdVar** [Long integer](#) variable where the id of the selected menu item is returned. If an optional callback is defined for a menu item with [MENU\\_ADD\\_STRING](#) it will be ignored when used with MENU\_CONTEXT.

**See also** [Dynamic Dialog Tools](#), [Menus](#), [MENU\\_ADD\\_STRING](#), [MENU\\_ADD\\_POPUP](#), [MENU\\_NEW\\_POPUP](#)

**Example**

```
MENU NEW POPUP TO hPop&
MENU ADD STRING, hPop&, "one", 1, %mf_enabled
MENU ADD STRING, hPop&, "two", 2, %mf_enabled
MENU ADD STRING, hPop&, "three", 3, %mf_enabled
MENU CONTEXT hPop&, 500, 500, %tpm_leftbutton TO CommandVar&
```

## MENU DELETE statement

# MENU DELETE statement

**Purpose** Delete a [menu](#) item from an existing menu.

**Syntax** `MENU DELETE hMenu, [BYCMD] position&`

**Remarks** If the menu item is a popup child menu, the menu is destroyed and its memory is released.

*hMenu* [Handle](#) of the menu holding the item you are deleting.

*position&* Position of the item within the menu. If BYCMD is specified, *position&* refers to the unique menu identifier. Otherwise, *position&* is the position of the menu item, where *position&* = 1 for the first position, *position&* = 2 for the second, and so on.

**See also** [Dynamic Dialog Tools](#), [Menus](#), [MENU\\_ADD\\_POPUP](#), [MENU\\_ADD\\_STRING](#), [MENU\\_ATTACH](#), [MENU\\_DRAW\\_BAR](#), [MENU\\_GET\\_STATE](#), [MENU\\_GET\\_TEXT](#), [MENU\\_NEW\\_BAR](#), [MENU\\_NEW\\_POPUP](#), [MENU\\_SET\\_STATE](#), [MENU\\_SET\\_TEXT](#)

## MENU DRAW BAR statement

# MENU DRAW BAR statement

**Purpose** Redraw the [menu](#) bar for a given [dialog](#).

**Syntax** `MENU DRAW BAR hDlg`

**Remarks** This operation should be performed when a menu is altered dynamically after the dialog has been initially created, without regard to the visible state of the dialog.

*hDlg* [Handle](#) of the dialog that owns the menu to be redrawn.

**See also** [Dynamic Dialog Tools](#), [Menus](#), [MENU\\_ADD\\_POPUP](#), [MENU\\_ADD\\_STRING](#), [MENU\\_ATTACH](#), [MENU\\_DELETE](#), [MENU\\_GET\\_STATE](#), [MENU\\_GET\\_TEXT](#), [MENU\\_NEW\\_BAR](#), [MENU\\_NEW\\_POPUP](#), [MENU\\_SET\\_STATE](#), [MENU\\_SET\\_TEXT](#)

## MENU GET STATE statement

# MENU GET STATE statement IMPROVED

**Purpose** Return the state of a specified [menu](#) item.

**Syntax** `MENU GET STATE hMenu, [BYCMD] position& TO state&`

**Remarks** Retrieves the menu flags associated with the specified menu item.

*hMenu* [Handle](#) of the menu containing the item to examine.

*position&* Position within the menu of the menu item to examine. If the BYCMD option is specified, *position&* specifies the unique menu item identifier of the item to examine. Otherwise, *position&* indicates the physical position of the menu item within the menu, where *position&* = 1 for the first position, *position&* = 2 for the second position, and so on.

*state&* [Long integer](#) variable where the menu state will be placed. If the item does not exist, the result is -1. Otherwise the result is a bitmask containing one or more of the following, combined together with the OR operator to form the bitmask:

|                |                                                                                 |
|----------------|---------------------------------------------------------------------------------|
| %MFS_CHECKED   | Menu item has a checkmark next to it.                                           |
| %MFS_DEFAULT   | Menu item is the default item.                                                  |
| %MFS_DISABLED  | Menu item is disabled and cannot be selected.                                   |
| %MFS_ENABLED   | Menu item is enabled and can be selected.                                       |
| %MFS_GRAYED    | Menu item is disabled and cannot be selected, and is drawn in a "grayed" state. |
| %MFS_HILITE    | Menu item is highlighted.                                                       |
| %MFS_UNCHECKED | Menu item does not have a checkmark next to it.                                 |
| %MFS_UNHILITE  | Menu item is not highlighted.                                                   |

**See also** [Dynamic Dialog Tools](#), [Menus](#), [MENU\\_ADD\\_POPUP](#), [MENU\\_ADD\\_STRING](#), [MENU\\_ATTACH](#), [MENU\\_DELETE](#), [MENU\\_DRAW\\_BAR](#), [MENU\\_GET\\_TEXT](#), [MENU\\_NEW\\_BAR](#), [MENU\\_NEW\\_POPUP](#), [MENU\\_SET\\_STATE](#), [MENU\\_SET\\_TEXT](#)

## MENU GET TEXT statement

# MENU GET TEXT statement

**Purpose** Return the text associated with a given [menu](#) item.

**Syntax** `MENU GET TEXT hMenu, [BYCMD] position& TO txt$`

**Remarks** Return the text displayed in the menu item identified by *position&*.

*hMenu* [Handle](#) of the menu that contains the menu item to be examined.

*position&* Position of the menu item to examine. If BYCMD is specified, *position&* refers to the unique menu item identifier of the item to examine. Otherwise, *position&* indicates the physical position of the menu item within the menu, where *position&* = 1 for the first position, *position&* = 2 for the second position, and so on.

*txt\$* variable where the text from the menu item will be placed.

**See also** [Dynamic Dialog Tools](#), [Menus](#), [MENU\\_ADD\\_POPUP](#), [MENU\\_ADD\\_STRING](#), [MENU\\_ATTACH](#), [MENU\\_DELETE](#), [MENU\\_DRAW\\_BAR](#), [MENU\\_GET\\_STATE](#), [MENU\\_NEW\\_BAR](#), [MENU\\_NEW\\_POPUP](#), [MENU\\_SET\\_STATE](#), [MENU\\_SET\\_TEXT](#)

## MENU NEW BAR statement

# MENU NEW BAR statement

**Purpose** Create a new [menu](#) bar.

**Syntax** `MENU NEW BAR TO hMenu`

**Remarks** Items may be added to the menu using the [MENU\\_ADD\\_POPUP](#) and [MENU\\_ADD\\_STRING](#) statements.

*hMenu* [Double-word](#) or [Long-integer](#) variable where the [handle](#) of the new menu bar will be placed.

**See also** [Dynamic Dialog Tools](#), [Menus](#), [MENU\\_ADD\\_POPUP](#), [MENU\\_ADD\\_STRING](#),

[MENU ATTACH](#), [MENU DELETE](#), [MENU DRAW BAR](#), [MENU GET STATE](#),  
[MENU GET TEXT](#), [MENU NEW POPUP](#), [MENU SET STATE](#), [MENU SET TEXT](#)

**Example** See [Menu Example](#).

## MENU NEW POPUP statement

# MENU NEW POPUP statement

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Create a new popup <a href="#">menu</a> .                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Syntax</b>   | <code>MENU NEW POPUP TO <i>hPopup</i></code>                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Remarks</b>  | Once created, items may be added to the popup menu using the <a href="#">MENU ADD POPUP</a> and <a href="#">MENU ADD STRING</a> statements.                                                                                                                                                                                                                                                                                          |
| <i>hPopup</i>   | <a href="#">Double-word</a> or <a href="#">Long-integer</a> variable where the <a href="#">handle</a> of the new popup menu will be placed.                                                                                                                                                                                                                                                                                          |
| <b>See also</b> | <a href="#">Dynamic Dialog Tools</a> , <a href="#">Menus</a> , <a href="#">MENU ADD POPUP</a> , <a href="#">MENU ADD STRING</a> ,<br><a href="#">MENU ATTACH</a> , <a href="#">MENU CONTEXT</a> , <a href="#">MENU DELETE</a> , <a href="#">MENU DRAW BAR</a> ,<br><a href="#">MENU GET STATE</a> , <a href="#">MENU GET TEXT</a> , <a href="#">MENU NEW BAR</a> , <a href="#">MENU SET STATE</a> ,<br><a href="#">MENU SET TEXT</a> |
| <b>Example</b>  | See <a href="#">Menu Example</a> .                                                                                                                                                                                                                                                                                                                                                                                                   |

## MENU SET STATE statement

# MENU SET STATE statement IMPROVED

|                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                           |                                     |                           |                                                                             |                            |                                                      |                           |                                                  |                          |                                                                                                        |                          |                          |                             |                                         |                            |                                      |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|-------------------------------------|---------------------------|-----------------------------------------------------------------------------|----------------------------|------------------------------------------------------|---------------------------|--------------------------------------------------|--------------------------|--------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|-----------------------------|-----------------------------------------|----------------------------|--------------------------------------|
| <b>Purpose</b>              | Set the state of a specified <a href="#">menu</a> item.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                           |                                     |                           |                                                                             |                            |                                                      |                           |                                                  |                          |                                                                                                        |                          |                          |                             |                                         |                            |                                      |
| <b>Syntax</b>               | <code>MENU SET STATE <i>hMenu</i>, [BYCMD] <i>position&amp;</i>, <i>state&amp;</i></code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                           |                                     |                           |                                                                             |                            |                                                      |                           |                                                  |                          |                                                                                                        |                          |                          |                             |                                         |                            |                                      |
| <b>Remarks</b>              | Change the state of the menu item identified by <i>position&amp;</i> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                           |                                     |                           |                                                                             |                            |                                                      |                           |                                                  |                          |                                                                                                        |                          |                          |                             |                                         |                            |                                      |
| <i>hMenu</i>                | <a href="#">Double-word</a> or <a href="#">Long-integer</a> variable containing the <a href="#">handle</a> of the menu that contains the item to change.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                           |                                     |                           |                                                                             |                            |                                                      |                           |                                                  |                          |                                                                                                        |                          |                          |                             |                                         |                            |                                      |
| <i>position&amp;</i>        | Position within the menu, of the menu item to be changed. If the BYCMD option is specified, <i>position&amp;</i> refers to the unique menu item identifier of the item. Otherwise, <i>position&amp;</i> indicates the physical position of the menu item within the menu, where <i>position&amp;</i> = 1 for the first position, <i>position&amp;</i> = 2 for the second position, and so on.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                           |                                     |                           |                                                                             |                            |                                                      |                           |                                                  |                          |                                                                                                        |                          |                          |                             |                                         |                            |                                      |
| <i>state&amp;</i>           | The new state of the menu item. This must be one or more of the following items, combined together with the <a href="#">OR</a> operator to form a bitmask: <table style="margin-left: 20px;"> <tr> <td><code>%MFS_CHECKED</code></td> <td>Place a checkmark next to the item.</td> </tr> <tr> <td><code>%MFS_DEFAULT</code></td> <td>The default menu item, displayed in bold. Only one item may be the default.</td> </tr> <tr> <td><code>%MFS_DISABLED</code></td> <td>Disable the menu item so that it cannot be selected.</td> </tr> <tr> <td><code>%MFS_ENABLED</code></td> <td>Enable the menu item so that it can be selected.</td> </tr> <tr> <td><code>%MFS_GRAYED</code></td> <td>Disable the menu item so that it cannot be selected, and draw it in a "grayed" state to indicate this.</td> </tr> <tr> <td><code>%MFS_HILITE</code></td> <td>Highlight the menu item.</td> </tr> <tr> <td><code>%MFS_UNCHECKED</code></td> <td>Removes any checkmark next to the item.</td> </tr> <tr> <td><code>%MFS_UNHILITE</code></td> <td>Removes the highlight from the item.</td> </tr> </table> | <code>%MFS_CHECKED</code> | Place a checkmark next to the item. | <code>%MFS_DEFAULT</code> | The default menu item, displayed in bold. Only one item may be the default. | <code>%MFS_DISABLED</code> | Disable the menu item so that it cannot be selected. | <code>%MFS_ENABLED</code> | Enable the menu item so that it can be selected. | <code>%MFS_GRAYED</code> | Disable the menu item so that it cannot be selected, and draw it in a "grayed" state to indicate this. | <code>%MFS_HILITE</code> | Highlight the menu item. | <code>%MFS_UNCHECKED</code> | Removes any checkmark next to the item. | <code>%MFS_UNHILITE</code> | Removes the highlight from the item. |
| <code>%MFS_CHECKED</code>   | Place a checkmark next to the item.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                           |                                     |                           |                                                                             |                            |                                                      |                           |                                                  |                          |                                                                                                        |                          |                          |                             |                                         |                            |                                      |
| <code>%MFS_DEFAULT</code>   | The default menu item, displayed in bold. Only one item may be the default.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                           |                                     |                           |                                                                             |                            |                                                      |                           |                                                  |                          |                                                                                                        |                          |                          |                             |                                         |                            |                                      |
| <code>%MFS_DISABLED</code>  | Disable the menu item so that it cannot be selected.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                           |                                     |                           |                                                                             |                            |                                                      |                           |                                                  |                          |                                                                                                        |                          |                          |                             |                                         |                            |                                      |
| <code>%MFS_ENABLED</code>   | Enable the menu item so that it can be selected.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                           |                                     |                           |                                                                             |                            |                                                      |                           |                                                  |                          |                                                                                                        |                          |                          |                             |                                         |                            |                                      |
| <code>%MFS_GRAYED</code>    | Disable the menu item so that it cannot be selected, and draw it in a "grayed" state to indicate this.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                           |                                     |                           |                                                                             |                            |                                                      |                           |                                                  |                          |                                                                                                        |                          |                          |                             |                                         |                            |                                      |
| <code>%MFS_HILITE</code>    | Highlight the menu item.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                           |                                     |                           |                                                                             |                            |                                                      |                           |                                                  |                          |                                                                                                        |                          |                          |                             |                                         |                            |                                      |
| <code>%MFS_UNCHECKED</code> | Removes any checkmark next to the item.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                           |                                     |                           |                                                                             |                            |                                                      |                           |                                                  |                          |                                                                                                        |                          |                          |                             |                                         |                            |                                      |
| <code>%MFS_UNHILITE</code>  | Removes the highlight from the item.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                           |                                     |                           |                                                                             |                            |                                                      |                           |                                                  |                          |                                                                                                        |                          |                          |                             |                                         |                            |                                      |
| <b>See also</b>             | <a href="#">Dynamic Dialog Tools</a> , <a href="#">Menus</a> , <a href="#">MENU ADD POPUP</a> , <a href="#">MENU ADD STRING</a> ,<br><a href="#">MENU ATTACH</a> , <a href="#">MENU CONTEXT</a> , <a href="#">MENU DELETE</a> , <a href="#">MENU DRAW BAR</a> ,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                           |                                     |                           |                                                                             |                            |                                                      |                           |                                                  |                          |                                                                                                        |                          |                          |                             |                                         |                            |                                      |

[MENU GET STATE](#), [MENU GET TEXT](#), [MENU NEW BAR](#), [MENU NEW POPUP](#),  
[MENU SET TEXT](#)

## MENU SET TEXT statement

# MENU SET TEXT statement

|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>       | Set the text of a <a href="#">menu</a> item.                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Syntax</b>        | <code>MENU SET TEXT <i>hMenu</i>, [BYCMD] <i>position&amp;</i>, <i>txt\$</i></code>                                                                                                                                                                                                                                                                                                                                                   |
| <b>Remarks</b>       | Set the text of the menu item identified by <i>position&amp;</i> .                                                                                                                                                                                                                                                                                                                                                                    |
| <i>hMenu</i>         | <a href="#">Handle</a> of the menu that contains the menu item to change.                                                                                                                                                                                                                                                                                                                                                             |
| <i>position&amp;</i> | Position within the menu, of the menu item to be changed. If the BYCMD option is used, <i>position&amp;</i> specifies the unique menu item identifier of the item to change. Otherwise, <i>position&amp;</i> indicates the physical position of the menu item within the menu, where <i>position&amp;</i> = 1 for the first position, <i>position&amp;</i> = 2 for the second position, and so on.                                    |
| <i>txt\$</i>         | The new text for the menu item.                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>See also</b>      | <a href="#">Dynamic Dialog Tools</a> , <a href="#">Menus</a> , <a href="#">MENU ADD POPUP</a> , <a href="#">MENU ADD STRING</a> ,<br><a href="#">MENU ATTACH</a> , <a href="#">MENU CONTEXT</a> , <a href="#">MENU DELETE</a> , <a href="#">MENU DRAW BAR</a> ,<br><a href="#">MENU GET STATE</a> , <a href="#">MENU GET TEXT</a> , <a href="#">MENU NEW BAR</a> , <a href="#">MENU NEW POPUP</a> ,<br><a href="#">MENU SET STATE</a> |

## METHOD / END METHOD statements

# Keyword Template

|                 |
|-----------------|
| <b>Purpose</b>  |
| <b>Syntax</b>   |
| <b>Remarks</b>  |
| <b>See also</b> |
| <b>Example</b>  |

# METHOD/END METHOD statements

**IMPROVED**

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Define a <a href="#">METHOD</a> procedure within a <a href="#">class</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Syntax</b>  | <code>[CLASS OVERRIDE] METHOD <i>name</i> [&lt;<i>DispID</i>&gt;] [ALIAS "<i>altname</i>"] (var AS <i>type</i>...)<br/>[THREADSAFE] [AS <i>type</i>]<br/>    [<i>statements</i>]<br/>    METHOD = <i>expression</i><br/>END METHOD</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Remarks</b> | METHOD/END METHOD is used to define a METHOD procedure within a class.<br>Standard methods can only be called through a virtual function table on a valid <a href="#">object</a> .<br><br>A METHOD is a block of code, very similar to a user-defined function. Optionally, it can return a value, like a <a href="#">FUNCTION</a> , or merely act as a subroutine, like a <a href="#">SUB</a> . If the optional "AS type" is included, the method returns a value set by " <i>Method=expr</i> ", or defaults to a return value of zero (0) or nul<br><br>, depending upon the type. METHOD parameters may be any <a href="#">variable</a> type, including <a href="#">VARIANT</a> variables. Methods may be called using any of the five following forms: |

```

DIM ObjVar AS MyInterface
LET ObjVar = NEWCOM Prgid$
1. ObjVar.Method1(param)
2. CALL ObjVar.Method1(param)
3. ObjVar.Method1(param) TO var
4. CALL ObjVar.Method1(param) TO var
5. var = ObjVar.Method1(param)

```

Forms 1 and 2 assume that the Method does not return a value, or you simply wish to discard it. Forms 3, 4, and 5 require that the Method return a value compatible with the type of variable specified as *var*. Parentheses enclosing parameters are optional in forms 1 and 3.

Methods may be declared (using AS *type...*) to return a string, any of the types, a specific class of object variable (AS MyClass), a Variant, or a [user defined Type](#).

**Type Libraries only support the following data types: [BYTE](#), [WORD](#), [DWORD](#), [INTEGER](#), [LONG](#), [QUAD](#), [SINGLE](#), [DOUBLE](#), [CURRENCY](#), [OBJECT](#), [STRING](#), and [VARIANT](#). If any Methods or Properties use data types not supported by Type Libraries, you will receive a [Error 581 - Type Library creation error](#), when using the [#COM\\_TLIB\\_ON](#) metastatement.**

In addition to the explicit return value which you declare, all Methods and [Properties](#) on an [IAutomation](#) or [IDispatch](#) interface have another "Hidden Return Value", which is cryptically named hResult. While the name would imply a handle for a result, it's really not a handle at all, but just a [long integer](#) value, used to indicate success or failure of the Method. After calling a Method or Property, you can retrieve the hResult value with the PowerBASIC function [OBJRESULT](#). The most significant bit of the value is known as the severity bit. That bit is 0 (value is positive) for success, or 1 (value is negative) for failure. The remaining bits are used to convey error codes and additional status information. If you call any object Method/Property (either [Dispatch](#) or [Direct](#)), and the severity bit of hResult is set, PowerBASIC generates [Run-Time error 99](#): Object error. When you create a Method or Property, PowerBASIC automatically returns an hResult of zero, which implies success. You can return a non-zero hResult value by executing a METHOD `OBJRESULT = expr` within a Method, or PROPERTY `OBJRESULT = expr` within a Property.

## Class Methods

A CLASS METHOD is one which is private to the class in which it is located. That is, it may only be called from a METHOD or PROPERTY in the same class. The CLASS METHOD must be located within a CLASS block, but outside of any [INTERFACE](#) blocks. This shows it is a direct member of the class, rather than a member of an [interface](#).

```

CLASS MyClass
 INSTANCE MyVar AS LONG

 CLASS METHOD MyClassMethod(BYVAL param AS LONG) AS STRING
 METHOD = "My" + STR$(param + MyVar)
 END METHOD

 INTERFACE MyInterface
 INHERIT IUNKNOWN
 METHOD MyMethod()
 Result$ = ME.MyClassMethod(66)
 END METHOD
 END INTERFACE
END CLASS

```

In the above example, MyClassMethod() is a CLASS METHOD, and is always accessed using the pseudo-object [ME](#) (in this case ME.MyClassMethod). Class methods are never accessible from outside a class, nor are they ever described or published in a type library.

By definition, there is no reason to have a private PROPERTY, so PowerBASIC does not offer a CLASS PROPERTY structure.

## **Constructors and Destructors**

There are two special class methods which you may optionally add to a class. They meet a very specific need: automatic initialization when an object is created, and cleanup when an object is destroyed. Technically, they are known as [constructor and destructor](#) methods, and can perform almost any functionality needed by your object: initialization of variables, reading/writing data to/from disk, etc. You do not call these methods directly from your code. If they are present in your class, PowerBASIC automatically calls them each time an object of that class is created or destroyed. If you choose to use them, these special class methods must be named CREATE and DESTROY. They may take no parameters, and may not return a result. They are defined at the class level, so they may never appear within an INTERFACE definition.

```

CLASS MyClass
 INSTANCE MyVar AS LONG

 CLASS METHOD CREATE()
 ' Do initialization
 END METHOD

 CLASS METHOD Destroy()
 ' Do cleanup
 END METHOD

 INTERFACE MyInterface
 INHERIT IUNKNOWN
 METHOD MyMethod()
 ' Do things
 END METHOD
 END INTERFACE
END CLASS

```

As displayed above, CREATE and DESTROY must be placed at the class level, but outside of any interface block. You should note that it's not possible to name any standard method (one that's accessible through an interface) as CREATE or DESTROY. That's just to help you remember the rules for a constructor or destructor. However, you may use these names as needed to describe a method external to your program.

A very important caution: You must never create an object of the current class in a CREATE method. To do so will cause CREATE to be executed again and again until all available memory is consumed. This is a fatal error, from which recovery is impossible.

## **Override Methods**

You can add to, or replace, the functionality of a particular method or property of an inherited [base class](#) by coding a replacement which is preceded by the word OVERRIDE. The overriding method must have the same name and signature (parameters, return value, etc.) as the one it replaces.

## **Dispatch ID**

Every method and property in a [dual interface](#) needs a positive, long integer value to identify it. That integer value is known as a DisplID (Dispatch ID), and it's used internally by [COM](#) services to call the correct function on a [Dispatch](#) interface. You can optionally specify a particular DisplID by enclosing it in angle brackets immediately following the Method/Property name:

```
METHOD MethodOne <76> ()
```

If you don't specify a DisplID, PowerBASIC will assign a random value for you. This is fine for internal objects, but may cause a failure for [published](#) COM objects, as the DisplID

could change each time you compile your program. It is particularly important that you specify a DispID for each Method/Property in a COM [Event Interface](#).

### **BYREF and BYVAL attributes**

Just like a SUB or FUNCTION, PowerBASIC uses

parameters as the default form, unless you specify a override. Either key word can be placed before the parameter name, along with IN, OUT, and INOUT, as described later.

- BYVAL A copy of the data value is placed on the [stack](#) as a parameter. The copy is destroyed when the METHOD ends. BYVAL parameters default to an IN parameter, if no explicit direction is specified.
- BYREF A [pointer](#) to the data is placed on the stack as a parameter. If the data is a variable, any changes to the parameter are passed back to the caller in the variable. If the data is an expression, it is destroyed when the METHOD ends. BYREF parameters default to an INOUT parameter, if no explicit direction is specified.

### **Direction attributes**

METHOD parameters may also specify the direction in which data is passed between the caller and callee:

- IN Data is passed from the caller to the METHOD. Generally speaking, you'll find that almost all IN parameters are passed BYVAL, and that is highly recommended. However, it is possible to pass them BYREF if necessary.
- OUT Data is passed from the METHOD back to the caller. All OUT parameters must be passed BYREF.
- INOUT Data is passed from the caller to the METHOD, and results are returned to the caller in the same parameter. All INOUT parameters must be passed BYREF.

In many cases, the direction of a parameter can be inferred directly from the BYVAL/BYREF attribute (BYVAL=IN, BYREF=OUT). However, we recommend that you include the direction attribute as an added means of self-documentation. Each METHOD parameter name may be preceded by one of BYVAL/BYREF, and one of IN/OUT/INOUT, in any sequence.

You should note an interesting rule of COM objects: **IN parameters are read-only. They may not be altered.**

IN parameters are considered by COM rules to be "constant" which may not be altered, because they are values which are not returned to the caller. However, since this is not a rule normally applied to a standard SUB or FUNCTION, it can allow programming bugs which are most difficult to find and correct. For this reason, PowerBASIC automatically protects you from this issue with no action needed on your part. When writing METHOD or PROPERTY code in PowerBASIC, you may freely assign new values to BYVAL/IN parameters. They will simply be discarded when the METHOD exits. Of course, not every programming language protects you in this way, so you must use caution if you create a COM METHOD in another compiler.

### **Using OPTIONAL/OPT**

METHOD statements may specify one or more parameters as optional by preceding the parameter with either the keyword

(or the abbreviation OPT). When a parameter is declared optional, all subsequent parameters in the declaration are optional as well, whether or not they specify an explicit OPTIONAL or OPT directive.

VARIANT variables are particularly well suited for use as an optional parameter. If the

calling code omits an optional VARIANT parameter, (BYVAL or BYREF), PowerBASIC (and most other compilers) substitute a variant of type %VT\_ERROR which contains an error value of %DISP\_E\_PARAMNOTFOUND (&H80020004). In this case, you can check for this value directly, or use the [ISMISSING](#) function to determine whether the parameter was physically passed or not.

When optional parameters (other than VARIANT) are omitted from the calling code, the stack area normally reserved for those parameters is zero-filled.

If the parameter is defined as a BYVAL parameter, it will have the value zero. For [TYPE](#) or [UNION](#) variables passed BYVAL, the compiler will pass a string of binary zeroes of length [SIZEOF](#)(*Type\_or\_union\_var*).

If the parameter is defined as a BYREF parameter, [VARPTR](#)(*Varname*) will equal zero; when this is true, any attempt to use *Varname* in your code will result in a General Protection Fault or memory corruption. You should use the ISMISSING() function first to determine whether it is safe to access the parameter.

### **THREADSAFE Option Descriptor**

If you include the option THREADSAFE, PowerBASIC automatically establishes a semaphore which allows only one

to execute it at a time. Others must wait until the first thread exits the THREADSAFE procedure before they are allowed to begin.

**See also** [#COM](#), [CLASS](#), [INSTANCE](#), [INTERFACE \(Direct\)](#), [ISMISSING](#), [Just what is COM?](#), [ME](#), [PROPERTY](#), [What is an object, anyway?](#)

## METRICS function

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## METRICS function New!

**Purpose** Retrieves information or dimensions of system elements.

**Syntax** *MetricVar* = METRICS(*MetricName*)

**Remarks** Returns information about the particular system metric specified by the parameter *MetricName*. All dimensions are specified in [pixels](#). For example:

```
MetricVar& = METRICS(Scroll.Horz)
```

The above example retrieves the height (in pixels) of a horizontal scrollbar, and assigns it to the variable *MetricVar&*.

| <i>MetricName</i> | <b><i>MetricName</i></b> | <b>Description</b>                                               |
|-------------------|--------------------------|------------------------------------------------------------------|
|                   | BORDER.X                 | The width of a window border.                                    |
|                   | BORDER.Y                 | The height of a window border.                                   |
|                   | CAPTION                  | The height of a normal caption area.                             |
|                   | EDGE.X                   | The width of a 3-D border.                                       |
|                   | EDGE.Y                   | The height of a 3-D border.                                      |
|                   | FRAME.FIXED.X            | The thickness of the horizontal frame of a window which is fixed |

|                |                                                                                                    |
|----------------|----------------------------------------------------------------------------------------------------|
|                | size (one which cannot be resized).                                                                |
| FRAME.FIXED.Y  | The thickness of the vertical frame of a window which is fixed size (one which cannot be resized). |
| FRAME.RESIZE.X | The thickness of the horizontal frame of a window which can be resized.                            |
| FRAME.RESIZE.Y | The thickness of the vertical frame of a window which can be resized.                              |
| ICON.X         | The default width of an icon.                                                                      |
| ICON.Y         | The default height of an icon.                                                                     |
| ICONSPACE.X    | The width of a grid cell for items in large icon view.                                             |
| ICONSPACE.Y    | The height of a grid cell for items in large icon view.                                            |
| MAXIMIZED.X    | The width of a maximized top-level window.                                                         |
| MAXIMIZED.Y    | The height of a maximized top-level window.                                                        |
| MENUBAR        | The height of a single-line menu bar.                                                              |
| MINIMUM.X      | The minimum width of a window.                                                                     |
| MINIMUM.Y      | The minimum height of a window.                                                                    |
| SCROLL.HORZ    | The height of a horizontal scrollbar.                                                              |
| SCROLL.VERT    | The width of a vertical scrollbar.                                                                 |

## MID\$ function

# MID\$ function

IMPROVED

**Purpose** Returns a part of a

**Syntax**

```
s$ = MID$(StringExpr, Start& [, Count&])
s$ = MID$(StringExpr, Start& TO End&)
```

**Remarks** The MID\$ function returns a part of a [string expression](#). The first form tells the number of characters to extract, while the second form tells the start and end position instead. Both forms provide the same functionality, so the choice is just a matter of programmer convenience.

*Start&* and *End&* are positions in the string, starting with 1 as the first character. *Count&* tells the number of characters to extract. For example, both of the following examples return "wer".

```
a$ = MID$("PowerBASIC", 3, 3)
a$ = MID$("PowerBASIC", 3 TO 5)
```

If *Count&* is omitted, or there aren't enough characters in *StringExpr*, all remaining characters are returned. If there are no characters at the *Start&* position, an empty string is returned.

If *Start&* or *End&* are negative, the positions are counted backwards from the end of the string (-1 is the last character). If *Count&* is negative, it is interpreted as `LEN(string_expression)-ABS(Count&)`.

**See also** [EXTRACT\\$](#), [INSTR](#), [LEFT\\$](#), [LTRIM\\$](#), [MID\\$ statement](#), [RIGHT\\$](#), [RTRIM\\$](#), [SPLIT](#), [TALLY](#), [TRIM\\$](#), [VERIFY](#)

**Example**

```
a$ = MID$("PowerBASIC", 4, 2) ' returns "er"
a$ = MID$("PowerBASIC", 4) ' returns "erBASIC"
a$ = MID$("PowerBASIC", 20) ' returns a null string
a$ = MID$("1234567890", 3, -4) ' returns "345678"
a$ = MID$("abcde", -3, 2) ' returns "cd"
a$ = MID$("PowerBASIC", 4 TO 6) ' returns "erB"
a$ = MID$("PowerBASIC", 4 TO 99) ' returns "erBASIC"
```

## MID\$ statement

# MID\$ statement

**IMPROVED**

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>      | Replace characters in a variable.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Syntax</b>       | <pre>MID\$(StringVar, Start&amp; [, Count&amp;]) = replacement MID\$(StringVar, Start&amp; TO End&amp;      = replacement</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Remarks</b>      | <p>The MID\$ statement replaces characters in a string variable. The first form tells the number of characters to replace, while the second form tells the start and end position instead. Both forms provide the same functionality, so the choice is just a matter of programmer convenience.</p> <p><i>Start&amp;</i> and <i>End&amp;</i> are positions in the string, starting with 1 as the first character. <i>Count&amp;</i> tells the number of characters to replace.</p> <p>If <i>Count&amp;</i> is omitted, or there aren't enough characters in <i>StringVar</i>, all remaining characters are replaced. If there are no characters at the <i>Start&amp;</i> position, no operation is performed.</p> <p>If <i>Start&amp;</i> or <i>End&amp;</i> are negative, the positions are counted backwards from the end of the string (-1 is the last character). If <i>Count&amp;</i> is negative, it is interpreted as <code>LEN(string_expression)-ABS(Count&amp;)</code>.</p> <p>The replacement will never extend past the end of <i>StringVar</i>. In other words, MID\$ cannot alter the length of a string.</p> |
| <b>Restrictions</b> | If <i>Start&amp;</i> evaluates to a position outside of the string on either side, or if <i>Start&amp;</i> is zero, no operation is performed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>See also</b>     | <a href="#">BUILD\$</a> , <a href="#">INSTR</a> , <a href="#">LTRIM\$</a> , <a href="#">MID\$ function</a> , <a href="#">REMOVE\$</a> , <a href="#">REPLACE</a> , <a href="#">RTRIM\$</a> , <a href="#">TALLY</a> , <a href="#">TRIM\$</a> , <a href="#">VERIFY</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Example</b>      | <pre>DummyString\$ = "1234567890" FOR M = 1 TO 10   TestString\$ = DummyString\$   MID\$(TestString\$,1,M) = "PowerBASIC" NEXT M</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Result</b>       | <pre>P234567890 Po34567890 Pow4567890 Powe567890 ... PowerBAS90 PowerBAS10 PowerBASIC</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

## MIN function

# MIN function

|                |                                                                                                                                         |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Return the argument with the smallest (minimum) value.                                                                                  |
| <b>Syntax</b>  | <pre>y = MIN(arg, arg [, arg] ...) y&amp; = MIN&amp;(arg&amp;, arg&amp; [, arg&amp;] ...) y\$ = MIN\$(arg\$, arg\$ [, arg\$] ...)</pre> |
| <b>Remarks</b> | These functions take any number of arguments and return the argument with the smallest (minimum) value. MIN handles arguments of any    |

type.

MIN& handles arguments that evaluate to [Integers](#) and [Long-integers](#) (MIN& is more efficient than MIN).

MIN\$ handles

arguments.

If any arguments of MIN& are outside of the range of Long-integers, the result is undefined. Any

arguments of MIN& will be rounded to Long-integers before the comparison begins.

MIN% is recognized as a valid synonym for MIN&.

**See also** [CHOOSE](#), [CHOOSE&](#), [CHOOSE\\$](#), [IIF](#), [IIF&](#), [IIF\\$](#), [MAX](#), [MAX&](#), [MAX\\$](#), [SWITCH](#), [SWITCH&](#), [SWITCH\\$](#)

**Example**

```
x& = MIN&(A, B, C, D)
x$ = MIN$("abacadabra", "cad", A$, B$(4), C$ + D$ + LEFT$(E$, 5))
x## = MIN(1.1@@, A%/B!, C#(x)^D, E##, SIN(F&))
```

## MKBYT\$ function

# MKBYT\$, MKCUR\$, MKCUX\$, MKD\$, MKDWD\$, MKE\$, MKI\$, MKL\$, MKQ\$, MKS\$ and MKWRD\$ functions

**Purpose** Converts a

value into an ANSI.

**Syntax**

```
AnsiStringVar$ = MKBYT$(byte_expr)
AnsiStringVar$ = MKCUR$(currency_expr)
AnsiStringVar$ = MKCUX$(extended_currency_expr)
AnsiStringVar$ = MKD$(double_precision_expr)
AnsiStringVar$ = MKDWD$(double_word_expr)
AnsiStringVar$ = MKE$(extended_precision_expr)
AnsiStringVar$ = MKI$(integer_expr)
AnsiStringVar$ = MKL$(long_integer_expr)
AnsiStringVar$ = MKQ$(quad_integer_expr)
AnsiStringVar$ = MKS$(single_precision_expr)
AnsiStringVar$ = MKWRD$(word_expr)
```

**Remarks**

The MKx functions return the binary representations of a number as a set of [bytes](#) in an [ANSI](#) string. Do not confuse these functions with the [STR\\$](#) or [FORMAT\\$](#) functions, which return a printable string.

In all but the most extreme cases, the returned string should only be stored as an ANSI string or [UDT](#) which consist of single bytes. [WIDE](#) (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The [CVx](#) functions are complementary to the MKx functions. They convert the binary representation in a string to an actual numeric value:

| Function | Converts to    | From               |
|----------|----------------|--------------------|
| MKBYT\$  | 1-byte string  | Byte               |
| MKCUR\$  | 8-byte string  | Currency           |
| MKCUX\$  | 8-byte string  | Extended-currency  |
| MKD\$    | 8-byte string  | Double-precision   |
| MKDWD\$  | 4-byte string  | Double-word        |
| MKE\$    | 10-byte string | Extended-precision |
| MKI\$    | 2-byte string  | Integer            |

|         |               |                  |
|---------|---------------|------------------|
| MKL\$   | 4-byte string | Long-integer     |
| MKQ\$   | 8-byte string | Quad-integer     |
| MKS\$   | 4-byte string | Single-precision |
| MKWRD\$ | 2-byte string | Word             |

See also [CVI and associated functions](#)

## MKCUR\$ function

# MKBYT\$, MKCUR\$, MKCUX\$, MKD\$, MKDWD\$, MKE\$, MKI\$, MKL\$, MKQ\$, MKS\$ and MKWRD\$ functions

**Purpose** Converts a

value into an ANSI.

**Syntax**

```

AnsiStringVar$ = MKBYT$(byte_expr)
AnsiStringVar$ = MKCUR$(currency_expr)
AnsiStringVar$ = MKCUX$(extended_currency_expr)
AnsiStringVar$ = MKD$(double_precision_expr)
AnsiStringVar$ = MKDWD$(double_word_expr)
AnsiStringVar$ = MKE$(extended_precision_expr)
AnsiStringVar$ = MKI$(integer_expr)
AnsiStringVar$ = MKL$(long_integer_expr)
AnsiStringVar$ = MKQ$(quad_integer_expr)
AnsiStringVar$ = MKS$(single_precision_expr)
AnsiStringVar$ = MKWRD$(word_expr)

```

**Remarks**

The MKx functions return the binary representations of a number as a set of [bytes](#) in an [ANSI](#) string. Do not confuse these functions with the [STR\\$](#) or [FORMAT\\$](#) functions, which return a printable string.

In all but the most extreme cases, the returned string should only be stored as an ANSI string or [UDT](#) which consist of single bytes. [WIDE](#) (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The [CVx](#) functions are complementary to the MKx functions. They convert the binary representation in a string to an actual numeric value:

| Function | Converts to    | From               |
|----------|----------------|--------------------|
| MKBYT\$  | 1-byte string  | Byte               |
| MKCUR\$  | 8-byte string  | Currency           |
| MKCUX\$  | 8-byte string  | Extended-currency  |
| MKD\$    | 8-byte string  | Double-precision   |
| MKDWD\$  | 4-byte string  | Double-word        |
| MKE\$    | 10-byte string | Extended-precision |
| MKI\$    | 2-byte string  | Integer            |
| MKL\$    | 4-byte string  | Long-integer       |
| MKQ\$    | 8-byte string  | Quad-integer       |
| MKS\$    | 4-byte string  | Single-precision   |
| MKWRD\$  | 2-byte string  | Word               |

See also [CVI and associated functions](#)

## MKCUX\$ function

# MKBYT\$, MKCUR\$, MKCUX\$, MKD\$, MKDWD\$, MKE\$, MKI\$, MKL\$, MKQ\$, MKS\$ and MKWRD\$ functions

**Purpose** Converts a value into an ANSI .

**Syntax**

```
AnsiStringVar$ = MKBYT$(byte_expr)
AnsiStringVar$ = MKCUR$(currency_expr)
AnsiStringVar$ = MKCUX$(extended_currency_expr)
AnsiStringVar$ = MKD$(double_precision_expr)
AnsiStringVar$ = MKDWD$(double_word_expr)
AnsiStringVar$ = MKE$(extended_precision_expr)
AnsiStringVar$ = MKI$(integer_expr)
AnsiStringVar$ = MKL$(long_integer_expr)
AnsiStringVar$ = MKQ$(quad_integer_expr)
AnsiStringVar$ = MKS$(single_precision_expr)
AnsiStringVar$ = MKWRD$(word_expr)
```

**Remarks** The MKx functions return the binary representations of a number as a set of [bytes](#) in an [ANSI](#) string. Do not confuse these functions with the [STR\\$](#) or [FORMAT\\$](#) functions, which return a printable string.

In all but the most extreme cases, the returned string should only be stored as an ANSI string or [UDT](#) which consist of single bytes. [WIDE](#) (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The [CVx](#) functions are complementary to the MKx functions. They convert the binary representation in a string to an actual numeric value:

| Function | Converts to    | From               |
|----------|----------------|--------------------|
| MKBYT\$  | 1-byte string  | Byte               |
| MKCUR\$  | 8-byte string  | Currency           |
| MKCUX\$  | 8-byte string  | Extended-currency  |
| MKD\$    | 8-byte string  | Double-precision   |
| MKDWD\$  | 4-byte string  | Double-word        |
| MKE\$    | 10-byte string | Extended-precision |
| MKI\$    | 2-byte string  | Integer            |
| MKL\$    | 4-byte string  | Long-integer       |
| MKQ\$    | 8-byte string  | Quad-integer       |
| MKS\$    | 4-byte string  | Single-precision   |
| MKWRD\$  | 2-byte string  | Word               |

See also [CVI and associated functions](#)

## MKD\$ function

# MKBYT\$, MKCUR\$, MKCUX\$, MKD\$, MKDWD\$, MKE\$, MKI\$, MKL\$, MKQ\$, MKS\$ and MKWRD\$ functions

**Purpose** Converts a

value into an ANSI .

**Syntax**

```

AnsiStringVar$ = MKBYT$(byte_expr)
AnsiStringVar$ = MKCUR$(currency_expr)
AnsiStringVar$ = MKCUX$(extended_currency_expr)
AnsiStringVar$ = MKD$(double_precision_expr)
AnsiStringVar$ = MKDWD$(double_word_expr)
AnsiStringVar$ = MKE$(extended_precision_expr)
AnsiStringVar$ = MKI$(integer_expr)
AnsiStringVar$ = MKL$(long_integer_expr)
AnsiStringVar$ = MKQ$(quad_integer_expr)
AnsiStringVar$ = MKS$(single_precision_expr)
AnsiStringVar$ = MKWRD$(word_expr)

```

**Remarks**

The MKx functions return the binary representations of a number as a set of [bytes](#) in an [ANSI](#) string. Do not confuse these functions with the [STR\\$](#) or [FORMAT\\$](#) functions, which return a printable string.

In all but the most extreme cases, the returned string should only be stored as an ANSI string or [UDT](#) which consist of single bytes. [WIDE](#) (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The [CVx](#) functions are complementary to the MKx functions. They convert the binary representation in a string to an actual numeric value:

| Function | Converts to    | From               |
|----------|----------------|--------------------|
| MKBYT\$  | 1-byte string  | Byte               |
| MKCUR\$  | 8-byte string  | Currency           |
| MKCUX\$  | 8-byte string  | Extended-currency  |
| MKD\$    | 8-byte string  | Double-precision   |
| MKDWD\$  | 4-byte string  | Double-word        |
| MKE\$    | 10-byte string | Extended-precision |
| MKI\$    | 2-byte string  | Integer            |
| MKL\$    | 4-byte string  | Long-integer       |
| MKQ\$    | 8-byte string  | Quad-integer       |
| MKS\$    | 4-byte string  | Single-precision   |
| MKWRD\$  | 2-byte string  | Word               |

See also [CVI and associated functions](#)

**MKDIR statement****MKDIR statement**

**Purpose** Create a subdirectory/folder (like the DOS MKDIR command).

**Syntax** MKDIR *path\$*

**Remarks** *path\$* is a [string expression](#) describing the directory to be created.

MKDIR (make directory) creates the subdirectory specified by *path\$*. If you try to create a directory that already exists, a run-time [Error 75](#) occurs ("Path/file access error"). If *path\$* includes an parent folder that does not exist, a run-time [Error 76](#) occurs ("Path not found").

**MKDIR can use Long File Names (LFNs).**

See also [CHDIR](#), [RMDIR](#)

**Example** MKDIR "C:\Program Files\Company\Application Data"

## MKDWD\$ function

# MKBYT\$, MKCUR\$, MKCUX\$, MKD\$, MKDWD\$, MKE\$, MKI\$, MKL\$, MKQ\$, MKS\$ and MKWRD\$ functions

**Purpose** Converts a value into an ANSI .

**Syntax**

```

AnsiStringVar$ = MKBYT$(byte_expr)
AnsiStringVar$ = MKCUR$(currency_expr)
AnsiStringVar$ = MKCUX$(extended_currency_expr)
AnsiStringVar$ = MKD$(double_precision_expr)
AnsiStringVar$ = MKDWD$(double_word_expr)
AnsiStringVar$ = MKE$(extended_precision_expr)
AnsiStringVar$ = MKI$(integer_expr)
AnsiStringVar$ = MKL$(long_integer_expr)
AnsiStringVar$ = MKQ$(quad_integer_expr)
AnsiStringVar$ = MKS$(single_precision_expr)
AnsiStringVar$ = MKWRD$(word_expr)

```

**Remarks** The MKx functions return the binary representations of a number as a set of [bytes](#) in an [ANSI](#) string. Do not confuse these functions with the [STR\\$](#) or [FORMAT\\$](#) functions, which return a printable string.

In all but the most extreme cases, the returned string should only be stored as an ANSI string or [UDT](#) which consist of single bytes. [WIDE](#) (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The [CVx](#) functions are complementary to the MKx functions. They convert the binary representation in a string to an actual numeric value:

| Function | Converts to    | From               |
|----------|----------------|--------------------|
| MKBYT\$  | 1-byte string  | Byte               |
| MKCUR\$  | 8-byte string  | Currency           |
| MKCUX\$  | 8-byte string  | Extended-currency  |
| MKD\$    | 8-byte string  | Double-precision   |
| MKDWD\$  | 4-byte string  | Double-word        |
| MKE\$    | 10-byte string | Extended-precision |
| MKI\$    | 2-byte string  | Integer            |
| MKL\$    | 4-byte string  | Long-integer       |
| MKQ\$    | 8-byte string  | Quad-integer       |
| MKS\$    | 4-byte string  | Single-precision   |
| MKWRD\$  | 2-byte string  | Word               |

See also [CVI and associated functions](#)

## MKE\$ function

# MKBYT\$, MKCUR\$, MKCUX\$, MKD\$, MKDWD\$, MKE\$, MKI\$, MKL\$, MKQ\$, MKS\$ and MKWRD\$ functions

**Purpose** Converts a

value into an ANSI .

**Syntax**

```

AnsiStringVar$ = MKBYT$(byte_expr)
AnsiStringVar$ = MKCUR$(currency_expr)
AnsiStringVar$ = MKCUX$(extended_currency_expr)
AnsiStringVar$ = MKD$(double_precision_expr)
AnsiStringVar$ = MKDWD$(double_word_expr)
AnsiStringVar$ = MKE$(extended_precision_expr)
AnsiStringVar$ = MKI$(integer_expr)
AnsiStringVar$ = MKL$(long_integer_expr)
AnsiStringVar$ = MKQ$(quad_integer_expr)
AnsiStringVar$ = MKS$(single_precision_expr)
AnsiStringVar$ = MKWRD$(word_expr)

```

**Remarks**

The MKx functions return the binary representations of a number as a set of [bytes](#) in an [ANSI](#) string. Do not confuse these functions with the [STR\\$](#) or [FORMAT\\$](#) functions, which return a printable string.

In all but the most extreme cases, the returned string should only be stored as an ANSI string or [UDT](#) which consist of single bytes. [WIDE](#) (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The [CVx](#) functions are complementary to the MKx functions. They convert the binary representation in a string to an actual numeric value:

| Function | Converts to    | From               |
|----------|----------------|--------------------|
| MKBYT\$  | 1-byte string  | Byte               |
| MKCUR\$  | 8-byte string  | Currency           |
| MKCUX\$  | 8-byte string  | Extended-currency  |
| MKD\$    | 8-byte string  | Double-precision   |
| MKDWD\$  | 4-byte string  | Double-word        |
| MKE\$    | 10-byte string | Extended-precision |
| MKI\$    | 2-byte string  | Integer            |
| MKL\$    | 4-byte string  | Long-integer       |
| MKQ\$    | 8-byte string  | Quad-integer       |
| MKS\$    | 4-byte string  | Single-precision   |
| MKWRD\$  | 2-byte string  | Word               |

See also [CVI and associated functions](#)

**MKI\$ function**

# MKBYT\$, MKCUR\$, MKCUX\$, MKD\$, MKDWD\$, MKE\$, MKI\$, MKL\$, MKQ\$, MKS\$ and MKWRD\$ functions

**Purpose**

Converts a value into an ANSI .

**Syntax**

```

AnsiStringVar$ = MKBYT$(byte_expr)
AnsiStringVar$ = MKCUR$(currency_expr)
AnsiStringVar$ = MKCUX$(extended_currency_expr)
AnsiStringVar$ = MKD$(double_precision_expr)
AnsiStringVar$ = MKDWD$(double_word_expr)
AnsiStringVar$ = MKE$(extended_precision_expr)
AnsiStringVar$ = MKI$(integer_expr)
AnsiStringVar$ = MKL$(long_integer_expr)
AnsiStringVar$ = MKQ$(quad_integer_expr)

```

*AnsiStringVar\$ = MKS\$(single\_precision\_expr)*

*AnsiStringVar\$ = MKWRD\$(word\_expr)*

**Remarks**

The MKx functions return the binary representations of a number as a set of [bytes](#) in an [ANSI](#) string. Do not confuse these functions with the [STR\\$](#) or [FORMAT\\$](#) functions, which return a printable string.

In all but the most extreme cases, the returned string should only be stored as an ANSI string or [UDT](#) which consist of single bytes. [WIDE](#) (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The [CVx](#) functions are complementary to the MKx functions. They convert the binary representation in a string to an actual numeric value:

| Function | Converts to    | From               |
|----------|----------------|--------------------|
| MKBYT\$  | 1-byte string  | Byte               |
| MKCUR\$  | 8-byte string  | Currency           |
| MKCUX\$  | 8-byte string  | Extended-currency  |
| MKD\$    | 8-byte string  | Double-precision   |
| MKDWD\$  | 4-byte string  | Double-word        |
| MKE\$    | 10-byte string | Extended-precision |
| MKI\$    | 2-byte string  | Integer            |
| MKL\$    | 4-byte string  | Long-integer       |
| MKQ\$    | 8-byte string  | Quad-integer       |
| MKS\$    | 4-byte string  | Single-precision   |
| MKWRD\$  | 2-byte string  | Word               |

**See also**

[CVI and associated functions](#)

**MKL\$ function**

# MKBYT\$, MKCUR\$, MKCUX\$, MKD\$, MKDWD\$, MKE\$, MKI\$, MKL\$, MKQ\$, MKS\$ and MKWRD\$ functions

**Purpose**

Converts a value into an ANSI .

**Syntax**

*AnsiStringVar\$ = MKBYT\$(byte\_expr)*

*AnsiStringVar\$ = MKCUR\$(currency\_expr)*

*AnsiStringVar\$ = MKCUX\$(extended\_currency\_expr)*

*AnsiStringVar\$ = MKD\$(double\_precision\_expr)*

*AnsiStringVar\$ = MKDWD\$(double\_word\_expr)*

*AnsiStringVar\$ = MKE\$(extended\_precision\_expr)*

*AnsiStringVar\$ = MKI\$(integer\_expr)*

*AnsiStringVar\$ = MKL\$(long\_integer\_expr)*

*AnsiStringVar\$ = MKQ\$(quad\_integer\_expr)*

*AnsiStringVar\$ = MKS\$(single\_precision\_expr)*

*AnsiStringVar\$ = MKWRD\$(word\_expr)*

**Remarks**

The MKx functions return the binary representations of a number as a set of [bytes](#) in an [ANSI](#) string. Do not confuse these functions with the [STR\\$](#) or [FORMAT\\$](#) functions, which return a printable string.

In all but the most extreme cases, the returned string should only be stored as an ANSI string or [UDT](#) which consist of single bytes. [WIDE](#) (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The [CVx](#) functions are complementary to the MKx functions. They convert the binary

representation in a string to an actual numeric value:

| Function | Converts to    | From               |
|----------|----------------|--------------------|
| MKBYT\$  | 1-byte string  | Byte               |
| MKCUR\$  | 8-byte string  | Currency           |
| MKCUX\$  | 8-byte string  | Extended-currency  |
| MKD\$    | 8-byte string  | Double-precision   |
| MKDWD\$  | 4-byte string  | Double-word        |
| MKE\$    | 10-byte string | Extended-precision |
| MKI\$    | 2-byte string  | Integer            |
| MKL\$    | 4-byte string  | Long-integer       |
| MKQ\$    | 8-byte string  | Quad-integer       |
| MKS\$    | 4-byte string  | Single-precision   |
| MKWRD\$  | 2-byte string  | Word               |

See also [CVI and associated functions](#)

## MKQ\$ function

# MKBYT\$, MKCUR\$, MKCUX\$, MKD\$, MKDWD\$, MKE\$, MKI\$, MKL\$, MKQ\$, MKS\$ and MKWRD\$ functions

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Converts a value into an ANSI .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Syntax</b>  | <pre> AnsiStringVar\$ = MKBYT\$(byte_expr) AnsiStringVar\$ = MKCUR\$(currency_expr) AnsiStringVar\$ = MKCUX\$(extended_currency_expr) AnsiStringVar\$ = MKD\$(double_precision_expr) AnsiStringVar\$ = MKDWD\$(double_word_expr) AnsiStringVar\$ = MKE\$(extended_precision_expr) AnsiStringVar\$ = MKI\$(integer_expr) AnsiStringVar\$ = MKL\$(long_integer_expr) AnsiStringVar\$ = MKQ\$(quad_integer_expr) AnsiStringVar\$ = MKS\$(single_precision_expr) AnsiStringVar\$ = MKWRD\$(word_expr) </pre>                                                                                                                                                                                                                               |
| <b>Remarks</b> | <p>The MKx functions return the binary representations of a number as a set of <a href="#">bytes</a> in an <a href="#">ANSI</a> string. Do not confuse these functions with the <a href="#">STR\$</a> or <a href="#">FORMAT\$</a> functions, which return a printable string.</p> <p>In all but the most extreme cases, the returned string should only be stored as an ANSI string or <a href="#">UDT</a> which consist of single bytes. <a href="#">WIDE</a> (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.</p> <p>The <a href="#">CVx</a> functions are complementary to the MKx functions. They convert the binary representation in a string to an actual numeric value:</p> |

| Function | Converts to    | From               |
|----------|----------------|--------------------|
| MKBYT\$  | 1-byte string  | Byte               |
| MKCUR\$  | 8-byte string  | Currency           |
| MKCUX\$  | 8-byte string  | Extended-currency  |
| MKD\$    | 8-byte string  | Double-precision   |
| MKDWD\$  | 4-byte string  | Double-word        |
| MKE\$    | 10-byte string | Extended-precision |
| MKI\$    | 2-byte string  | Integer            |

|         |               |                  |
|---------|---------------|------------------|
| MKL\$   | 4-byte string | Long-integer     |
| MKQ\$   | 8-byte string | Quad-integer     |
| MKS\$   | 4-byte string | Single-precision |
| MKWRD\$ | 2-byte string | Word             |

See also [CVI and associated functions](#)

## MKS\$ function

# MKBYT\$, MKCUR\$, MKCUX\$, MKD\$, MKDWD\$, MKE\$, MKI\$, MKL\$, MKQ\$, MKS\$ and MKWRD\$ functions

**Purpose** Converts a

value into an ANSI.

**Syntax**

```

AnsiStringVar$ = MKBYT$(byte_expr)
AnsiStringVar$ = MKCUR$(currency_expr)
AnsiStringVar$ = MKCUX$(extended_currency_expr)
AnsiStringVar$ = MKD$(double_precision_expr)
AnsiStringVar$ = MKDWD$(double_word_expr)
AnsiStringVar$ = MKE$(extended_precision_expr)
AnsiStringVar$ = MKI$(integer_expr)
AnsiStringVar$ = MKL$(long_integer_expr)
AnsiStringVar$ = MKQ$(quad_integer_expr)
AnsiStringVar$ = MKS$(single_precision_expr)
AnsiStringVar$ = MKWRD$(word_expr)

```

**Remarks**

The MKx functions return the binary representations of a number as a set of [bytes](#) in an [ANSI](#) string. Do not confuse these functions with the [STR\\$](#) or [FORMAT\\$](#) functions, which return a printable string.

In all but the most extreme cases, the returned string should only be stored as an ANSI string or [UDT](#) which consist of single bytes. [WIDE](#) (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The [CVx](#) functions are complementary to the MKx functions. They convert the binary representation in a string to an actual numeric value:

| Function | Converts to    | From               |
|----------|----------------|--------------------|
| MKBYT\$  | 1-byte string  | Byte               |
| MKCUR\$  | 8-byte string  | Currency           |
| MKCUX\$  | 8-byte string  | Extended-currency  |
| MKD\$    | 8-byte string  | Double-precision   |
| MKDWD\$  | 4-byte string  | Double-word        |
| MKE\$    | 10-byte string | Extended-precision |
| MKI\$    | 2-byte string  | Integer            |
| MKL\$    | 4-byte string  | Long-integer       |
| MKQ\$    | 8-byte string  | Quad-integer       |
| MKS\$    | 4-byte string  | Single-precision   |
| MKWRD\$  | 2-byte string  | Word               |

See also [CVI and associated functions](#)

## MKWRD\$ function

# MKBYT\$, MKCUR\$, MKCUX\$, MKD\$, MKDWD\$, MKE\$, MKI\$, MKL\$, MKQ\$, MKS\$ and MKWRD\$ functions

**Purpose** Converts a value into an ANSI.

**Syntax**

```

AnsiStringVar$ = MKBYT$(byte_expr)
AnsiStringVar$ = MKCUR$(currency_expr)
AnsiStringVar$ = MKCUX$(extended_currency_expr)
AnsiStringVar$ = MKD$(double_precision_expr)
AnsiStringVar$ = MKDWD$(double_word_expr)
AnsiStringVar$ = MKE$(extended_precision_expr)
AnsiStringVar$ = MKI$(integer_expr)
AnsiStringVar$ = MKL$(long_integer_expr)
AnsiStringVar$ = MKQ$(quad_integer_expr)
AnsiStringVar$ = MKS$(single_precision_expr)
AnsiStringVar$ = MKWRD$(word_expr)

```

**Remarks** The MKx functions return the binary representations of a number as a set of [bytes](#) in an [ANSI](#) string. Do not confuse these functions with the [STR\\$](#) or [FORMAT\\$](#) functions, which return a printable string.

In all but the most extreme cases, the returned string should only be stored as an ANSI string or [UDT](#) which consist of single bytes. [WIDE](#) (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The [CVx](#) functions are complementary to the MKx functions. They convert the binary representation in a string to an actual numeric value:

| Function | Converts to    | From               |
|----------|----------------|--------------------|
| MKBYT\$  | 1-byte string  | Byte               |
| MKCUR\$  | 8-byte string  | Currency           |
| MKCUX\$  | 8-byte string  | Extended-currency  |
| MKD\$    | 8-byte string  | Double-precision   |
| MKDWD\$  | 4-byte string  | Double-word        |
| MKE\$    | 10-byte string | Extended-precision |
| MKI\$    | 2-byte string  | Integer            |
| MKL\$    | 4-byte string  | Long-integer       |
| MKQ\$    | 8-byte string  | Quad-integer       |
| MKS\$    | 4-byte string  | Single-precision   |
| MKWRD\$  | 2-byte string  | Word               |

**See also** [CVI and associated functions](#)

## MOD operator

# MOD operator

**Purpose** Return the remainder of the division between two numbers.

**Syntax**  $p \text{ MOD } q$

**Remarks** The MOD operator divides the two operands,  $p$  and  $q$ , and returns the remainder of that division. The result of the initial division is truncated to an

value, before the remainder is calculated. See the example below.  
 The remainder may be a  
 value. MOD is often considered to complement integral division.

**See Also**

[LET](#)

**Example**

```
lResult1& = 10& MOD 3& ' Returns 1&
fResult2! = 13! MOD 2.7! ' Returns 2.2!

iStack& = 1023&
HiStack& = iStack& \ 256& ' Returns 3&
LoStack& = iStack& MOD 256 ' Returns 255&

' c! and d! are calculated equivalently
a! = 13
b! = 2.7
c! = a! MOD b!
d! = a! - FIX(a! / b!) * b!

CurrentLine = 1
WHILE CurrentLine < Lines
 PrintLine txt$(CurrentLine)
 IF (CurrentLine MOD 55) = 0 THEN DoFormFeed
 INCR CurrentLine
WEND
```

## MONTHNAME\$ function

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## MONTHNAME\$ function New!

**Purpose**

Converts a Month number to the associated name.

**Syntax**

*s\$* = MONTHNAME\$(*MonthNumber&*)

**Remarks**

The MONTHNAME\$ function converts a Month number into a  
 representing its associated name. The argument must be in the range of 1 through 12,  
 representing the names January, February, etc.

**See also**

[DATE\\$](#), [DAYNAME\\$](#), [POWERTIME](#)

## MOUSEPTR statement

# MOUSEPTR statement

**Purpose**

Change the mouse pointer (cursor) to a new shape.

**Syntax**

MOUSEPTR *style* [TO *var&*]

**Remarks** If the optional TO clause is included, the [handle](#) of the previous cursor is assigned to *var&*. If the operation fails, the value zero is assigned to *var&*. Normally, the [Long integer](#) or [DWORD](#) value style should be in the range of 1 through 13 to choose one of the stock cursor shapes as follows:

| <b>style<br/>&amp;</b> | <b>Definition</b>                      |
|------------------------|----------------------------------------|
| 0                      | Hide mouse pointer **                  |
| 1                      | Arrow                                  |
| 2                      | Cross                                  |
| 3                      | I-Beam                                 |
| 4                      | Arrow                                  |
| 5                      | Sizing pointer (all directions)        |
| 6                      | Sizing pointer (NE-SW diagonal)        |
| 7                      | Sizing pointer (vertical)              |
| 8                      | Sizing pointer (NW-SE diagonal)        |
| 9                      | Sizing pointer (horizontal)            |
| 10                     | Up arrow                               |
| 11                     | Hourglass ("Busy" or "Wait" pointer)   |
| 12                     | No mouse pointer                       |
| 13                     | App Starting (arrow with an hourglass) |

\*\* If *style&* = 0 then the OS may restore the cursor if it is moved.

If style is outside the range 0 through 13, it must contain a valid handle to a cursor, such as the value which was returned by a prior invocation of MOUSEPTR. This allows the programmer to restore a previous cursor style.

The mouse pointer is only changed for dialogs and windows in your application. If the mouse pointer is moved over another application or the desktop, the pointer will change to the default for that application/process. In GUI applications, MOUSEPTR can be useful in %WM\_SETCURSOR message handler routines that override the default cursor handling.

## MSGBOX function

# MSGBOX function

**Purpose** Display a message box containing a text and an optional title, using one or more styles, and returning the button selected by the user.

**Syntax** `!Result& = MSGBOX(txt$ [, [style&], title$])`

**Remarks** The MSGBOX function is comprised of the following elements:

*txt\$* Indicates the text to display within the message box.

*style&* Optional parameter which determines the appearance of the message box. Some styles may be combined (OR'ed together) to specify the button and icon displayed in the message box. If *style&* is omitted, PowerBASIC substitutes %MB\_OK. The following styles are defined in [WIN32API.INC](#), in the form of numeric equates:

|                      |                                  |
|----------------------|----------------------------------|
| %MB_OK               | Display OK button (default)      |
| %MB_OKCANCEL         | Display OK and Cancel buttons    |
| %MB_ABORTRETRYIGNORE | Display Abort, Retry and Ignore  |
| %MB_YESNOCANCEL      | Display Yes, No and Cancel       |
| %MB_YESNO            | Display Yes and No buttons       |
| %MB_RETRYCANCEL      | Display Retry and Cancel buttons |

|                     |                                                                                                                                                                                    |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| %MB_ICONERROR       | Display Error icon (stop sign)                                                                                                                                                     |
| %MB_ICONINFORMATION | Display Information icon ("i")                                                                                                                                                     |
| %MB_ICONQUESTION    | Display Query icon (question mark)                                                                                                                                                 |
| %MB_ICONWARNING     | Display Warning icon (exclamation)                                                                                                                                                 |
| %MB_DEFBUTTON1      | Default to 1st button (default)                                                                                                                                                    |
| %MB_DEFBUTTON2      | Default to 2nd button                                                                                                                                                              |
| %MB_DEFBUTTON3      | Default to 3rd button                                                                                                                                                              |
| %MB_APPLMODAL       | Application Modal - Despite the name, the user can continue to interact with other dialogs without dismissing the MSGBOX (default)                                                 |
| %MB_SYSTEMMODAL     | System Modal - Operates identically to %MB_APPLMODAL, except the MSGBOX is given the %WS_EX_TOPMOST style so that it remains above all other windows and dialogs.                  |
| %MB_TASKMODAL       | Task Modal - All top-level windows belonging to the current application are disabled until the MSGBOX is dismissed. %MB_TASKMODAL is commonly used to display a truly modal MSGBOX |

*title\$* Optional title to be displayed in the caption of the message box. If *title\$* is not specified, "PowerBASIC" is used automatically.

*!Result&* Identifies the Button selected by the user. This will be equal to one of the following equates:

|           |               |
|-----------|---------------|
| %IDOK     | OK button     |
| %IDCANCEL | Cancel button |
| %IDABORT  | Abort button  |
| %IDRETRY  | Retry button  |
| %IDIGNORE | Ignore button |
| %IDYES    | Yes button    |
| %IDNO     | No button     |

Additional styles may be found in WIN32API.INC in the section prefixed with %MB\_. If you are not interested in which button the user selects, use a [MSGBOX statement](#) rather than a MSGBOX function.

A question mark may be used as an abbreviation for the MSGBOX statement.

**Restrictions** Strings displayed by the MSGBOX function are displayed only up to the first [\\$NUL](#) character, if any.

**See also** [INPUTBOX\\$](#), [MSGBOX statement](#), [TXT pseudo-object](#)

**Example**

```
!Result& = MSGBOX("Overwrite registry file?", %MB_OKCANCEL OR %
MB_DEFBUTTON2 _
OR %MB_TASKMODAL, "Critical Warning")
```

## MSGBOX statement

# MSGBOX statement

**Purpose** Display a message box containing a text and optional title, using one or more styles.

**Syntax** `MSGBOX txt$ [, [style%], title$]`  
`? txt$ [, [style%], title$]`

**Remarks** The MSGBOX statement comprises the following elements:

*txt\$* Text to display within the message box.

*style&* Optional parameter which determines the appearance of the message box. Some styles may be combined ([OR](#)ed together) to specify the button and icon displayed in the message box. If *style&* is omitted, PowerBASIC substitutes %MB\_OK. The following are some of the more common styles used with the MSGBOX statement (also see the [MSGBOX function](#) for more information):

|                      |                                                                                                                                                                                     |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>%MB_OK</b>        | Display OK button (default)                                                                                                                                                         |
| %MB_ICONERROR        | Display Error icon (stop sign)                                                                                                                                                      |
| %MB_ICONINFORMATION  | Display Information icon ("i")                                                                                                                                                      |
| %MB_ICONWARNING      | Display Warning icon (exclamation)                                                                                                                                                  |
| <b>%MB_APPLMODAL</b> | Application Modal - Despite the name, the user can continue to interact with other dialogs without dismissing the MSGBOX. (default)                                                 |
| %MB_SYSTEMMODAL      | System Modal - Operates identically to %MB_APPLMODAL, except the MSGBOX is given the %WS_EX_TOPMOST style so that it remains above all other windows and dialogs.                   |
| %MB_TASKMODAL        | Task Modal - All top-level windows belonging to the current application are disabled until the MSGBOX is dismissed. %MB_TASKMODAL is commonly used to display a truly modal MSGBOX. |

Additional styles may be found in [WIN32API.INC](#), in the section prefixed with %MB\_. If you are interested in which button the user selects, use a [MSGBOX function](#) rather than a MSGBOX statement.

*title\$* Determines the title to be displayed in the caption of the message box. If *title\$* is not specified, "PowerBASIC" is used automatically.

The MSGBOX statement may be represented by the query (?) character as a shortcut. This is similar to the behavior in the [PowerBASIC Console Compiler](#) (PB/CC), where the query character is recognized as a synonym for the PRINT statement. This can simplify the creation of certain test code, since the query character provides similar functionality in both compilers.

**Restrictions** Strings displayed by the MSGBOX function are displayed only up to the first [\\$NUL](#) character, if any.

**See also** [INPUTBOX\\$](#), [MSGBOX function](#), [TXT pseudo-object](#)

**Example**

```
MSGBOX "Got here, hit OK to continue",, "Title of subroutine 123"
MSGBOX "Current value of X% is: " & STR$(x%)
MSGBOX "Paused, click OK to continue!"
MSGBOX "Click OK to reboot the universe...", %MB_TASKMODAL OR %MB_ICONERROR,
"Reality has crashed!"
```

## MYBASE pseudo-variable

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## MYBASE pseudo-variable

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | A pseudo <a href="#">object</a> variable to reference the <a href="#">inherited</a> parent object.                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Syntax</b>   | <code>MYBASE.Method1(<i>param</i>)</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Remarks</b>  | <p>MYBASE is a pseudo-variable, which PowerBASIC automatically defines in every <a href="#">Method</a> and <a href="#">Property</a> on an inherited <a href="#">interface</a>. It is treated as a reference to the original, inherited object. Using MYBASE, it's possible to call the original Methods and Properties so you can modify or build upon them in the derived interface.</p> <p>MYBASE may not be assigned to an object variable, nor may it be used as a <a href="#">Sub/Function/Method/Property</a> parameter.</p> |
| <b>See also</b> | <a href="#">CLASS</a> , <a href="#">INTERFACE (Direct)</a> , <a href="#">INTERFACE (IDBind)</a> , <a href="#">ME</a> , <a href="#">METHOD</a> , <a href="#">PROPERTY</a> , <a href="#">What is an object, anyway?</a> , <a href="#">What is inheritance?</a>                                                                                                                                                                                                                                                                       |

## NAME statement

# NAME statement

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>      | Rename a file or a directory (like the DOS REN command).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Syntax</b>       | <code>NAME <i>filespec1</i>\$ AS <i>filespec2</i>\$</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Remarks</b>      | <p>The NAME statement comprises the following elements:</p> <p><i>filespec1</i>\$ The current name of a file or directory. The file must not be currently <a href="#">opened</a> or <a href="#">locked</a>. <i>filespec1</i>\$ may be either a Short File Name (SFN) or a Long File Name (LFN).</p> <p><i>filespec2</i>\$ The desired name of the file or directory, and may use Long File Name (LFN) naming conventions.</p> <p>Each filespec may contain drive and path specifications as well as a file or directory name.</p> <p>If <i>filespec1</i> does not exist, run-time <a href="#">Error 53</a> ("File not found") occurs. If <i>filespec2</i> already exists, run-time <a href="#">Error 58</a> ("File already exists"). If <i>filespec1</i> has been opened or locked by your application and not closed, an <a href="#">Error 51</a> can occur ("Internal system error"). You should never rename a file that has been opened by your code and not (yet) closed.</p> |
| <b>Restrictions</b> | It is possible to move a file from one directory, drive, or partition, to another. It is not possible to move directories between drives or partitions. Wildcard characters are not permitted in the file names.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Example</b>      | <pre>OldName\$ = "MYFILE.EXE" NewName\$ = "YOURFILE.EXE" NAME OldName\$ AS NewName\$</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

## NEXT statement

# FOR/NEXT statements

|                |                                                                                                                                                                                                      |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Define a loop of program statements whose execution is controlled by an automatically incrementing or decrementing counter.                                                                          |
| <b>Syntax</b>  | <pre>FOR <i>Counter</i> = <i>start</i> TO <i>stop</i> [STEP <i>increment</i>]   [<i>statements</i>] [EXIT FOR]   [<i>statements</i>] [ITERATE FOR]   [<i>statements</i>] NEXT [<i>Counter</i>]</pre> |
| <b>Remarks</b> | <i>Counter</i> is a numeric <a href="#">variable</a> serving as the loop counter.                                                                                                                    |

*start* is a numeric expression specifying the value initially assigned to *Counter*.

*stop* is a numeric expression giving the value that *Counter* must reach for the loop to be terminated.

*increment* is an optional numeric expression defining the amount by which *Counter* is incremented with each loop execution. If not specified, *increment* defaults to 1.

Note that *increment* must be the same data type or in the same range as *Counter*. For example:

```
FOR x?? = 50 TO 1 STEP -1
```

will fail because -1 is not within the range of an unsigned Word variable.

When a FOR statement is encountered, *start* is assigned to *Counter*, and *Counter* is tested to see if it is greater than (or, for negative *increment*, less than) *stop*. If not, the statements within the FOR/NEXT loop are executed, *increment* is added to *Counter*, and *Counter* again tested against *stop*. The statements in the loop are executed repeatedly until the test fails, at which time control passes to the statement immediately following the NEXT.

If *increment* is equal to the maximum value of a variable class (255 for a [byte](#), 32767 for an [Integer](#), 65535 for a [Word](#), etc), the compiler will generate an [error](#). If *step* is zero, an infinite loop can be created.

When using

values with FOR/NEXT, be sure to allow for round-off errors when mixing numbers of different precision. Using [constants](#) or variables of the same type throughout will help solve this problem:

```
FOR n# = 1.0 TO 1.5 STEP 0.1
 x$ = STR$(n#)
NEXT n#
```

executes 5 times and returns:

```
1
1.10000000149012
1.20000000298023
1.30000000447035
1.40000000596046
```

while:

```
FOR n@ = 1.0@ TO 1.5@ STEP 0.1@
 x$ = STR$(n@)
NEXT n@
```

executes 6 times and returns:

```
1
1.1
1.2
1.3
1.4
1.5
```

FOR/NEXT loops run fastest when *Counter* is a [Long-integer](#) variable, and *start* and *increment* are Long-integer constants. The value of *Counter* is available like any other variable within the loop. It is wise to avoid explicitly modifying the value of *Counter* within the loop. If you need to exit the loop prematurely, use an [EXIT FOR](#) statement. Keep range considerations in mind. For example, if *Counter* is an Integer variable, you may not use the maximum value for an Integer for *stop*, as *Counter* would be incremented outside the Integer range at the end of the loop.

The body of the loop is skipped altogether if the initial value of *Counter* is greater than *stop* (or, for a negative *increment*, if *Counter* is less than *stop*).

FOR/NEXT loops can be nested within other FOR/NEXT loops. Be sure to use unique

counter variables. Note that PowerBASIC allows the *Counter* in the NEXT keyword simply as a comment, which is ignored. For example, the following will compile, even though the counter variables are "crossed":

```
FOR n = 1 TO 10
 FOR m = 1 TO 20
 .
 .
 .
 NEXT n
NEXT m
```

You can omit the counter variable in the NEXT statement altogether. For example:

```
FOR n = 1 TO 10
 .
 .
 .
NEXT
```

If a NEXT is encountered without a corresponding FOR (or vice versa), a [compile-time error](#) is generated.

**Previous version of PowerBASIC supported a single NEXT statement used with multiple nested FOR/NEXT loops, such as NEXT c, b, a. This is no longer supported and you will need to update your code to use multiple NEXT statements.**

In certain situations, previous versions of PowerBASIC optimized FOR/NEXT loops to count down instead of up for improved execution speed. This optimization could cause the counter variable to contain a value which was not expected when execution of the loop was complete. This optimization has been improved so that the counter variable value is always correct upon loop completion, even if EXIT FOR was used to force an early termination.

Although the compiler does not care about such things, it is considered good programming practice to indent the statements between FOR and NEXT by two or three spaces to set off the structure of the loop.

For additional performance, use a [REGISTER](#) variable for the loop counter variable.

**Restrictions** The counter variable must be a simple numeric scalar variable, such as [LOCAL](#), [STATIC](#), [GLOBAL](#), or [REGISTER](#). This aids in maintaining high performance levels for a simple loop structure. [Variables](#) which require multiple operations to access are specifically disallowed: [THREADED](#), [INSTANCE](#),

Parameters, [POINTER](#) Targets, and [ARRAY](#).

**See also** [#OPTIMIZE](#), [#REGISTER](#), [DO/LOOP](#), [EXIT](#), [FOR EACH/NEXT](#), [ITERATE](#), [WHILE/WEND](#), [REGISTER](#)

## NOT operator

# NOT operator

**Purpose** The NOT operator works as a bitwise [arithmetic operator](#).

**Syntax** NOT *p*

**Remarks** PowerBASIC's NOT operator returns the one's-complement of an expression. When dealing with the absolute values 0 and -1, the NOT operator "reverses" the two values, performing a Boolean-like operation. PowerBASIC accepts any non-zero value as a logical TRUE value; therefore, subtle logic problems can arise in a program when the NOT operator is used to perform Boolean logic tests with operand values that are not limited to just 0 and -1.

Consider the following two test conditions:

```
test1 = 0 ' test1 is FALSE (zero)
IF NOT test1 THEN ' TRUE (-1 is non-zero)

test2 = 1 ' test2 is TRUE (1 is non-zero)
IF NOT test2 THEN ' still TRUE (-2 is non-zero)
```

Because NOT performs a bitwise operation on *test2*, it does not reverse the logical TRUE/FALSE value of *test2*, rather, it returns -2 (the one's-complement of 1) and this is evaluated as a logical TRUE value.

In cases where a proper logical (Boolean) evaluation is required, and the operand may be a value other than 0 and -1, the [ISFALSE](#) operator should be used in place of the NOT operator:

```
test3 = 1 ' test3 is TRUE (non-zero)
IF ISFALSE test3 THEN ' ISFALSE detects test3 is
[statements] ' TRUE so the IF test fails
```

The two's-complement of a value can be obtained with the following algorithm:

```
y = (NOT x) + 1
Using NOT as a logical operator
```

NOT returns 0 (FALSE) if *and only if* its operand is *exactly* -1 (TRUE). Generally, you should use the ISFALSE operator instead of NOT, when you are testing for logical falsity.

| x  | NOT x |
|----|-------|
| 0  | -1    |
| -1 | 0     |

### Using NOT as a bitwise arithmetic operator

NOT performs a one's-complement or bit reversal of each bit in an integral-class value. Here is a sample:

```
x% = NOT 16383% ' Result is -16384

NOT 0011 1111 1111 1111 (&H3FFF)
 1100 0000 0000 0000 (&HC000)
MSB ↑ ↑ LSB (bit 0)
```

See also [Arithmetic Operators](#), [AND](#), [EQV](#), [IMP](#), [ISFALSE](#), [ISTRUE](#), [OR](#), [Short-circuit evaluation](#), [XOR](#)

## NUL\$ function

# NUL\$ function

**Purpose** Return a  
consisting of a specified number of [\\$NUL](#) ([CHR\\$\(0\)](#)) characters.

**Syntax** `sResult$ = NUL$(count)`

**Remarks** NUL\$ returns a *count* character string of \$NUL characters.

**See also** [CHR\\$](#), [REPEAT\\$](#), [SPACE\\$](#), [STRING\\$](#)

## OBJECTIVE function

# OBJECTIVE function

**Purpose** Return [TRUE/FALSE](#) as an indication of the running state of an initialized [COM object](#) (EXE based).

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>   | <code>lResult&amp; = OBJACTIVE(<i>prgid</i>\$)</code>                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Remarks</b>  | OBJACTIVE can provide information that may prove useful in determining whether to use the NEWCOM or GETCOM options with the <a href="#">LET (with Objects)</a> statement. OBJACTIVE may only be used on COM objects that are in EXE format, not DLL/OCX/etc. In the latter case, OBJACTIVE returns FALSE (0).                                                                                                                                                                                |
| <i>prgid</i> \$ | The registered program ID string for the COM object. For example, "Word.Application.8", or a version-independent program ID such as "Word.Application". A valid program ID string can be obtained from a 16-byte class ID string using the <a href="#">PROGID\$</a> function, or derived from a 38 character <a href="#">GUID</a> string using PROGID\$ and <a href="#">GUID\$</a> .                                                                                                         |
| <b>See also</b> | <a href="#">DIM</a> , <a href="#">CLSIDS\$</a> , <a href="#">GUID\$</a> , <a href="#">GUIDTXT\$</a> , <a href="#">INTERFACE (Direct)</a> , <a href="#">INTERFACE (IDBind)</a> , <a href="#">ISNOTHING</a> , <a href="#">ISOBJECT</a> , <a href="#">Just what is COM?</a> , <a href="#">LET (with Objects)</a> , <a href="#">OBJECT</a> , <a href="#">OBJEQUAL</a> , <a href="#">OBJPTR</a> , <a href="#">OBJRESULT</a> , <a href="#">PROGID\$</a> , <a href="#">What is a COM component?</a> |
| <b>Example</b>  | <pre>' Create a reference to the MSWORD object LOCAL oWord AS IDISPATCH ' use late-binding LOCAL i      AS LONG  IF OBJACTIVE("Word.Application") THEN   ' Word is already active, use the existing instance   oWord = GETCOM "Word.Application" ELSE   ' Word is not active, create a new instance   oWord = NEWCOM "Word.Application" END IF ' Set MS Word to a normal visible state i = 0 OBJECT LET oWord.WindowState = i ' more code here</pre>                                         |

## OBJECT statement

# OBJECT statement

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Communicate with a <a href="#">COM object</a> through the <a href="#">dispatch</a> interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Syntax</b>  | <pre>OBJECT GET <i>interface.member</i>[.<i>member</i>.] [([[<i>paramname</i> =] <i>param1</i> [, ...]])] TO <i>ResultVar</i> OBJECT LET <i>interface.member</i>[.<i>member</i>.] [([[<i>paramname</i> =] <i>param1</i> [, ...]])] = <i>ValueVar</i> OBJECT SET <i>interface.member</i>[.<i>member</i>.] [([[<i>paramname</i> =] <i>param1</i> [, ...]])] = <i>ValueVar</i> OBJECT CALL <i>interface.member</i>[.<i>member</i>.] [([[<i>paramname</i> =] <i>param1</i> [, ...]])] [TO <i>ResultVar</i>] OBJECT RAISEEVENT [<i>interface.</i>]<i>member</i>([[<i>paramname</i> =] <i>param1</i> [, ...]])]</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Remarks</b> | <p>There are five general forms of the OBJECT statement which are used to communicate through a Dispatch <a href="#">interface</a> to an <a href="#">object</a>.</p> <p><b>OBJECT GET</b> Retrieve or read the value of an Interface member <a href="#">Property</a>. This is similar to retrieving the value of a <a href="#">variable</a>.</p> <p><b>OBJECT LET</b> Assign or write a value to an Interface member Property. This is similar to assigning a value to a variable.</p> <p><b>OBJECT SET</b> Assign or write a value to an Interface member Property that contains a reference to an object. For example, a reference to another Interface.</p> <p><b>OBJECT CALL</b> Call or execute a member Method of an Interface. This is equivalent to calling a <a href="#">Sub</a> or <a href="#">Function</a>.</p> <p><b>OBJECT RAISEEVENT</b> Call or execute a member Method of a Dispatch <a href="#">event Interface</a>. Because the Dispatch event interface is pre-defined, you are not required to specify the interface name in this form</p> |

of the statement. However, including it aids in self-documentation of your program. If your program is using a Direct, V-Table event handler you should use the [RAISEEVENT](#) statement instead. See the [EVENT SOURCE](#) statement for an OBJECT RAISEEVENT example.

All parameters, return values, and assignment values must be in the form of [COM-compatible](#) variables. [Literals](#) and expressions are not allowed. COM-compatible variables include [BYTE](#), [WORD](#), [DWORD](#), [INTEGER](#), [LONG](#), [QUAD](#), [SINGLE](#), [DOUBLE](#), [CURRENCY](#),

and [VARIANT](#). You should use caution passing string data since COM Objects require that [unicode](#) format be used. When string data is contained in a VARIANT variable, conversion to/from unicode is automatic, and no intervention is needed from the programmer. However, if you pass data in a [dynamic string](#) variable, you must use the [ACODES\\$\(\)](#) and [UCODES\\$\(\)](#) functions to convert the data to an appropriate format. For this reason, we recommend that string data be passed using VARIANT variables.

Dispatch OBJECT Method calls may be bound at run-time using [late binding](#), which requires no declaration of Properties and [Methods](#). However, for this very reason, the validity of these references can not be verified by PowerBASIC at the time the program is compiled.

The OBJECT statement can use both positional and named parameters, but you should keep in mind that not all COM Dispatch Servers support named parameters. Positional parameters are universally supported.

A positional parameter is simply a variable containing an appropriate value. It is identified by its position in the parameter list, just as in a traditional SUB or FUNCTION. A named parameter consists of a parameter identifier (a name), an equal (=) sign, and a variable containing an appropriate value. Positional parameters must precede any and all named parameters, but named parameters may be specified in any sequence.

Each time you call a Method or Property using the OBJECT statement, a status code is returned in a hidden parameter to indicate the success or failure of the operation. You can retrieve information about this status code with the [OBJRESULT](#) function, and also by using the [IDISPINFO](#) Dispatch Information Object. If the failure was severe, then a PowerBASIC [error 99](#) (Object Error) is also generated and the [ERR](#) system variable is set. You can find more information about these items by referring to [OBJRESULT](#), [IDISPINFO](#), and [ERR](#). This information can be very useful for both debugging and handling [run-time errors](#).

**Restrictions** All parameters, return values, and assignment values must be in the form of COM-compatible variables. Use of the wrong member mode (GET/LET/SET/CALL/RAISEEVENT) can sometimes result in unexpected and fatal run-time errors. So, it's usually prudent to test the result code in [OBJRESULT](#) after every OBJECT statement.

**See also** [ACODES\\$](#), [DIM](#), [CLASS](#), [CLSID\\$](#), [EVENT SOURCE](#), [IDISPINFO](#), [GUID\\$](#), [GUIDTXT\\$](#), [ID Binding](#), [INTERFACE \(Direct\)](#), [INTERFACE \(IDBind\)](#), [ISINTERFACE](#), [ISNOTHING](#), [ISOBJECT](#), [Just what is COM?](#), [Late Binding](#), [LET \(with Objects\)](#), [METHOD](#), [OBJECTIVE](#), [OBJPTR](#), [OBJRESULT](#), [PROGID\\$](#), [PROPERTY](#), [UCODES\\$](#), [What is an object, anyway?](#), [What is DISPATCH?](#)

**Example**

```
' Assumes Interface definitions have been
' declared for the Microsoft Agent Control
LOCAL AgentCtrlEx AS IAgentCtrlEx
LOCAL StartX AS LONG
LOCAL StartY AS LONG
LOCAL CharW AS LONG
LOCAL CharH AS LONG
LOCAL Connected AS LONG
LOCAL AgentName AS STRING
```

```

LOCAL AgentFile AS STRING

' Create a new instance of the COM Object
AgentCtrlEx = NEWCOM $PROGID_Agent2
IF ISFALSE(ISOBJECT(AgentCtrlEx)) THEN EXIT FUNCTION

' Set the connected property
Connected = 1
OBJECT LET AgentCtrlEx.Connected = Connected

' Load the Merlin Agent Character
AgentName = UCODE$("Merlin")
AgentFile = UCODE$("Merlin.acs")
OBJECT CALL AgentCtrlEx.Characters.Load(AgentName, AgentFile)

' Display the Merlin Agent Character on the screen
OBJECT CALL AgentCtrlEx.Characters.Character(AgentName).Show

' Find the center of the screen for the Character Agent
OBJECT GET AgentCtrlEx.Characters.Character(AgentName).Width TO CharW
OBJECT GET AgentCtrlEx.Characters.Character(AgentName).Height TO CharH
DESKTOP GET CLIENT TO StartX, StartY
StartX = (StartX - CharW)\2
StartY = (StartY - CharH)\2

' Move the Character to the center of the screen
OBJECT CALL AgentCtrlEx.Characters.Character(AgentName).MoveTo(StartX,
StartY)
' more code here

```

## OBJEQUAL function

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## OBJEQUAL function **New!**

**Purpose** Check if [object](#) variables refer to the same object.

**Syntax** *Result* = OBJEQUAL(*ObjectVar1*, *ObjectVar2*)

**Remarks** Compares two object variables to determine if they refer to the same object. It returns [true](#) (-1) if both refer to the same object (or both refer to NOTHING); otherwise it returns [false](#) (0).

If the two object variables refer to the same class, but not the same specific object, false (0) is returned.

**See also** [BITSE](#)

## OBJPTR function

# OBJPTR function

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Return an <a href="#">object</a> pointer contained in the specified object variable.                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Syntax</b>   | <i>ObjectPointer???</i> = OBJPTR( <i>objectvar</i> )                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Remarks</b>  | OBJPTR returns the object pointer as a Double-word ( <a href="#">DWORD</a> ) value.                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>See also</b> | <a href="#">DIM</a> , <a href="#">CLSIDS\$</a> , <a href="#">GUID\$</a> , <a href="#">GUIDTXT\$</a> , <a href="#">INTERFACE (Direct)</a> , <a href="#">INTERFACE (IDBind)</a> , <a href="#">ISINTERFACE</a> , <a href="#">ISNOTHING</a> , <a href="#">ISOBJECT</a> , <a href="#">LET (with Objects)</a> , <a href="#">OBJECT</a> , <a href="#">OBJACTIVE</a> , <a href="#">OBJEQUAL</a> , <a href="#">OBJRESULT</a> , <a href="#">PROGID\$</a> , <a href="#">What is an object, anyway?</a> |

## OBJRESULT function

# OBJRESULT function

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Returns a status code (hResult) to describe the success or failure of the most recent <a href="#">METHOD</a> or <a href="#">PROPERTY</a> procedure.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Syntax</b>  | <i>lResult&amp;</i> = OBJRESULT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Remarks</b> | <p>An Automation procedure is a METHOD or PROPERTY on an <a href="#">IAUTOMATION</a>, <a href="#">IDISPATCH</a>, or <a href="#">DUAL</a> interface. By definition, an Automation procedure always returns a hidden result code which is cryptically called an <a href="#">hResult</a>. OBJRESULT the most recent hResult generated by the program, and can be used to identify the success or failure of an operation.</p> <p>If an Automation procedure fails with a severe error, the <a href="#">ERR</a> system variable is set to an appropriate PowerBASIC error code. This is usually <a href="#">Error 99</a> ("Object error"). In such cases, you can use the OBJRESULT function to return the result (hResult&amp;) of the last run-time <a href="#">OBJECT</a> statement or <a href="#">direct</a> METHOD/PROPERTY reference.</p> <p><a href="#">Numeric equates</a> for most OBJRESULT errors can be found in the <a href="#">WIN32API.INC</a> file, and are mostly prefixed with %E_, %CO_, %OLE_, and %DISP_. The following list includes the most common codes that may be returned by a direct call of a Method or Property:</p> |

|                 |               |
|-----------------|---------------|
| %S_OK           | = &H0         |
| %S_FALSE        | = &H1         |
| %E_UNEXPECTED   | = &H8000FFFF& |
| %E_NOTIMPL      | = &H80004001& |
| %E_NOINTERFACE  | = &H80004002& |
| %E_POINTER      | = &H80004003& |
| %E_ABORT        | = &H80004004& |
| %E_FAIL         | = &H80004005& |
| %E_ACCESSDENIED | = &H80070005& |
| %E_HANDLE       | = &H80070006& |
| %E_OUTOFMEMORY  | = &H8007000E& |
| %E_INVALIDARG   | = &H80070057& |

This list tells the most common status codes which may be returned by a [DISPATCH](#) call using the [OBJECT](#) statement:

|                        |              |
|------------------------|--------------|
| %S_OK                  | = &H0        |
| %DISP_E_ARRAYISLOCKED  | = &H8002000D |
| %DISP_E_BADINDEX:      | = &H8002000B |
| %DISP_E_BADPARAMCOUNT  | = &H8002000E |
| %DISP_E_BADVARTYPE     | = &H80020008 |
| %DISP_E_EXCEPTION      | = &H80020009 |
| %DISP_E_MEMBERNOTFOUND | = &H80020003 |
| %DISP_E_NONAMEDARGS    | = &H80020007 |
| %DISP_E_OVERFLOW       | = &H8002000A |

```

%DISP_E_PARAMNOTFOUND = &H80020004
%DISP_E_TYPERISMATCH = &H80020005
%DISP_E_UNKNOWNINTERFACE = &H80020001
%DISP_E_UNKNOWNLCID = &H8002000C
%DISP_E_UNKNOWNNAME = &H80020006
%DISP_E_PARAMNOTOPTIONAL = &H8002000F

```

If the status code %DISP\_E\_EXCEPTION is returned, you can use the [IDISPINFO](#) object to secure much additional information about the status. This includes a more specific error code, a description, help file information, etc. If the status code %DISP\_E\_PARAMNOTFOUND or %DISP\_E\_TYPERISMATCH, you can use [IDISPINFO.PARAM](#) to determine which parameter actually caused the problem. Please refer to the [IDISPINFO](#) section for more details.

As can be seen from the above lists, a large numeric status code can be cryptic. However, you can translate the OBJRESULT code into a descriptive message using the [OBJRESULT\\$](#) function. This can be most helpful, especially during application development and [debugging](#).

**Restrictions** Methods and Properties on a custom interface (a direct interface based upon IUnknown rather than IDispatch) do not support OLE Automation, and do not return an OBJRESULT (hResult).

**See also** [DIM](#), [CLASS](#), [CLSIDS\\$](#), [IDISPINFO](#), [GUID\\$](#), [GUIDTXT\\$](#), [INTERFACE \(Direct\)](#), [INTERFACE \(IDBind\)](#), [ISINTERFACE](#), [ISNOTHING](#), [ISOBJECT](#), [LET \(with Objects\)](#), [METHOD](#), [PROPERTY](#), [OBJECT](#), [OBJACTIVE](#), [OBJEQUAL](#), [OBJPTR](#), [OBJRESULTS\\$](#), [PROGID\\$](#), [What is an hResult?](#), [What is an object, anyway?](#)

## OBJRESULT\$ function

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## OBJRESULT\$ function

**Purpose** Returns a string which describes an [OBJRESULT \(hResult\)](#) code.

**Syntax** `text$ = OBJRESULT$([nexp&])`

**Remarks** This function returns a text

which describes the hResult code specified by *nexp*&. If the parameter *nexp*& is omitted, it is replaced by the most recent OBJRESULT value. That is, OBJRESULT\$() is identical to OBJRESULT\$(OBJRESULT).

**See also** [DIM](#), [CLASS](#), [CLSIDS\\$](#), [IDISPINFO](#), [GUID\\$](#), [GUIDTXT\\$](#), [INTERFACE \(Direct\)](#), [INTERFACE \(IDBind\)](#), [ISINTERFACE](#), [ISNOTHING](#), [ISOBJECT](#), [LET \(with Objects\)](#), [METHOD](#), [PROPERTY](#), [OBJECT](#), [OBJACTIVE](#), [OBJPTR](#), [OBJRESULT](#), [PROGID\\$](#), [What is an hResult?](#), [What is an object, anyway?](#)

## OCT\$ function

## OCT\$ function IMPROVED

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Convert an integral value to an octal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Syntax</b>   | <code>s\$ = OCT\$(IntVal [, Digits, LeadSpaces, TrailSpaces])</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Remarks</b>  | <p><i>IntVal</i> is a</p> <p>expression in the range of a 64-bit <a href="#">Quad</a> Integer (-9223372036854775808 to +9223372036854775807). Any fractional part of the value is rounded. The result string is always formatted as an integral number using all the significant digits in <i>IntVal</i>. It is never expressed in scientific notation.</p> <p>If <i>Digits</i> is 0 (or not given), no leading characters will be added to the numeric field. If <i>Digits</i> is a positive number greater than 0, the result string will be prepended with leading zeros to achieve the desired length. If <i>Digits</i> is a negative number, leading spaces are added to reach the absolute length. <i>Digits</i> may be in the range of -22 to +22.</p> <p><i>LeadSpaces</i> specifies additional leading spaces to be prepended, regardless of the length of the numeric portion of the string.</p> <p><i>TrailSpaces</i> specifies additional trailing spaces to be appended to the end of the string.</p> |
| <b>See also</b> | <a href="#">BIN\$</a> , <a href="#">DEC\$</a> , <a href="#">FORMAT\$</a> , <a href="#">HEX\$</a> , <a href="#">STR\$</a> , <a href="#">TRIM\$</a> , <a href="#">USING\$</a> , <a href="#">VAL</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

## OemToChr\$ function

### Keyword Template

|                 |
|-----------------|
| <b>Purpose</b>  |
| <b>Syntax</b>   |
| <b>Remarks</b>  |
| <b>See also</b> |
| <b>Example</b>  |

## OemToChr\$ function New!

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Translates a byte of <a href="#">OEM</a> characters into <a href="#">ANSI/WIDE</a> characters.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Syntax</b>   | <code>a\$ = OemToChr\$(OemExpr\$)</code><br><code>a\$\$ = OemToChr\$(GRAPHIC, OemExpr\$)</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Remarks</b>  | <p><i>OemExpr\$</i> contains a series of <a href="#">byte</a> (8-bit) characters in OEM format. <code>OemToChr\$</code> translates it into either ANSI multi-byte equivalent characters or WIDE (16-bit) <a href="#">Unicode</a> characters, depending upon the context of the source code. PowerBASIC will always choose the correct form with no intervention needed by the programmer. Control codes, <code>CHR\$(0)</code> to <code>CHR\$(31)</code> and <code>CHR\$(127)</code>, are handled uniquely, as they are normally considered to be non-printing characters. By default, they are just copied, without any translation.</p> |
| <b>GRAPHIC</b>  | If the option GRAPHIC is included, it indicates you want to convert control codes into the codes which will display the graphic symbols defined in the original IBM OEM character set. Most of these codes are only available as wide Unicode characters.                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>See also</b> | <a href="#">ChrToOem\$</a> , <a href="#">ChrToUtf8\$</a> , <a href="#">Utf8ToChr\$</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

## ON ERROR statement

# ON ERROR statement

**Purpose** Specify an [error handling](#) routine; enable or disable [error trapping](#).

**Syntax**

```
ON ERROR GOTO {label | line_number}
ON ERROR RESUME NEXT
ON ERROR GOTO 0
```

**Remarks** [label](#) or [line\\_number](#) identifies the first line of the error trapping routine. Once error handling has been turned on with this statement, all [run-time errors](#) result in a jump to your error handling code. When the error handler begins execution, additional error trapping is temporarily suspended. When your error handling is complete, you must use the [RESUME](#) statement (any form) to continue execution. RESUME reactivates the temporary suspension of error trapping.

You must use additional care when you trap an error within a [GOSUB](#) block of code, because a [RETURN](#) address has been saved on the system [stack](#). If you use a form of RESUME which re-enters the GOSUB block, a RETURN will still be executed later, and the stack will be balanced. However, if RESUME <Label> or RESUME FLUSH redirects execution elsewhere, you must use RETURN FLUSH to remove the return address from the stack.

To disable error trapping, use ON ERROR GOTO 0 or ON ERROR RESUME NEXT. You can use this technique if an error occurs for which you have not defined a recovery path; you can also choose to display the contents of [ERR](#) or [ERRCLEAR](#) at this time.

The default for error trapping is disabled. If an error occurs while error trapping is disabled, the error code is placed into the ERR system variable, and execution continues. Errors can still be trapped by checking the value of the ERR or ERRCLEAR variable with

[ERR THEN](#) or [SELECT CASE ERR](#) statements.

Error trapping is local to each [Sub](#), [Function](#), [Method](#), and [Property](#). PowerBASIC does not support global error trapping.

Numeric errors such as Divide-by-zero, Overflow and Underflow are not trapped. Array out-of-bounds and null-pointer trapping are only enabled if [#DEBUG ERROR ON](#) is used.

If you're running a program with error trapping turned off, a run-time error may cause a General Protection Fault (GPF). A GPF cannot be trapped with ON ERROR.

It is not possible to branch to an error handler from within an expression. The compiler tests for an error only after the statement is completed. This means that a statement such as:

```
ON ERROR GOTO ErrorHandlerLabel
IF GETATTR(sFile) THEN
 ' Do something
END IF
```

will generate an [Error 53](#) when *sFile* does not exist, but will not branch to the *ErrorHandlerLabel*. This is because the [GETATTR\(sFile\)](#) is an expression in the [IF/ END IF](#) block. You could do a

```
ON ERROR GOTO ErrorHandlerLabel
a& = GETATTR(sFile)f
IF a& THEN
 ' Do something
END IF
```

which will branch to the *ErrorHandlerLabel* if *sFile* does not exist. You could also check the value of the [ERR](#) variable or use a [TRY/ END TRY](#) block to see if an error occurred when checking for errors that occur during an expression.

**See also** [#DEBUG DISPLAY](#), [#DEBUG ERROR](#), [ERR](#), [ERRCLEAR](#), [ERROR](#), [Error Overview](#), [ERROR\\$](#), [Errors and Error Trapping](#), [RESUME](#)

## ON GOSUB statement

# ON GOSUB statement

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Call one of several subroutines according to the value of a numeric expression.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Syntax</b>   | <code>ON <i>n</i> GOSUB {<i>label</i>   <i>line_number</i>} [, {<i>label</i>   <i>line_number</i>}] ...</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Remarks</b>  | <p><i>n</i> is a numeric expression ranging from 1 to 255, and each <a href="#">label</a> or <a href="#">line number</a> identifies a statement to branch to. When this statement is encountered, the <i>n</i>th label in the list is branched to; for example, if <i>n</i> equals 4, the fourth label in the list receives control. If <i>n</i> is less than one or greater than the number of labels, no branch occurs, and PowerBASIC continues execution with the statement immediately following the ON GOSUB statement.</p> <p>Each subroutine should end with <a href="#">RETURN</a>, which causes execution to resume with the statement immediately following the ON GOSUB statement. ON GOSUB can only branch to labels or line numbers that have the same scope as the ON GOSUB statement.</p> <p>The <a href="#">SELECT</a> and <a href="#">IF blocks</a> also perform multiple branching and are more flexible than ON GOSUB.</p> <p>Note that ON GOSUB (and <a href="#">ON GOTO</a>) have been internally optimized to produce greater run-time performance than was possible with previous versions of PowerBASIC.</p> |
| <b>See also</b> | <a href="#">GOSUB</a> , <a href="#">FUNCTION/END FUNCTION</a> , <a href="#">IF block</a> , <a href="#">METHOD</a> , <a href="#">ON GOTO</a> , <a href="#">PROPERTY</a> , <a href="#">RETURN</a> , <a href="#">SELECT</a> , <a href="#">SUB/END SUB</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Example</b>  | <pre>FOR I&amp; = 1 TO 3   ON I&amp; GOSUB OneHandler, TwoHandler, ThreeHandler NEXT I&amp;  OneHandler:   Message\$ = "Handler number" + STR\$(I&amp;)   RETURN  TwoHandler:   Message\$ = "Handler number" + STR\$(I&amp;)   RETURN  ThreeHandler:   Message\$ = "Handler number" + STR\$(I&amp;)   RETURN</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Result</b>   | <pre>Handler number 1 Handler number 2 Handler number 3</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

## ON GOTO statement

# ON GOTO statement

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Send program flow to one of several possible destinations based on the value of a expression.                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Syntax</b>  | <code>ON <i>n</i> GOTO {<i>label</i>   <i>line_number</i>} [, {<i>label</i>   <i>line_number</i>}] ...</code>                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Remarks</b> | <p><i>n</i> is a numeric expression ranging from 1 to 255, and <a href="#">label</a> or <a href="#">line number</a> identifies a statement in the program to branch to. The <i>n</i>th label is branched to; for example, if <i>n</i> equals 4, the fourth label in the list receives control. If <i>n</i> is less than one or greater than the number of labels in the list, program execution continues with the statement that immediately follows the ON GOTO statement.</p> |

ON GOTO behaves exactly like [ON GOSUB](#), except that it performs a [GOTO](#) rather than a GOSUB. This means that the program retains no memory of where the branch originated. ON GOTO can only branch to labels or line numbers that have the same scope as the ON GOTO statement.

The [SELECT](#) and [IF blocks](#) also perform multiple branching, and are more flexible than ON GOTO. See the [GOTO](#) entry for a discussion of ways to avoid using GOTOs in your programs.

Note that ON GOTO (and ON GOSUB) have been internally optimized to produce greater run-time performance than was possible with previous versions of PowerBASIC.

#### See also

[GOTO](#), [IF block](#), [ON GOSUB](#), [SELECT](#)

#### Example

```
SUB MainEx
 FOR I& = 1 TO 3
 ON I& GOTO OneHandler, TwoHandler, ThreeHandler
 Back:
 NEXT I&
 EXIT SUB

OneHandler:
 Message$ = "Handler number" + STR$(I&)
 GOTO Back

TwoHandler:
 Message$ = "Handler number" + STR$(I&)
 GOTO Back

ThreeHandler:
 Message$ = "Handler number" + STR$(I&)
 GOTO Back
END SUB
```

#### Result

```
Handler number 1
Handler number 2
Handler number 3
```

## OPEN statement

# OPEN statement

**IMPROVED**

#### Purpose

Prepare a [file](#) or device for reading or writing.

#### Syntax

```
OPEN filespec [FOR mode] [ACCESS access] [LOCK lock] AS _
 [#] filenum& [LEN = record_size] [BASE = base] [CHR = ANSI|WIDE]
OPEN HANDLE filehandle [FOR mode] [ACCESS access] [LOCK lock] AS _
 [#] filenum& [LEN = record_size] [BASE = base] [CHR = ANSI|WIDE]
```

#### Remarks

The main function of OPEN is to associate a file number (*filenum&*) with a file or physical device and to prepare that device for reading and/or writing. This file number is then used, rather than its name, in every statement that refers to the file. The [FREEFILE](#) function can be used to determine the next unused file number, or you can pick one yourself. An OPEN statement is usually balanced by a matching CLOSE statement. The OPEN statement comprises the following elements:

#### *filespec*

A [string expression](#) specifying the name of the file to be opened, and may optionally include a drive and/or path specification. *filespec* may be either a Short File Name (SFN) or a Long File Name (LFN). *filespec* has a limit of 259 characters (%MAX\_PATH - 1), although the file name portion of *filespec* may be no more than 255 characters (%MAX\_FNAME - 1).

#### *mode*

Specifies the file organization and style of access ([sequential](#), [random access](#), or [binary](#))

for reading, writing (or both), or appending. If *mode* is not specified, the default is RANDOM access.

| Mode          | File type  | Action                       |
|---------------|------------|------------------------------|
| INPUT         | Sequential | Read from                    |
| OUTPUT        | Sequential | Write to                     |
| APPEND        | Sequential | Append to                    |
| BINARY        | Binary     | Reading or writing           |
| <b>RANDOM</b> | Random     | Reading or writing (default) |

*access* Specifies the type of access this process will have to the file. By default, the file may be written to and read from.

| Access            | Description                                      |
|-------------------|--------------------------------------------------|
| READ              | Only read operations allowed                     |
| WRITE             | Only write operations allowed                    |
| <b>READ WRITE</b> | Both read and write operations allowed (default) |

**Note that APPEND mode requires READ/WRITE access.**

*lock* Specifies the type of access other processes will have to the file. If a LOCK clause is not specified in the OPEN statement, the default LOCK READ WRITE mode is applied. This mode ensures exclusive access to the file, and enables PowerBASIC to optimize its internal buffering for utmost I/O performance. If other processes or threads are to be permitted WRITE access to the file (LOCK SHARED or LOCK READ), internal buffering is disabled. Whilst performance may be marginally lower, it ensures that data read from the file is completely up-to-date.

| Lock              | Description                                         |
|-------------------|-----------------------------------------------------|
| SHARED            | Both read and write operations allowed              |
| WRITE             | Prevent write operations                            |
| READ              | Prevent read operations                             |
| <b>READ WRITE</b> | Neither read nor write operations allowed (default) |

To open a text file for OUTPUT and allow other processes to only read the file, use the following:

```
OPEN "MYFILE.TXT" FOR OUTPUT LOCK WRITE AS #1
```

It is possible for an application to open more than one copy of a given file at the same time. In this case, each OPEN statement must use a unique file number, and LOCK READ WRITE mode should not be used.

*filenum&* A unique [integer](#) value identifying the file, in the range 1 to 32767. Typically, this value is obtained from the FREEFILE function.

*record\_size* Specifies the size of each record of a random access file. The default record length is 128 if not specified. If *record\_size* is specified for a sequential file, it instructs PowerBASIC to use internal buffering to improve I/O performance. A random access file is limited to 32768 [bytes](#) per record, to ensure consistent behavior across all Win32 platforms.

*base* Specifies the number of the first record in a random access file, or the number of the first byte in a sequential or binary file. It can be either zero (0) or one (1). The default value for *base* is 1, if not specified.

*Chr* Specifies the character mode for this file: [ANSI](#) or [WIDE](#) (Unicode). Since sequential files consist of text alone, the selected mode is enforced by PowerBASIC. All data read or written to the file is automatically forced to the selected mode, regardless of the type of variables or expressions used. With binary or random files, this specification has no effect, but it may be included in your code for self-documentation purposes.

ANSI characters in the U.S. range of [CHR\\$\(0\)](#) to [CHR\\$\(127\)](#) are known as [ASCII](#), and are always represented by a single byte. International ANSI characters in the range of [CHR\\$\(128\)](#) to [CHR\\$\(255\)](#) may be followed by one or more additional bytes in order to accurately represent non-U.S. characters. The exact definition of these characters depends upon the character set in use. WIDE characters are always represented by two bytes per character. If the Chr option is not specified, the default mode is ANSI.

**HANDLE** The HANDLE option allows you to access files that have already been opened by another process, DLL, or API function. The *filehandle* specified here must be a valid Win32 operating system file handle.

When PowerBASIC closes a file opened with OPEN HANDLE, the Win32 handle is simply detached from the internal PowerBASIC handle table. The file is not physically closed since PowerBASIC did not originally open it. In PowerBASIC, the [FILEATTR](#) function can be used to obtain the operating system file handle for a file opened with the OPEN statement.

**Restrictions** Attempting to OPEN a file for INPUT that does not exist causes a run-time [Error 53](#) ("File not found"). Attempting to open a file that is locked can result in either an [Error 70](#) ("Permission denied"), or an [Error 75](#) ("Path/file access error").

Similarly, attempting to OPEN a file using a file number that is already in use will result in a run-time [Error 55](#) ("File is already open "). For this reason, programs that use hard-coded file numbers should take special care to close files before the file number is used again. In addition, code that may be used by more than one thread should use FREEFILE and avoid hard-coded file numbers.

If you try to open a nonexistent file for OUTPUT, APPEND, RANDOM, or BINARY operations, a new file is automatically created. For this reason, files on Read-only network drives may only be opened in INPUT mode.

**See also** [CLOSE](#), [FILEATTR](#), [FILENAME\\$](#), [FILESCAN](#), [FREEFILE](#), [TCP\\_OPEN](#), [UDP\\_OPEN](#)

**Example** This program is divided into five procedures. The difference between each procedure is the mode in which the file is opened, and the way the data in the file is manipulated:

```
SUB SequentialOutput
 ' The file is opened for sequential output,
 ' and some data is written to it. If the file
 ' exists, it is over-written.
 OPEN "OPEN.DTA" FOR OUTPUT AS #1
 IntegerVar% = 12345
 TempStr$ = "History is made at night."
 WRITE #1, TempStr$, IntegerVar%*2, TempStr$, IntegerVar% \ 2
 CLOSE #1
END SUB ' end procedure Sequential Output

SUB SequentialAppend
 ' The file is opened for sequential output, and
 ' data in this case is added to the end of file.
 ' If the file does not exist, it is created.
 OPEN "OPEN.DTA" FOR APPEND AS #1
 IntegerVar% = 32123
 TempStr$ = "I am not a number!"
 WRITE #1, TempStr$, IntegerVar% * 0.2
 CLOSE #1
END SUB ' end procedure Sequential Append

SUB SequentialInput
 ' The file is opened for sequential input,
 ' and data is read from the file.
 DIM a$
 OPEN "OPEN.DTA" FOR INPUT AS #1
 LINE INPUT #1, TempStr$
 TempStr$ = ""
 WHILE ISFALSE EOF(1) ' check if at end of file
 LINE INPUT #1, a$
 TempStr$ = TempStr$ + a$
 WEND
 CLOSE #1
END SUB ' end procedure SequentialInput
```

```

SUB BinaryIO
 ' The file is opened for binary I/O. Data is
 ' read 'using GET$. SEEK explicitly moves the
 ' file pointer to 'the end of file, and the
 ' same data is written back to 'the file.
 OPEN "OPEN.DTA" FOR BINARY AS #1
 TempStr$ = ""
 WHILE ISFALSE EOF(1)
 GET$ #1, 1, Char$
 TempStr$ = TempStr$ + Char$
 WEND
 SEEK #1, LOF(1)
 FOR I& = 1 TO LEN(TempStr$)
 PUT$ #1, MID$(TempStr$,I&,1)
 NEXT I&
 CLOSE 1
END SUB ' end procedure BinaryIO

SUB RandomIO
 ' Open file for random I/O. GET and PUT read
 ' and write the data.
 OPEN "OPEN.DTA" FOR RANDOM AS #1 LEN = 1
 TempStr$ = ""
 TempSize& = LOF(1) ' save file size
 ' using GET, read in the entire file
 FOR I& = 1 TO TempSize&
 GET #1, I&, Char$
 TempStr$ = TempStr$ + Char$
 NEXT I&
 ' PUT copies the data in reverse into the
 ' random access file.
 SEEK #1, 1
 FOR I& = TempSize& TO 1 STEP -1
 LSET Char$ = MID$(TempStr$,I&,1)
 PUT #1,, Char$
 NEXT I&
 CLOSE #1
END SUB ' end procedure RandomIO

```

## OPTION EXPLICIT statement

# OPTION EXPLICIT statement

|                 |                                                                                                                                                                                                                                                                                                                                                      |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Force explicit declaration of all <a href="#">variables</a> .                                                                                                                                                                                                                                                                                        |
| <b>Syntax</b>   | OPTION EXPLICIT                                                                                                                                                                                                                                                                                                                                      |
| <b>Remarks</b>  | Using OPTION EXPLICIT in a program has the same effect as using the <a href="#">#DIM ALL</a> metastatement. That is, it requires that all variables be declared before they are used.<br><br>When this option is used, the compiler generates a <a href="#">compile-time error</a> if a variable or array is used without being explicitly declared. |
| <b>See also</b> | <a href="#">#DIM</a>                                                                                                                                                                                                                                                                                                                                 |

## OR operator

# OR operator

**Purpose** The OR operator works as both a logical and a bitwise [arithmetic operator](#).

**Syntax**  $p \text{ OR } q$

**Remarks** **Using OR as a logical operator**

OR returns TRUE (non-zero) if and only if either or both of its operands is TRUE. Here is OR's truth table:

| Truth table |   |        |
|-------------|---|--------|
| x           | y | x OR y |
| T           | T | T      |
| T           | F | T      |
| F           | T | T      |
| F           | F | F      |

**Using OR as a bitwise arithmetic operator**

An OR mask sets selected bits of an

value without affecting the other bits. To set the most significant 2 bits in &H9700, use OR with a mask of &HC000; that is, the mask contains all 0s, except for the bit positions you wish to force to 1:

|           |                     |                     |
|-----------|---------------------|---------------------|
|           | 1001 0111 0000 0000 | = &H9700            |
| <b>OR</b> | 1100 0000 0000 0000 | = &HC000 (the mask) |
|           | 1101 0111 0000 0000 | = &HD700 (result)   |
| MSB       | ↑                   | ↑                   |
|           |                     | LSB (bit 0)         |

**See also** [Arithmetic Operators](#), [AND](#), [EQV](#), [IMP](#), [ISFALSE](#), [ISTRUE](#), [LET](#), [NOT](#), [XOR](#)

## PARSE statement

# PARSE statement

**Purpose** Parse an entire

and extract all delimited fields into an [array](#).

**Syntax** `PARSE start$, target$( ) [, {[ANY] delim$ | BINARY}]`

**Remarks** PARSE parses the entire string or [string expression](#) specified by *start\$*, assigning each delimited sub-string to successive elements of *target\$*. The array specified by *target\$* may be a [dynamic string](#) array, a [fixed-length string](#) array, or a [nul-terminated string](#) array.

The field delimiter is defined by *delim\$*, which may be one or more characters long. To be valid, the entire delimiter must match exactly, but the delimiter itself is never assigned as a part of the delimited field.

If *delim\$* is not specified or is null (zero-length), standard comma-delimited (optionally quoted) fields are presumed. In this case only, the following parsing rules apply. If a standard field is enclosed in optional quotes, they are removed. If any characters appear between a quoted field and the next comma delimiter, they are discarded. If no leading quote is found, any leading or trailing blank spaces are trimmed before the field is returned.

ANY If the ANY option is chosen, each appearance of any single character comprising *delim\$* is considered a valid delimiter.

BINARY The BINARY option presumes that the *string\_expr* was created with the [JOINS/BINARY](#) function, or its equivalent, which creates a string as a binary image or in the PowerBASIC and/or Visual Basic packed string format: If a string is shorter than 65535 bytes, it starts

with a 2-byte length [WORD](#) followed by the string data. Otherwise it will start a 2-byte value of 65535, followed by a [DWORD](#) indicating the string length, then finally the string data itself.

It is usually advantageous to dimension *target\$* to the correct size with the use of the [PARSECOUNT](#) function. The PARSE statement is typically much more efficient, as a whole, than repeated use of the [PARSE\\$](#) function when it is necessary to parse an entire string expression.

The JOIN\$ function is the natural complement to the PARSE statement.

**See also** [JOINS\\$, PARSE\\$, PARSECOUNT, PATHNAME\\$, PATHSCAN\\$](#)

**Example**

```
a$ = "Trevor, Bob, Bruce, Dan, Simon, Jenny"
DIM b$(1 TO PARSECOUNT(a$))
PARSE a$, b$()
ARRAY SORT b$()
```

**Result**

```
b$(1) = "Bob"
b$(2) = "Bruce"
b$(3) = "Dan"
b$(4) = "Jenny"
b$(5) = "Simon"
b$(6) = "Trevor"
```

## PARSE\$ function

# PARSE\$ function

**Purpose** Return a delimited field from a [string expression](#).

**Syntax** `a$ = PARSE$(string_expr [, {[ANY] string_delimiter / BINARY}], index&)`

**Remarks** PARSE\$ uses the following parameters:

*string\_expr* The

to parse. If *string\_expr* is empty (a null string) or contains no delimiter character(s), the string is considered to contain exactly one field. In this case, PARSE\$ will return *string\_expr*.

*string\_delimiter* Contains delimiter character(s). A delimiter is a character, list of characters, or string, that is used to mark the end of a field in *string\_expr*. For example, if you consider a sentence to be a list of words, the delimiter between the words is a space (or perhaps punctuation). Text files typically consist of lines that are delimited by CR/LF ([\\$CRLF](#) or [CHR\\$\(13,10\)](#)) characters; a database file may consist of items separated by commas; etc. A delimiter is not considered part of a field, but as the divider between fields, so the delimiter is never returned by PARSE\$.

If *delim\$* is not specified or is null (zero-length), standard comma-delimited (optionally quoted) fields are presumed. In this case only, the following parsing rules apply. If a standard field is enclosed in optional quotes, they are removed. If any characters appear between a quoted field and the next comma delimiter, they are discarded. If no leading quote is found, any leading or trailing blank spaces are trimmed before the field is returned.

Delimiters are case-sensitive, so capitalization may be a consideration.

ANY If the ANY keyword is used, *string\_delimiter* contains a set of characters, any of which may act as a delimiter character. If the ANY keyword is omitted, the entire *string\_delimiter* string acts as a single delimiter.

BINARY The BINARY option presumes that *string\_expr* was created with the [JOINS\\$/BINARY](#) function, or its equivalent, which creates a string as a binary image or in the PowerBASIC and/or Visual Basic packed string format: If a string is shorter than 65535 bytes, it starts with a 2-byte length [WORD](#) followed by the string data. Otherwise it will start a 2-byte

value of 65535, followed by a [DWORD](#) indicating the string length, then finally the string data itself.

*index&*

An

variable or expression that specifies the delimited field number to return. The first field is 1, and so on up to the maximum number of fields contained in *string\_expr*, which may be determined with the PARSECOUNT function. If *index&* is negative, *string\_expr* is parsed from right to left. In this case, *index&* = -1 returns the last field in *string\_expr*, -2 returns the second to last, etc. If *index&* evaluates to zero, or is outside of the actual field count, an empty string is returned.

**See also**

[JOINS](#), [PARSE](#), [PARSECOUNT](#), [PATHNAME\\$](#), [PATHSCAN\\$](#)

**Example**

```
a$ = PARSE$("one,two,three", 2) ' returns "two"
a$ = PARSE$("one;two,three", 2) ' returns "three"
a$ = PARSE$("one", 2) ' returns ""
a$ = PARSE$("xyz", 1) ' returns "xyz"
a$ = PARSE$("xx1x", "x", 3) ' returns "1"
a$ = PARSE$("1;2,3", ANY ";", 2) ' returns "2"
```

## PARSECOUNT function

# PARSECOUNT function

**Purpose**

Return the count of delimited strings in a [string expression](#).

**Syntax**

```
x& = PARSECOUNT(string_expr [, {[ANY] string_delimiter | BINARY}])
```

**Remarks**

PARSECOUNT uses the same rules as [PARSE\\$](#) in the determination of fields within *string\_expr*. Individual fields within *string\_expr* are evaluated, and the tally of the fields forms the result value.

It is important to note that PARSECOUNT may only be used with string data which contains variable length sub-fields, each of which is separated by a delimiter. To determine the count of fixed length data, divide the *StringExpr* length by the sub-field length. If this function is used with fixed length data, the results are undefined.

*string\_expr*

This is the

to examine and parse. If *StringExpr* is empty (a null string) or contains no delimiter character(s), the string is considered to contain exactly one sub-field. In this case, PARSECOUNT returns the value 1.

*string\_delimiter*

This defines one or more characters to use as a delimiter. To be valid, the entire delimiter must match exactly, but the delimiter itself is never returned as part of the field.

If *string\_delimiter* is not specified, or contains an empty string, special rules apply. The delimiter is assumed to be a comma. Fields may optionally be enclosed in quotes, and are ignored before the result string is returned. Any characters that appear between a quote mark and the next comma delimiter character are discarded. If no leading quote is found, any leading or trailing quotes are trimmed before the result string is returned.

ANY

If the ANY keyword is used, *string\_delimiter* contains a set of characters, any of which may act as a delimiter character. If the ANY keyword is omitted, the entire *string\_delimiter* string acts as a single delimiter.

BINARY

The BINARY option returns the number of sub-fields and presumes that *StringExpr* was created with the [JOINS/BINARY](#) function, or its equivalent, which creates a string in the PowerBASIC and/or Visual Basic packed string format: If a string is shorter than 65535 bytes, it starts with a 2-byte length [WORD](#) followed by the string data. Otherwise it will start with a 2-byte value of 65535, followed by a [DWORD](#) indicating the string length, then the actual string data.

**See also**

[JOINS](#), [PARSE](#), [PARSE\\$](#), [PATHNAME\\$](#), [PATHSCAN\\$](#)

```

Example a& = PARSECOUNT("one,two,three") ' returns 3
 a& = PARSECOUNT("one;two,three") ' returns 2
 a& = PARSECOUNT("") ' returns 1
 a& = PARSECOUNT("xx1x","x") ' returns 4
 a& = PARSECOUNT("1;2,3", ANY ",;") ' returns 3

```

## PATHNAME\$ function

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## PATHNAME\$ function IMPROVED

**Purpose** Parse a path/file name to extract component parts

**Syntax** *fil\$* = PATHNAME\$(*director*, *filespec\$*)

**Remarks** The PATHNAME\$ function evaluates a text path/file text name, and returns a requested part of the name. The functionality is strictly one of

parsing alone. No attempt is made to find the file on disk. If you wish to scan for a particular file on disk, you should use the companion function [PATHSCAN\\$](#).

*director* This is one of the following words which is used to specify the requested part:

- |           |                                                                                                                                                                                         |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FULL      | Returns the full path/file name, just as given in the <i>filespec\$</i> parameter. This is really a non-operation, but is included for symmetry with the companion function PATHSCAN\$. |
| PATH      | Returns the path portion of the path/file name. That is the text up to and including the last backslash (\) or colon (:).                                                               |
| NAME      | Return the name portion of the path/file name. That is the text to the right of the last backslash (\) or colon (:), ending just before the last period (.).                            |
| EXTN      | Returns the extension portion of the path/file name. That is the last period (.) in the string plus the text to the right of it.                                                        |
| NAME<br>X | Returns the NAME and the EXTN parts combined.                                                                                                                                           |

*filespec\$* A path/file name which does not necessarily exist on disk.

**See also** [DIR\\$](#), [EXE](#), [PATHSCAN\\$](#), [PARSE](#), [PARSE\\$](#), [PARSECOUNT](#)

```

Example PATHNAME$(PATH, "C:\PB\XXX.TXT") ' returns "C:\PB\"
 PATHNAME$(NAME, "C:\PB\XXX.TXT") ' returns "XXX"
 PATHNAME$(NAMEX, "C:\PB\XXX.TXT") ' returns "XXX.TXT"
 PATHNAME$(EXTN, "C:\PB\XXX.TXT") ' returns ".TXT"

```

## PATHSCAN\$ function

# Keyword Template

Purpose

Syntax

**Remarks****See also****Example**

## PATHSCAN\$ function

**Purpose** Find a file on disk and return the path and/or file name parts.**Syntax** `fil$ = PATHSCAN$(director, filespec$[, pathspec$])`**Remarks** The PATHSCAN\$ function scans specified directories to find a particular file. If the file is found, it returns either the full path/file name, or a selected part of it. If the file is not found, a nul (zero-length)

is returned. If you wish to simply parse a text file name, without regard to its validation on disk, you should use the companion function [PATHNAMES\\$](#).

*director* This is one of the following words which is used to specify the requested part:

- FULL Return the full drive/path/file name.
- PATH Return the path portion of the path/file name. That is the text up to and including the last backslash (\).
- NAME Return the name portion of the path/file name. That is the text to the right of the last backslash (\), ending just before the last period (.) in the string.
- EXTN Return the extension portion of the path/file name. That is the last period (.) in the string plus the text to the right of it.
- NAMEX Return the NAME and the EXTN parts combined.
- X

*filespec\$* A file name which is expected to exist on disk. It must not be an ambiguous name -- that is, it may not include a query (?) or an asterisk (\*) character.*pathspec\$* An optional path string which includes one or more paths to be searched to find filespec\$. If multiple path names are included in this string, they must each be separated by a semicolon (;) delimiter. If pathspec\$ is not given, or it is a nul (zero-length) string, the following directories are searched:

1. The directory from which the application was loaded.
2. The current directory.
3. The Windows System32 directory.
4. The Windows System16 directory.
5. The Windows directory.
6. The directories in the PATH environment variable.

**See also** [DIR\\$](#), [EXE](#), [PATHNAMES\\$](#), [PARSE](#), [PARSE\\$](#), [PARSECOUNT](#)**Example** The following information assumes that the file named "MyFile.txt" currently exists in the directory "C:\PB".

```
f$ = "MyFile.txt" : p$ = "C:\MyDir;C:\PB"
```

```
PATHSCAN$(FULL, f$, p$) ' returns "C:\PB\MyFile.txt"
PATHSCAN$(PATH, f$, p$) ' returns "C:\PB\"
PATHSCAN$(NAME, f$, p$) ' returns "MyFile"
PATHSCAN$(EXTN, f$, p$) ' returns ".txt"
PATHSCAN$(NAMEX, f$, p$) ' returns "MyFile.txt"
```

## PBLIBMAIN function

## PBLIBMAIN function

**Purpose** PBLIBMAIN performs a similar task to [DLLMAIN](#) and [LIBMAIN](#), except that PBLIBMAIN takes no parameters.

In 32-bit Windows, PBLIBMAIN is called each time a [DLL](#) is loaded or unloaded by an application or process, and (usually) if a thread is started and stopped. Your code should never call PBLIBMAIN.

**Syntax** FUNCTION PBLIBMAIN [( )] [AS LONG]

**Remarks** See [LIBMAIN](#) / [DLLMAIN](#) for more information.

**See also** [DLLMAIN](#), [LIBMAIN](#), [PBMAIN](#), [THREAD CREATE](#), [WINMAIN](#)

## PBMAIN function

# PBMAIN function

**Purpose** PBMAIN is a user-defined function called by Windows to begin running an executable application. Every PowerBASIC executable (EXE) must contain either a PBMAIN or a [WINMAIN](#) function.

**Syntax** FUNCTION PBMAIN [( )] [AS LONG]

**Remarks** Either a PBMAIN or WINMAIN function is required in every PowerBASIC application (.EXE). If you use PBMAIN, no parameters are passed, and you cannot directly obtain the instance handle of your application or the pointer to any command-line parameters.

However, you can use [COMMAND\\$](#) to get the command-line passed to your program, and the GetModuleHandle API function to get the application instance handle.

**Return** The return value of PBMAIN has an effective range of 0 to 255. Batch files may act on the result through the IF [NOT] ERRORLEVEL batch command.

**Restrictions** [DLLs](#) created with PowerBASIC should contain a [DLLMAIN](#), [LIBMAIN](#), or [PBLIBMAIN](#) function instead of PBMAIN/WINMAIN.

**See also** [COMMAND\\$](#), [DLLMAIN](#), [LIBMAIN](#), [PBLIBMAIN](#), [WINMAIN](#)

**Example**

```
#COMPILE EXE
FUNCTION PBMAIN
 MSGBOX "This is my program!"
 'Return an error level of 15
 FUNCTION = 15 ' or you can use PBMAIN = 15
END FUNCTION
```

## PEEK function

# PEEK, PEEK\$, and PEEK\$\$ functions

**IMPROVED**

**Purpose** Returns a [byte](#) or sequence of bytes at a specified memory location.

**Syntax**

```
numvar = PEEK([datatype,] address???)
ansivar = PEEK$([STRINGZ,] address???, count&)
widevar = PEEK$$([WSTRINGZ,] address???, count&)
```

**Remarks** The PEEK functions and complementary [POKE](#) statements are low-level methods of accessing individual bytes in memory. The data is retrieved from memory, starting at the specified 32-bit *address???*.

PEEK retrieves a

value starting at a specified memory address.

PEEK\$ retrieves *count&* consecutive bytes and returns them as a

. If [STRINGZ](#) (or ASCIIZ) is specified, PEEK\$ reads successive characters from

memory, up to the specified size, until a terminating **\$NUL** (**CHR\$(0)**) byte is found.

Since **STRINGZ** strings must contain a terminating **\$NUL**, the maximum length of the returned string is 1 character less than *count&*.

**PEEK\$\$** retrieves *count&* consecutive 2-byte wide characters, and returns them as a [wide](#) character string. If **WSTRINGZ** is specified, **PEEK\$\$** reads successive characters from memory, up to the specified size, until a terminating **\$NUL** (**CHR\$(0)**) character is found.

Since **WSTRINGZ** strings must contain a terminating **\$NUL**, the maximum length of the returned string is 1 character less than *count&*.

Contrary to intuitive notions, **PEEK** and **POKE** execute at the same high performance levels as [pointer](#) variables. They offer an excellent alternative to pointers in many situations.

|                     |                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>datatype</i>     | The numeric data type to retrieve, which may be any one of <a href="#">BYTE</a> , <a href="#">WORD</a> , <a href="#">DWORD</a> , <a href="#">INTEGER</a> , <a href="#">LONG</a> , <a href="#">QUAD</a> , <a href="#">SINGLE</a> , <a href="#">DOUBLE</a> , <a href="#">EXT</a> , <a href="#">CUR</a> , <a href="#">CUX</a> . If a data type is not specified, <b>BYTE</b> is assumed. |
| <i>address???</i>   | A valid 32-bit memory address specifying the location in memory where data retrieval should begin.                                                                                                                                                                                                                                                                                    |
| <i>count&amp;</i>   | A numeric expression that specifies the number of consecutive characters to be read from memory.                                                                                                                                                                                                                                                                                      |
| <b>Restrictions</b> | If <i>address???</i> (or any memory in the range covered by <i>count&amp;</i> ) references an invalid address (memory that is not allocated to the application), Windows will generate a General Protection Fault (GPF) and terminate the application. GPFs cannot be trapped with an <a href="#">ON ERROR</a> error handler.                                                         |
| <b>See also</b>     | , <a href="#">POKE</a> , <a href="#">STRPTR</a> , <a href="#">VARPTR</a>                                                                                                                                                                                                                                                                                                              |

**Example** One common application for **PEEK\$** and **POKE\$** is to perform fast [array](#) and memory block copy operations by simply copying the entire block of memory which contains the array data, rather than storing each element individually with an assignment statement:

```
Elements& = 2000 ' 2000 elements in each array
DIM OriginalArray%(1 TO Elements&)
DIM NewArray%(1 TO Elements&)

'Method 1: assign each element individually
FOR Index& = 1 TO Elements&
 NewArray%(Index&) = OriginalArray%(Index&)
NEXT Index&

'Method 2: block copy with PEEK$ and POKE$ (faster)
Source& = VARPTR(OriginalArray%(1))
Dest& = VARPTR(NewArray%(1))
ArrayLen& = Elements& * 2 'byte length of array
POKE$ Dest&, PEEK$(Source&, ArrayLen&) 'copy block
```

## PEEK\$ function

# PEEK, PEEK\$, and PEEK\$\$ functions

**IMPROVED**

|                |                                                                                                                                                                                                                                                                        |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Returns a <a href="#">byte</a> or sequence of bytes at a specified memory location.                                                                                                                                                                                    |
| <b>Syntax</b>  | <i>numvar</i> = <b>PEEK</b> ([ <i>datatype</i> ,] <i>address???</i> )<br><i>ansivar</i> = <b>PEEK\$</b> ([ <b>STRINGZ</b> ,] <i>address???</i> , <i>count&amp;</i> )<br><i>widevar</i> = <b>PEEK\$\$</b> ([ <b>WSTRINGZ</b> ,] <i>address???</i> , <i>count&amp;</i> ) |
| <b>Remarks</b> | The <b>PEEK</b> functions and complementary <a href="#">POKE</a> statements are low-level methods of accessing individual bytes in memory. The data is retrieved from memory, starting at the specified 32-bit <i>address???</i> .<br><br><b>PEEK</b> retrieves a      |

value starting at a specified memory address.

PEEK\$ retrieves *count*& consecutive bytes and returns them as a

. If [STRINGZ](#) (or ASCIIZ) is specified, PEEK\$ reads successive characters from memory, up to the specified size, until a terminating [\\$NUL](#) ([CHR\\$\(0\)](#)) byte is found.

Since STRINGZ strings must contain a terminating \$NUL, the maximum length of the returned string is 1 character less than *count*&.

PEEK\$\$ retrieves *count*& consecutive 2-byte wide characters, and returns them as a [wide](#) character string. If [WSTRINGZ](#) is specified, PEEK\$\$ reads successive characters from memory, up to the specified size, until a terminating \$NUL ([CHR\\$\(0\)](#)) character is found.

Since WSTRINGZ strings must contain a terminating \$NUL, the maximum length of the returned string is 1 character less than *count*&.

Contrary to intuitive notions, PEEK and POKE execute at the same high performance levels as [pointer](#) variables. They offer an excellent alternative to pointers in many situations.

|                     |                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>datatype</i>     | The numeric data type to retrieve, which may be any one of <a href="#">BYTE</a> , <a href="#">WORD</a> , <a href="#">DWORD</a> , <a href="#">INTEGER</a> , <a href="#">LONG</a> , <a href="#">QUAD</a> , <a href="#">SINGLE</a> , <a href="#">DOUBLE</a> , <a href="#">EXT</a> , <a href="#">CUR</a> , <a href="#">CUX</a> . If a data type is not specified, BYTE is assumed. |
| <i>address???</i>   | A valid 32-bit memory address specifying the location in memory where data retrieval should begin.                                                                                                                                                                                                                                                                             |
| <i>count&amp;</i>   | A numeric expression that specifies the number of consecutive characters to be read from memory.                                                                                                                                                                                                                                                                               |
| <b>Restrictions</b> | If <i>address???</i> (or any memory in the range covered by <i>count</i> &) references an invalid address (memory that is not allocated to the application), Windows will generate a General Protection Fault (GPF) and terminate the application. GPFs cannot be trapped with an <a href="#">ON ERROR</a> error handler.                                                      |
| <b>See also</b>     | , <a href="#">POKE</a> , <a href="#">STRPTR</a> , <a href="#">VARPTR</a>                                                                                                                                                                                                                                                                                                       |

#### Example

One common application for PEEK\$ and [POKE\\$](#) is to perform fast [array](#) and memory block copy operations by simply copying the entire block of memory which contains the array data, rather than storing each element individually with an assignment statement:

```
Elements& = 2000 ' 2000 elements in each array
DIM OriginalArray%(1 TO Elements&)
DIM NewArray%(1 TO Elements&)

'Method 1: assign each element individually
FOR Index& = 1 TO Elements&
 NewArray%(Index&) = OriginalArray%(Index&)
NEXT Index&

'Method 2: block copy with PEEK$ and POKE$ (faster)
Source& = VARPTR(OriginalArray%(1))
Dest& = VARPTR(NewArray%(1))
ArrayLen& = Elements& * 2 'byte length of array
POKE$ Dest&, PEEK$(Source&, ArrayLen&) 'copy block
```

## PEEK\$\$ function

# PEEK, PEEK\$, and PEEK\$\$ functions

IMPROVED

**Purpose** Returns a [byte](#) or sequence of bytes at a specified memory location.

**Syntax**

```
numvar = PEEK([datatype,] address???)
ansivar = PEEK$([STRINGZ,] address???, count&)
widevar = PEEK$$([WSTRINGZ,] address???, count&)
```

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Remarks</b>      | <p>The PEEK functions and complementary <a href="#">POKE</a> statements are low-level methods of accessing individual bytes in memory. The data is retrieved from memory, starting at the specified 32-bit <i>address???</i>.</p> <p>PEEK retrieves a value starting at a specified memory address.</p> <p>PEEK\$ retrieves <i>count</i>&amp; consecutive bytes and returns them as a . If <a href="#">STRINGZ</a> (or ASCIIZ) is specified, PEEK\$ reads successive characters from memory, up to the specified size, until a terminating <a href="#">\$NUL</a> (<a href="#">CHR\$(0)</a>) byte is found. Since STRINGZ strings must contain a terminating \$NUL, the maximum length of the returned string is 1 character less than <i>count</i>&amp;.</p> <p>PEEK\$\$ retrieves <i>count</i>&amp; consecutive 2-byte wide characters, and returns them as a <a href="#">wide</a> character string. If <a href="#">WSTRINGZ</a> is specified, PEEK\$\$ reads successive characters from memory, up to the specified size, until a terminating \$NUL (<a href="#">CHR\$(0)</a>) character is found. Since WSTRINGZ strings must contain a terminating \$NUL, the maximum length of the returned string is 1 character less than <i>count</i>&amp;.</p> <p>Contrary to intuitive notions, PEEK and POKE execute at the same high performance levels as <a href="#">pointer</a> variables. They offer an excellent alternative to pointers in many situations.</p> |
| <i>datatype</i>     | The numeric data type to retrieve, which may be any one of <a href="#">BYTE</a> , <a href="#">WORD</a> , <a href="#">DWORD</a> , <a href="#">INTEGER</a> , <a href="#">LONG</a> , <a href="#">QUAD</a> , <a href="#">SINGLE</a> , <a href="#">DOUBLE</a> , <a href="#">EXT</a> , <a href="#">CUR</a> , <a href="#">CUX</a> . If a data type is not specified, BYTE is assumed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <i>address???</i>   | A valid 32-bit memory address specifying the location in memory where data retrieval should begin.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <i>count&amp;</i>   | A numeric expression that specifies the number of consecutive characters to be read from memory.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Restrictions</b> | If <i>address???</i> (or any memory in the range covered by <i>count</i> &) references an invalid address (memory that is not allocated to the application), Windows will generate a General Protection Fault (GPF) and terminate the application. GPFs cannot be trapped with an <a href="#">ON ERROR</a> error handler.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>See also</b>     | , <a href="#">POKE</a> , <a href="#">STRPTR</a> , <a href="#">VARPTR</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Example</b>      | <p>One common application for PEEK\$ and <a href="#">POKE\$</a> is to perform fast <a href="#">array</a> and memory block copy operations by simply copying the entire block of memory which contains the array data, rather than storing each element individually with an assignment statement:</p> <pre> Elements&amp; = 2000 ' 2000 elements in each array DIM OriginalArray%(1 TO Elements&amp;) DIM NewArray%(1 TO Elements&amp;)  'Method 1: assign each element individually FOR Index&amp; = 1 TO Elements&amp;   NewArray%(Index&amp;) = OriginalArray%(Index&amp;) NEXT Index&amp;  'Method 2: block copy with PEEK\$ and POKE\$ (faster) Source&amp; = VARPTR(OriginalArray%(1)) Dest&amp; = VARPTR(NewArray%(1)) ArrayLen&amp; = Elements&amp; * 2 'byte length of array POKE\$ Dest&amp;, PEEK\$(Source&amp;, ArrayLen&amp;) 'copy block </pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

## PLAY WAVE statement

# Keyword Template

**Purpose**  
**Syntax**  
**Remarks**  
**See also**  
**Example**

## PLAY statement **New!**

**Purpose** Play a sound under program control.

**Syntax** `PLAY WAVE ResourceID$ [,descriptors...] [TO ResultVar&]  
PLAY WAVE END`

**Remarks** The PLAY statement allows you to play a previously created WAVE [resource](#) or WAVE file. It's generally advantageous to use the resource form. Access is typically faster and the need for extra files is reduced. The first form of PLAY WAVE starts the sound, while PLAY WAVE END stops any waveform sound which is currently playing.

*ResourceID\$* is a [string expression](#) which tells either the [Resource ID](#) of the waveform data, or the disk file where it can be found. If the resource ID is numeric, just precede the number with #, such as "#12345". If the Resource ID contains a period, it is presumed to be the name of a disk file. Otherwise, an attempt is made to load it from a resource -- if not found, it is then presumed to be a disk file. If the waveform data cannot be found, an [error 53](#) (File Not Found) is generated.

If you include the optional TO clause, a success value is assigned to the *ResultVar&*. If the operation succeeds, the value [True](#) (non-zero) is assigned. If it fails, the value [False](#) (zero) is assigned.

The default method is to play the waveform data in the background. That is, the Play statement returns immediately so the application can execute other code while the sound is playing.

By default, the new sound takes precedence over any other sound currently playing.

When PLAY WAVE is executed, any other sound playing is stopped immediately. The new sound is played to replace it. This default methodology can be altered with options described later.

The optional descriptor words (one or more) may be added to control the way in which the sound is played. The descriptors available are:

|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Loop                           | The sound is played repeatedly in the background. It plays forever, until PLAY WAVE END is executed, or the program terminates.                                                                                                                                                                                                                                                                                                                                                                |
| NoStop                         | If another sound is playing, the new sound is discarded and not played. The value <a href="#">False</a> (zero) is returned to the <i>ResultVar&amp;</i> to let you know that the operation failed. You can try again to play the new sound at your convenience.                                                                                                                                                                                                                                |
| Synch                          | The sound plays in synchronous mode, commonly known as the foreground. The application waits for the sound to complete before continuing execution of other code. The sound and the code are synchronized.                                                                                                                                                                                                                                                                                     |
| YieldMS( <i>TimeOut&amp;</i> ) | If another sound is playing, the new sound yields and allows the first sound to complete. The numeric expression <i>TimeOut&amp;</i> tells the maximum number of milliseconds (approximate) to wait before giving up. If the Timeout period expires and the first sound is still playing, the new sound is aborted. If the Timeout period is zero (0), the program will wait an unlimited amount of time for the first sound to finish. The maximum <i>TimeOut&amp;</i> permitted is one hour. |

**See also** [#RESOURCE](#)

## PLAY WAVE END statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## PLAY statement **New!**

Purpose

Play a sound under program control.

Syntax

```
PLAY WAVE ResourceID$ [,descriptors...] [TO ResultVar&]
PLAY WAVE END
```

Remarks

The PLAY statement allows you to play a previously created WAVE [resource](#) or WAVE file. It's generally advantageous to use the resource form. Access is typically faster and the need for extra files is reduced. The first form of PLAY WAVE starts the sound, while PLAY WAVE END stops any waveform sound which is currently playing.

*ResourceID\$* is a [string expression](#) which tells either the [Resource ID](#) of the waveform data, or the disk file where it can be found. If the resource ID is numeric, just precede the number with #, such as "#12345". If the Resource ID contains a period, it is presumed to be the name of a disk file. Otherwise, an attempt is made to load it from a resource -- if not found, it is then presumed to be a disk file. If the waveform data cannot be found, an [error 53](#) (File Not Found) is generated.

If you include the optional TO clause, a success value is assigned to the *ResultVar&*. If the operation succeeds, the value [True](#) (non-zero) is assigned. If it fails, the value [False](#) (zero) is assigned.

The default method is to play the waveform data in the background. That is, the Play statement returns immediately so the application can execute other code while the sound is playing.

By default, the new sound takes precedence over any other sound currently playing.

When PLAY WAVE is executed, any other sound playing is stopped immediately. The new sound is played to replace it. This default methodology can be altered with options described later.

The optional descriptor words (one or more) may be added to control the way in which the sound is played. The descriptors available are:

|                                |                                                                                                                                                                                                                                                                 |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Loop                           | The sound is played repeatedly in the background. It plays forever, until PLAY WAVE END is executed, or the program terminates.                                                                                                                                 |
| NoStop                         | If another sound is playing, the new sound is discarded and not played. The value <a href="#">False</a> (zero) is returned to the <i>ResultVar&amp;</i> to let you know that the operation failed. You can try again to play the new sound at your convenience. |
| Synch                          | The sound plays in synchronous mode, commonly known as the foreground. The application waits for the sound to complete before continuing execution of other code. The sound and the code are synchronized.                                                      |
| YieldMS( <i>TimeOut&amp;</i> ) | If another sound is playing, the new sound yields and allows the first sound to complete. The numeric expression <i>TimeOut&amp;</i> tells the maximum number of milliseconds (approximate) to wait before giving                                               |

up. If the Timeout period expires and the first sound is still playing, the new sound is aborted. If the Timeout period is zero (0), the program will wait an unlimited amount of time for the first sound to finish. The maximum *TimeOut* permitted is one hour.

See also [#RESOURCE](#)

## POKE statement

# POKE, POKE\$, and POKE\$\$ statements

**Purpose** Store a [byte](#) or sequence of bytes at a specified memory location.

**Syntax**  
 POKE [*DataType*,] *Address???*, *DataValue* [, *DataValue*...]  
 POKE\$ [*STRINGZ*,] *Address???*, *StringExpr*  
 POKE\$\$ [*WSTRINGZ*,] *Address???*, *StringExpr*

**Remarks** The POKE statements and complementary [PEEK](#) functions are low-level methods of accessing individual bytes in memory. The data is stored to memory starting at the specified 32-bit address.

In its classic form, the POKE statement stores a single byte (8 bits) whose value ranges from 0 to 255. In its enhanced form, POKE provides the functionality of a dynamic pointer: the *DataType* parameter specifies the data type and hence the size of the target data to write to the target memory address. *DataType* can be any one of [BYTE](#), [WORD](#), [DWORD](#), [INTEGER](#), [LONG](#), [QUAD](#), [SINGLE](#), [DOUBLE](#), [EXT](#), [CUR](#), [CUX](#). If a *DataType* is not specified, [BYTE](#) is assumed. If you specify more than one *DataValue*, they are stored in successive memory locations.

POKE\$ stores the bytes of *StringExpr* in consecutive bytes of memory. If [STRINGZ](#) (or [ASCIIZ](#)) is specified, POKE\$ writes successive characters to memory, up to the specified size, until a terminating [\\$NUL](#) byte is found in the source string. If no \$NUL is found in the string, one is automatically appended. It is the programmer's responsibility to ensure that POKE\$ does not overrun the target memory area to avoid data corruption or protection faults.

POKE\$\$ stores the characters of *StringExpr* as consecutive 2-byte words of memory. If [WSTRINGZ](#) is specified, POKE\$\$ writes successive [wide](#) characters, up to the specified size, until a terminating \$NUL is found in the source string. If no \$NUL is found in the string, one is automatically added. It is the programmer's responsibility to ensure that POKE\$\$ does not overrun the target memory area to avoid data corruption or protection faults.

Contrary to intuitive notions, PEEK and POKE execute at the same high performance levels as pointer variables. They offer an excellent alternative to pointers in many situations.

*Address???* A valid 32-bit memory address specifying the location in memory where data storage should begin.

*Datavalue* The data value to be stored at *Address???*.

*StringExpr* A [string constant](#), [literal](#) or [expression](#) that specifies the sequence of characters to be stored in memory, starting at by *Address???*.

**Restrictions** If POKE attempts to access memory that is not allocated to the application, Windows will generate a General Protection Fault (GPF) and terminate the application. GPFs cannot be trapped.

See also [GLOBALMEM ALLOC](#), [MEMORY](#),  
 , [PEEK](#), [STRPTR](#), [VARPTR](#)

## POKE\$ statement

# POKE, POKE\$, and POKE\$\$ statements

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>      | Store a <a href="#">byte</a> or sequence of bytes at a specified memory location.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Syntax</b>       | <pre>POKE [DataType,] Address???, DataValue [, DataValue...]</pre> <pre>POKE\$ [STRINGZ,] Address???, StringExpr</pre> <pre>POKE\$\$ [WSTRINGZ,] Address???, StringExpr</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Remarks</b>      | <p>The POKE statements and complementary <a href="#">PEEK</a> functions are low-level methods of accessing individual bytes in memory. The data is stored to memory starting at the specified 32-bit address.</p> <p>In its classic form, the POKE statement stores a single byte (8 bits) whose value ranges from 0 to 255. In its enhanced form, POKE provides the functionality of a dynamic pointer: the <i>DataType</i> parameter specifies the data type and hence the size of the target data to write to the target memory address. <i>DataType</i> can be any one of <a href="#">BYTE</a>, <a href="#">WORD</a>, <a href="#">DWORD</a>, <a href="#">INTEGER</a>, <a href="#">LONG</a>, <a href="#">QUAD</a>, <a href="#">SINGLE</a>, <a href="#">DOUBLE</a>, <a href="#">EXT</a>, <a href="#">CUR</a>, <a href="#">CUX</a>. If a <i>DataType</i> is not specified, <a href="#">BYTE</a> is assumed. If you specify more than one <i>DataValue</i>, they are stored in successive memory locations.</p> <p>POKE\$ stores the bytes of <i>StringExpr</i> in consecutive bytes of memory. If <a href="#">STRINGZ</a> (or <a href="#">ASCIIZ</a>) is specified, POKE\$ writes successive characters to memory, up to the specified size, until a terminating <a href="#">\$NUL</a> byte is found in the source string. If no <a href="#">\$NUL</a> is found in the string, one is automatically appended. It is the programmer's responsibility to ensure that POKE\$ does not overrun the target memory area to avoid data corruption or protection faults.</p> <p>POKE\$\$ stores the characters of <i>StringExpr</i> as consecutive 2-byte words of memory. If <a href="#">WSTRINGZ</a> is specified, POKE\$\$ writes successive <a href="#">wide</a> characters, up to the specified size, until a terminating <a href="#">\$NUL</a> is found in the source string. If no <a href="#">\$NUL</a> is found in the string, one is automatically added. It is the programmer's responsibility to ensure that POKE\$\$ does not overrun the target memory area to avoid data corruption or protection faults.</p> <p>Contrary to intuitive notions, PEEK and POKE execute at the same high performance levels as pointer variables. They offer an excellent alternative to pointers in many situations.</p> |
| <i>Address???</i>   | A valid 32-bit memory address specifying the location in memory where data storage should begin.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <i>Datavalue</i>    | The data value to be stored at <i>Address???</i> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <i>StringExpr</i>   | A <a href="#">string constant</a> , <a href="#">literal</a> or <a href="#">expression</a> that specifies the sequence of characters to be stored in memory, starting at by <i>Address???</i> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Restrictions</b> | If POKE attempts to access memory that is not allocated to the application, Windows will generate a General Protection Fault (GPF) and terminate the application. GPFs cannot be trapped.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>See also</b>     | <a href="#">GLOBALMEM ALLOC</a> , <a href="#">MEMORY</a> ,<br>, <a href="#">PEEK</a> , <a href="#">STRPTR</a> , <a href="#">VARPTR</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

## POKE\$\$ statement

# POKE, POKE\$, and POKE\$\$ statements

|                |                                                                                                                                                                               |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Store a <a href="#">byte</a> or sequence of bytes at a specified memory location.                                                                                             |
| <b>Syntax</b>  | <pre>POKE [DataType,] Address???, DataValue [, DataValue...]</pre> <pre>POKE\$ [STRINGZ,] Address???, StringExpr</pre> <pre>POKE\$\$ [WSTRINGZ,] Address???, StringExpr</pre> |

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Remarks</b>      | <p>The POKE statements and complementary <a href="#">PEEK</a> functions are low-level methods of accessing individual bytes in memory. The data is stored to memory starting at the specified 32-bit address.</p> <p>In its classic form, the POKE statement stores a single byte (8 bits) whose value ranges from 0 to 255. In its enhanced form, POKE provides the functionality of a dynamic pointer: the <i>Data Type</i> parameter specifies the data type and hence the size of the target data to write to the target memory address. <i>Data Type</i> can be any one of <a href="#">BYTE</a>, <a href="#">WORD</a>, <a href="#">DWORD</a>, <a href="#">INTEGER</a>, <a href="#">LONG</a>, <a href="#">QUAD</a>, <a href="#">SINGLE</a>, <a href="#">DOUBLE</a>, <a href="#">EXT</a>, <a href="#">CUR</a>, <a href="#">CUX</a>. If a <i>Data Type</i> is not specified, BYTE is assumed. If you specify more than one <i>Data Value</i>, they are stored in successive memory locations.</p> <p>POKE\$ stores the bytes of <i>StringExpr</i> in consecutive bytes of memory. If <a href="#">STRINGZ</a> (or ASCIIZ) is specified, POKE\$ writes successive characters to memory, up to the specified size, until a terminating <a href="#">\$NUL</a> byte is found in the source string. If no \$NUL is found in the string, one is automatically appended. It is the programmer's responsibility to ensure that POKE\$ does not overrun the target memory area to avoid data corruption or protection faults.</p> <p>POKE\$\$ stores the characters of <i>StringExpr</i> as consecutive 2-byte words of memory. If <a href="#">WSTRINGZ</a> is specified, POKE\$\$ writes successive <a href="#">wide</a> characters, up to the specified size, until a terminating \$NUL is found in the source string. If no \$NUL is found in the string, one is automatically added. It is the programmer's responsibility to ensure that POKE\$\$ does not overrun the target memory area to avoid data corruption or protection faults.</p> <p>Contrary to intuitive notions, PEEK and POKE execute at the same high performance levels as pointer variables. They offer an excellent alternative to pointers in many situations.</p> |
| <i>Address???</i>   | A valid 32-bit memory address specifying the location in memory where data storage should begin.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <i>Datavalue</i>    | The data value to be stored at <i>Address???</i> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <i>StringExpr</i>   | A <a href="#">string constant</a> , <a href="#">literal</a> or <a href="#">expression</a> that specifies the sequence of characters to be stored in memory, starting at by <i>Address???</i> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Restrictions</b> | If POKE attempts to access memory that is not allocated to the application, Windows will generate a General Protection Fault (GPF) and terminate the application. GPFs cannot be trapped.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>See also</b>     | <a href="#">GLOBALMEM ALLOC</a> , <a href="#">MEMORY</a> ,<br>, <a href="#">PEEK</a> , <a href="#">STRPTR</a> , <a href="#">VARPTR</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

## POWERARRAY Object

# Keyword Template

**Purpose**  
**Syntax**  
**Remarks**  
**See also**  
**Example**

## POWERARRAY Object New!

**Purpose** The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the

elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of [arrays](#). It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a [VARIANT](#) variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

## Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

|              |      |                 |       |
|--------------|------|-----------------|-------|
| %vt_i2       | = 2  | %vt_ui4         | = 19  |
| %vt_i4       | = 3  | %vt_i8          | = 20  |
| %vt_r4       | = 4  | %vt_int         | = 22  |
| %vt_r8       | = 5  | %vt_uint        | = 23  |
| %vt_cy       | = 6  | %vt_ptr         | = 26  |
| %vt_date     | = 7  | %vt_userdefined | = 29  |
| %vt_bstr     | = 8  | %vt_filetime    | = 64  |
| %vt_dispatch | = 9  | %vt_astr        | = 201 |
| %vt_bool     | = 11 | %vt_stringfix   | = 203 |
| %vt_variant  | = 12 | %vt_wstringfix  | = 204 |
| %vt_unknown  | = 13 | %vt_stringz     | = 205 |
| %vt_decimal  | = 14 | %vt_wstringz    | = 206 |
| %vt_i1       | = 16 | %vt_type        | = 211 |
| %vt_ui1      | = 17 | %vt_ext         | = 221 |
| %vt_ui2      | = 18 | %vt_curx        | = 222 |

The array dimensions are stated at the time the array is created by executing the [DIM](#) method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with [RedimPreserve](#). It is also predefined in the compiler.

```

TYPE PowerBounds
 Elements1 AS LONG
 LowBound1 AS LONG
 Elements2 AS LONG
 LowBound2 AS LONG
 Elements3 AS LONG
 LowBound3 AS LONG
 Elements4 AS LONG
 LowBound4 AS LONG
END TYPE

TYPE PowerBound
 Elements AS LONG
 LowBound AS LONG
END TYPE

```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the [OBJRESULT](#) function will return a non-zero result rather than %S\_OK (zero).

### IPowerArray Methods/Properties

**METHOD ARRAYBASE ( ) AS DWORD <1>**

This method returns the address of the first element of the array.

**METHOD ARRAYDESC ( ) AS DWORD <2>**

This method returns the address of the SAFEARRAY descriptor.

**PROPERTY GET ARRAYINFO ( ) AS WString <3>**

You can attach a [wide text](#) string to an array for informational or documentation. This Get

Property retrieves the info string, if one is present.

**PROPERTY SET ARRAYINFO ( ) = WString <3>**

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a [wide dynamic string](#) to the array.

**METHOD CLONE (PowerArray) <4>**

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

**METHOD COPYFROMVARIANT (ByRef Variant) <5>**

An exact copy is made of the SafeArray contained in the parameter Variant. The array copy is stored in this PowerArray object.

**METHOD COPYTOVARIANT (ByRef Variant) <6>**

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter Variant. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

**METHOD DIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <9>**

Dimensions (creates) a new array. The VT& parameter is specified by one of the %VT values listed in remarks. Subscripts& is the number of dimensions (1 to 4), Bounds is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter SIZE tells the size (in bytes) of each element. SIZE is only used with %vt\_stringfix, %vt\_wstringfix, %vt\_stringz, %vt\_wstringz, and %vt\_type.

**METHOD ERASE ( ) <10>**

The contained array is destroyed and the object is then considered empty.

**METHOD ELEMENTPTR (ByVal Index1&, Opt ByVal Index2&, \_  
Opt ByVal Index3&, Opt ByVal Index4&)**

**AS LONG <11>**

Calculates and retrieves the address of the data element specified by the Index parameter(s).

**METHOD ELEMENTSIZE ( ) <12>**

Retrieves the storage size (in bytes) of each data element of the array.

**METHOD LBOUND (Subscript&) AS LONG <13>**

Retrieves the lower bound number for the dimension specified by the Subscript& parameter. The first subscript is 1, the second is 2, etc.

**METHOD LOCK ( ) <14>**

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD MOVEFROMVARIANT (ByRef Variant) <17>**

Transfers ownership of the SafeArray contained in the variant parameter to this PowerArray object. The variant is then changed to %vt\_empty.

**METHOD MOVETOVARIANT (ByRef Variant) <18>**

Transfers ownership of the SafeArray contained in this PowerArray object to the variant parameter. The PowerArray object is then changed to empty.

**METHOD REDIM (ByVal VT&, ByVal Subscripts&, ByRef Bounds, OPTIONAL ByVal SIZE) <19>**

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The VT& parameter is specified by one of the %VT values listed in remarks. Subscripts& is the number of dimensions (1 to 4), Bounds is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter SIZE tells the size (in bytes) of each element. SIZE is only used with %vt\_stringfix, %vt\_wstringfix, %vt\_stringz, %

vt\_wstringz, and %vt\_type.

**METHOD REDIMPRESERVE (ByRef Bound) <20>**

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

**METHOD RESET () <21>**

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt\_empty, and object variables are set to nothing. The array memory is not deallocated.

**METHOD SUBSCRIPTS () <22>**

Retrieves the number of dimensions (subscripts) for this array.

**METHOD UBOUND (Subscript&) AS LONG <23>**

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

**METHOD UNLOCK () <24>**

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef GetVar, ByVal Index1&, Opt ByVal Index2&, \_  
\_ Opt ByVal Index3&, Opt ByVal Index4&) AS  
LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef SetVar, ByVal Index1&, Opt ByVal Index2&, \_  
\_ Opt ByVal Index3&, Opt ByVal Index4&) AS  
LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

**METHOD VALUETYPE () <27>**

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

**See Also** [ARRAY ASSIGN](#), [ARRAY DELETE](#), [ARRAY INSERT](#), [ARRAY SCAN](#), [ARRAY SORT](#), [DIM](#), [LBOUND](#), [REDIM](#), [UBOUND](#)

## POWERTIME object

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## PowerTime Object New!

**Purpose** A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a [quad-integer](#). This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other [objects](#), but using a predefined internal [class](#) and a predefined internal [interface](#).

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member [methods](#). The IPowerTime interface is DUAL -- member methods may be referenced using either [Direct](#) or [Dispatch](#) form.

**Remarks** The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate [%PB\\_COMPILETIME](#). Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX Built.DateString
MSGBOX Built.TimeString
```

### **POWERTIME Methods**

#### **AddDays <1> (ByVal Days&)**

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

#### **AddHours <2> (ByVal Hours&)**

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

#### **AddMinutes <3> (ByVal Minutes&)**

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

#### **AddMonths <4> (ByVal Months&)**

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

#### **AddMSeconds <5> (ByVal Milliseconds&)**

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

#### **AddSeconds <6> (ByVal Seconds&)**

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

#### **AddTicks <7> (ByVal Ticks&)**

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

#### **AddYears <8> (ByVal Years&)**

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

#### **DateDiff <11> (PowerTime, Sign&, Years&, Months&, Days&)**

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is

larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

**DateString <12> (OPT ByVal LCID&) AS String**

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

**DateStringLong <13> (OPT ByVal LCID&) AS WString**

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

**Day <15> () AS Long**

Returns the Day component of the PowerTime object. It is a value in the range of 1-31.

**DayOfWeek <16> () AS Long**

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

**DayOfWeekString <17> (OPT ByVal LCID&) AS WString**

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

**DaysInMonth <18> () AS Long**

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

**PROPERTY GET FileTime <20> () AS Quad**

Returns a Quad-Integer value of the PowerTime object as a FileTime.

**PROPERTY SET FileTime <20> (ByVal FileTime&&)**

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

**Hour <21> () as Long**

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

**IsLeapYear <22> () as Long**

Returns [true/false](#) (-1/0) to tell if the PowerTime object year is a leap year.

**Minute <23> () as Long**

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

**Month <24> () as Long**

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

**MonthString <25> () AS String**

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

**MSecond <26> () as Long**

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

**NewDate <27> (ByVal Year&, Opt ByVal Month&, Opt ByVal Day&)**

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in [OBJRESULT](#).

**NewTime <28> (ByVal Hour&, Opt ByVal Min&, Opt ByVal Sec&, Opt ByVal MSec&, Opt ByVal Tick&)**

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

**Now <29> ()**

The current local date and time on this computer is assigned to this PowerTime object.

**NowUTC <30> ()**

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

**Second <31> () as Long**

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

**Tick <32> () as Long**

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

**TimeDiff <33> (PowerTime, Sign&, Days&, OPT Hours&, OPT Minutes&, OPT Seconds&, OPT MSeconds&&, OPT Ticks&&)**

The internal PowerTime object is compared to the specified external PowerTime object.

The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours \* 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

**TimeString <34> () AS String**

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

**TimeString24 <35> () AS WString**

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

**TimeStringFull <36> () AS WString**

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

**Today <38> ()**

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

**ToLocalTime <39> ()**

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

**ToUTC <40> ()**

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

**Year <42> () as Long**

Returns the Year component of the PowerTime object as a numeric value.

**See also**

[DATE\\$](#), [DAYNAME\\$](#), [MONTHNAME\\$](#), [TIME\\$](#)

## PREFIX/END PREFIX statements

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## PREFIX/END PREFIX statements New!

**Purpose** Executes a series of statements, each of which utilizes pre-defined source code.

**Syntax**

```
PREFIX "source code"
 [additional statements]
END PREFIX
```

**Remarks** PREFIX/END PREFIX statements enclose a set of statements, each of which has the same specified "source code" prepended. The "source code" (in languages which support it) is usually required to be the name of an [object](#) variable. However, in PowerBASIC, this definition has been expanded greatly to allow virtually any code to be used. This reduces repetitive typing and reduces the risk of typing errors. For example:

| PREFIX/END PREFIX                                                                            | Compiles as:                                                              |
|----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| <pre>PREFIX MyObject."     Init(XX)     Sleep(2) END PREFIX</pre>                            | <pre>MyObject.Init(XX) MyObject.Sleep(2)</pre>                            |
| <pre>PREFIX "MyStruc."     Height = 220     Width = 345     Color = %Blue END PREFIX</pre>   | <pre>MyStruc.Height = 220 MyStruc.Width = 345 MyStruc.Color = %Blue</pre> |
| <pre>PREFIX "ASM "     Mov Eax, Ebx     Mov Ecx, &amp;H14     IMul Eax, Esi END PREFIX</pre> | <pre>ASM Mov Eax, Ebx ASM Mov Ecx, &amp;H14 ASM IMul Eax, Esi</pre>       |

If the "source code" prefix refers to an [object](#) variable or a [UDT](#) structure variable, be sure it ends with a period (.) to reference members of that item. Otherwise, be sure it contains whole words. Just as with macros and line continuations, you cannot put half a word on one line, and half a word on another. For example, the following code is illegal and will generate an exception:

```
PREFIX "PRI"
 NT #1, "Hello World"
END PREFIX
```

PREFIX/END PREFIX structures may not be nested.

**See Also** [ASM ALIGN](#)

## PRINT# statement

# PRINT# statement

**Purpose** Write data to a [device](#) or [sequential file](#).

**Syntax**

```
PRINT # fNum&
PRINT # fNum&, [ExpList] [SPC(n)] [TAB(n)] [,] [;] [...]
```

**Remarks** The first form of the PRINT# statement (with or without a trailing comma) outputs a blank line to the file (i.e. a CR/LF only).

The second form of the PRINT# statement has the following parts, which may occur in any order and quantity, within a single PRINT# statement:

|                  |                                                                                                                                                                                                                                                                                          |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>fNum&amp;</i> | Number used in an <a href="#">OPEN</a> statement to open a sequential file. It can be any numeric expression that evaluates to the number of an open file. Note that the Number symbol (#) preceding <i>fNum&amp;</i> is not optional.                                                   |
| <i>ExpList</i>   | and/or <a href="#">string expression</a> (s) to be written to the file.                                                                                                                                                                                                                  |
| SPC( <i>n</i> )  | An optional function used to insert <i>n</i> spaces into the printed output. Multiple use of the SPC argument is permitted in the PRINT statement, for example, between expressions. Values of <i>n</i> less than 1 are ignored.                                                         |
| TAB( <i>n</i> )  | An optional function used to tab to the <i>n</i> th column before printing <i>ExpList</i> . Multiple use of the TAB argument is permitted in the PRINT, for example, to position arguments in columns. Values of <i>n</i> less than 1 are ignored.                                       |
| {;,}             | Character that determines the position of the next character printed. A semicolon (;) means the next character is printed immediately after the last character; a comma (,) means the next character is printed at the start of the next print zone. Print zones begin every 14 columns. |

If the final argument of a PRINT# statement is a semicolon or comma, PRINT# will not append the (default) CR/LF byte pair to the data as it is written to the file. For example:

```
PRINT #1, "Hello";
PRINT #1, " world!"
```

...produces the contiguous string "Hello world!" in the disk file.

If you omit all arguments, the PRINT# statement prints a blank line in the file (i.e., a CR/LF pair only), but you must include the comma after the file number. Because PRINT# writes an image of the data to the file, you must delimit the data so it is printed correctly. If you use commas as delimiters, PRINT# also writes the blanks between print fields to the file. Also, remember that spacing of data displayed on a text screen using monospaced characters may not work well when the data is redisplayed in a graphical environment using proportionally spaced characters.

If you are not careful, you can waste a lot of disk space with unnecessary spaces, or worse, put fields so close together that you cannot tell them apart when they are later input with INPUT#. For example:

```
PRINT #1,1,2,3
```

sends:

```
1 2 3
```

to file #1. Because of the 14-column print zones between characters, superfluous spaces are sent to the file. On the other hand:

```
PRINT #1,1;2;3
```

sends:

```
1 2 3
```

to the file, and you cannot read the separate numeric values from this record because

INPUT# requires commas as delimiters. The best way to delimit fields is to put a comma between each field, like so:

```
PRINT #1, 1 ",", 2 ",", 3
```

which writes:

```
1, 2, 3
```

to the file, and wastes the least possible space and is easy to read with an [INPUT#](#) statement. The [WRITE#](#) statement delimits fields with commas automatically.

PRINT# is advantageous when writing a single

or on each line in a file. Use PRINT# followed by a comma but no arguments to write a blank line (carriage return/linefeed) to a file:

```
PRINT #1, 'writes a blank line to file #1
```

`array$()` When PRINT# specifies an [array](#) name with empty parentheses, the entire array is written to the disk file as text strings, with each element delimited by a CR/LF ([\\$CRLF](#) or [CHR\\$\(13,10\)](#)). Numeric [arrays](#) are converted to the [ASCII](#) text equivalent.

**Restrictions** Arrays of [User-Defined Types](#) (UDTs) may not be used with the array form of the PRINT# statement.

**See also** [GET](#), [GET\\$](#), [GET\\$\\$](#), [INPUT#](#), [LINE INPUT#](#), [PUT](#), [PUT\\$](#), [PUT\\$\\$](#), [WRITE#](#)

**Example**

```
' Classic PRINT# statement example
SUB MakeFile
 ' opens a sequential file for output. Using PRINT #,
 ' it writes lines of different data types to the file.
 x& = FREEFILE
 OPEN "INPUT#.DTA" FOR OUTPUT AS #x&
 StringVariable$ = "I'll be back."
 IntegerVar% = 1000
 FloatingPoint! = 30000.12
 ' Write a line of text to the sequential file.
 PRINT #x&, StringVariable$
 PRINT #x&, IntegerVar%
 PRINT #x&, FloatingPoint!
 CLOSE #x& ' close file variable
END SUB ' end procedure MakeFile

SUB ReadFile
 ' Opens a sequential file for input. Using INPUT #,
 ' reads lines of different types of data from the file.
 x& = FREEFILE
 OPEN "INPUT#.DTA" FOR INPUT AS #x&
 RESET StringVariable$
 RESET IntegerVar%
 RESET FloatingPoint!
 ' Read a line of text from the sequential file.
 INPUT #x&, StringVariable$
 INPUT #x&, IntegerVar%
 INPUT #x&, FloatingPoint!
 CLOSE #x& ' close file variable
END SUB ' end procedure ReadFile

' Array mode PRINT# statement example
a$ = "Trevor, Bob, Bruce, Dave, Simon, Jenny"
DIM b$(1 TO PARSECOUNT(a$))
PARSE a$, b$()
ARRAY SORT b$()
OPEN "filename.txt" FOR OUTPUT AS #1
PRINT #1, b$()
```

CLOSE #1

## PRINTER\$ function

# PRINTER\$ function

|                 |                                                                                                                                                                                                                                                                  |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Retrieve printer names and printer port names.                                                                                                                                                                                                                   |
| <b>Syntax</b>   | <i>device\$</i> = PRINTER\$([NAME   PORT], <i>printernum</i> &)                                                                                                                                                                                                  |
| <b>Remarks</b>  | <i>printernum</i> & specifies the printer number, from 1 to <a href="#">PRINTERCOUNT</a> . If the NAME option is specified in the first position, the printer name is returned. If the PORT option is specified instead, the port name (e.g., LPT1) is returned. |
| <b>See also</b> | <a href="#">LPRINT ATTACH</a> , <a href="#">PRINTERCOUNT</a> , <a href="#">XPRINT ATTACH</a>                                                                                                                                                                     |

## PRINTERCOUNT function

# PRINTERCOUNT function

|                 |                                                                                                                                                                                                           |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Retrieve the number of available (installed) printers.                                                                                                                                                    |
| <b>Syntax</b>   | <i>ncPrinters</i> & = PRINTERCOUNT                                                                                                                                                                        |
| <b>See also</b> | <a href="#">LPRINT ATTACH</a> , <a href="#">PRINTER\$</a> , <a href="#">XPRINT ATTACH</a>                                                                                                                 |
| <b>Example</b>  | <pre> FUNCTION PBMAIN   LOCAL ix AS LONG, sPrinters AS STRING   FOR ix = 1 TO PRINTERCOUNT     sPrinters = sPrinters &amp; PRINTER\$(NAME, ix) &amp; \$CRLF   NEXT   MSGBOX sPrinters END FUNCTION </pre> |

## PROCESS GET PRIORITY statement

# Keyword Template

|                 |
|-----------------|
| <b>Purpose</b>  |
| <b>Syntax</b>   |
| <b>Remarks</b>  |
| <b>See also</b> |
| <b>Example</b>  |

# PROCESS GET PRIORITY statement

|                |                                                                                                                                                                                                                                                                                                                                                                          |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Retrieve the Priority Value for the current <a href="#">process</a> .                                                                                                                                                                                                                                                                                                    |
| <b>Syntax</b>  | PROCESS GET PRIORITY TO <i>lResult</i> &                                                                                                                                                                                                                                                                                                                                 |
| <b>Remarks</b> | <p>PROCESS GET PRIORITY retrieves the priority value for the current process. The retrieved priority value is assigned to the <a href="#">long</a> or <a href="#">dword</a> variable designated by <i>lResult</i>&amp;.</p> <p>The process priority value is one of the following:</p> <pre>%IDLE_PRIORITY_CLASS = &amp;H00000040</pre> <p>Indicates a process whose</p> |

run only when the system is idle and are preempted by the threads of any process running in a higher priority class. An example is a screen saver. The idle priority class is inherited by child processes.

`%NORMAL_PRIORITY_CLASS = &H00000020`

Indicates a normal process with no special scheduling needs.

`%HIGH_PRIORITY_CLASS = &H00000080`

Indicates a process that performs time-critical tasks that must be executed immediately for it to run correctly. The threads of a high-priority class process preempt the threads of normal or idle priority class processes. An example is Windows Task List, which must respond quickly when called by the user, regardless of the load on the operating system. Use extreme care when using the high-priority class, because a high-priority class CPU-bound application can use nearly all available cycles.

`%REALTIME_PRIORITY_CLASS = &H00000100`

Indicates a process that has the highest possible priority. The threads of a real-time priority class process preempt the threads of all other processes, including operating system processes performing important tasks. For example, a real-time process that executes for more than a very brief interval can cause disk caches not to flush or cause the mouse to be unresponsive.

**See also** [PROCESS SET PRIORITY](#), [THREAD GET PRIORITY](#), [THREAD SET PRIORITY](#)

## PROCESS SET PRIORITY statement

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## PROCESS SET PRIORITY statement

**Purpose** Sets the Priority Value for the current [process](#).

**Syntax** `PROCESS SET PRIORITY Priority&`

**Remarks** PROCESS SET PRIORITY assigns a new priority value to the current process.

The process priority value must be one of the following:

`%IDLE_PRIORITY_CLASS = &H00000040`

Indicates a process whose

run only when the system is idle and are preempted by the threads of any process running in a higher priority class. An example is a screen saver. The idle priority class is inherited by child processes.

`%NORMAL_PRIORITY_CLASS = &H00000020`

Indicates a normal process with no special scheduling needs.

`%HIGH_PRIORITY_CLASS = &H00000080`

Indicates a process that performs time-critical tasks that must be executed immediately for it to run correctly. The threads of a high-priority class process preempt the threads of normal or idle priority class processes. An example is Windows Task List, which must respond quickly when called by the user, regardless of the load on

the operating system. Use extreme care when using the high-priority class, because a high-priority class CPU-bound application can use nearly all available cycles.

```
%REALTIME_PRIORITY_CLASS = &H00000100
```

Indicates a process that has the highest possible priority. The threads of a real-time priority class process preempt the threads of all other processes, including operating system processes performing important tasks. For example, a real-time process that executes for more than a very brief interval can cause disk caches not to flush or cause the mouse to be unresponsive.

See also [PROCESS GET PRIORITY](#), [THREAD GET PRIORITY](#), [THREAD SET PRIORITY](#)

## PROFILE statement

# PROFILE statement

**Purpose** Capture a profile report detailing total execution times of the [Subs](#), [Functions](#), [Methods](#), and [Properties](#) in a program and write it to a disk file.

**Syntax** `PROFILE diskfilename$`

**Remarks** At the time the PROFILE statement is executed, a standard [sequential file](#) of the specified file name `diskfilename$` is created. For the best results in executable files, the PROFILE statement should be the last statement executed in the [PBMAIN/WINMAIN](#) function.

The profile report contains a list of every procedure within the same module (EXE or [DLL](#)), the number of times it was called, and the total elapsed time (in milliseconds) spent executing all instances of the procedure. These statistics appear in the disk file in that specific order on each line:

```
<Procedure Name>, <Call Count>, <Time mSec>
```

The profile report only describes procedures that physically reside within the module (EXE or DLL) where the PROFILE statement is located. Procedures in an external EXE or DLL are not profiled individually; however, the time taken to call other procedures and DLL/API functions is included in the accumulated execution time of the calling procedure.

It is highly recommended that you close all other applications when profiling a PowerBASIC application. When an application is being profiled, PowerBASIC must generate a considerable amount of extra code to gather all of the needed information. This extra code is generated whenever a valid PROFILE statement appears in your program, regardless of whether it is actually executed.

For final production code, use the [#TOOLS OFF](#) metastatement is used to ensure the highest performance levels.

### Interpreting a profile report

The execution time of nested procedures needs to be understood in order to obtain a clear "picture" of the execution times. For example, consider the following results:

| <i>Procedure</i> | <i>calls</i> | <i>time</i> |
|------------------|--------------|-------------|
| MySubA,          | 1,           | 11016       |
| MySubB,          | 100,         | 10014       |

At first glance, these results may suggest a "bottleneck" in *MySubA* since it took *MySubA* 11016 milliseconds to execute just one call, whereas the average time for *MySubB* was only about 100 milliseconds per call (10014 mSec / 100 calls = 100.14 mSec).

However, if *MySubB* is actually **called by** *MySubA*, the results need to be assessed differently. For example, we could say: "*MySubB* took 10014 milliseconds of the 11016 milliseconds of the time spent in *MySubA*". Or to put it another way: "Of the 11016 milliseconds *MySubA* took to execute, 10014 milliseconds of that time was spent

executing *MySubB*".

Interpolating these results, it can be easily calculated that the code in *MySubA* only took 1002 milliseconds to run, yet this blossomed to 11016 milliseconds because of its dependence on *MySubB*.

Therefore, improving the performance of *MySubB* would clearly improve the overall speed of *MySubA*, and the profile results of both functions would be improved accordingly.

#### Restrictions

Profiling is "enabled" when the first procedure that contains a PROFILE statement begins execution. All procedures *subsequently* executed from within that procedure are profiled.

It is not possible to profile the actual PBMAIN or WINMAIN functions. If a PROFILE statement occurs within PBMAIN/WINMAIN, all procedures that are called from PBMAIN/LIBMAIN are profiled normally.

Therefore, if PBMAIN/WINMAIN contains code that requires profiling, simply rename the function and create a new PBMAIN/WINMAIN function that immediately calls the renamed function and then executes a PROFILE statement. See the example below.

For application code with nested and lengthy procedure calls, adding up the total number of milliseconds in the last column of a PROFILE disk file will usually produce a number that is far larger than the actual time it took your program to execute.

The time resolution of the profile report is limited by the *Quantum* supported by the operating system (Win95/98 is 54 mSec, and WinNT/2000/XP is 10 mSec), and can be influenced by any other applications which run concurrently. Nonetheless, PROFILE can offer a great insight as to which code may be consuming the most CPU time, and where optimization efforts should be concentrated.

#### See also

[#TOOLS](#), [CALLSTK](#), [CALLSTK\\$](#), [CALLSTKCOUNT](#), [FUNCNAME\\$](#), [TRACE](#)

#### Example

```
SUB B1
 SLEEP 1000
END SUB
```

```
SUB A1
 SLEEP 250
 CALL B1
END SUB
```

```
FUNCTION PBMAIN
 CALL A1
 PROFILE "Profile Results.txt" ' Profile at end
END FUNCTION
```

#### Result

|         |    |      |
|---------|----|------|
| A1,     | 1, | 1252 |
| B1,     | 1, | 1002 |
| PBMAIN, | 1, | 0    |

## PROGID\$ function

# PROGID\$ function

#### Purpose

Return the unique alphanumeric PROGID

(text) associated with a unique [CLSID](#) string of a [COM object](#) or component. A [COM](#) object/component must include an alphanumeric PROGID string in order to be used by PowerBASIC (and Visual Basic).

#### Syntax

a\$ = PROGID\$(*ClassID\$*)

#### Remarks

A PROGID string is the unique alphanumeric text name associated with a given COM object/component. For example, "Word.Application.8".

You convert the 16-byte (128-bit) binary class ID of a COM object/component into a PROGID string with the PROGID\$ function.

PROGID\$ takes the (16-byte) binary string *ClassID\$* representing the [GUID](#) or UUID of a COM object/component, and examines the system registry in order to determine the PROGID string associated with the *ClassID\$* string. ClassID\$ may be a [dynamic string](#) or [fixed-length string](#) of at least 16 bytes, or (typically) a GUID variable.

If the *ClassID\$* cannot be found, or any error occurs in the lookup process, PROGID\$ will not set the [ERR](#) system variable, but will return an empty string.

PROGID\$ is the complement to the [CLSID\\$](#) function. Using these two functions together, it is possible to extract the precise capitalization of the PROGID from the system registry. See the example below.

#### See also

[DIM](#), [CLSID\\$](#), [GUID\\$](#), [GUIDTXT\\$](#), [INTERFACE \(Direct\)](#), [INTERFACE \(IDBind\)](#), [ISINTERFACE](#), [ISNOTHING](#), [ISOBJECT](#), [Just what is COM?](#), [LET \(with Objects\)](#), [METHOD](#), [OBJECT](#), [OBJECTIVE](#), [OBJPTR](#), [OBJRESULT](#), [PROPERTY](#), [What is an object, anyway?](#)

#### Example

```
DIM MSWordClassID AS GUID
MSWordClassID = CLSID$("Word.Application")
IF TRIM$(MSWordClassID, $NUL) <> "" THEN
 'Success getting the CLSID$ of MSWord
 a$ = PROGID$(MSWordClassID)
 'a$ now contains "Word.Application.8"
 b$ = GUIDTXT$(MSWordClassID)
 'b$ holds "{000209FF-0000-0000-C000-000000000046}"
END IF
```

## PROGRESSBAR GET POS statement

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## PROGRESSBAR statement

**Purpose**

Manipulate a [PROGRESSBAR](#) control. A ProgressBar is a rectangle that is gradually filled, left to right, as some work progresses.

**Syntax**

```
PROGRESSBAR GET POS hDlg, id& TO datav&
PROGRESSBAR GET RANGE hDlg, id& TO LoDatav&, HiDatav&
PROGRESSBAR SET POS hDlg, id&, position&
PROGRESSBAR SET RANGE hDlg, id&, lolimit&, hilimit&
PROGRESSBAR SET STEP hDlg, id&, stepval&
PROGRESSBAR STEP hDlg, id& [, incramt&]
```

*hDlg*

[Handle](#) of the [dialog](#) that owns the ProgressBar.

*id&*

The [control identifier](#) assigned with [CONTROL ADD PROGRESSBAR](#).

**Remarks**

In each of the following samples and descriptions, the PROGRESSBAR control that is the subject of the statement is identified by the handle of the dialog that owns the ProgressBar (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD PROGRESSBAR. To alter the [color](#) of the bar or the background, use

[CONTROL SET COLOR.](#)**PROGRESSBAR GET POS *hDlg, id& TO datav&***

The current position of the ProgressBar is retrieved and assigned to the variable designated by *datav&*.

**PROGRESSBAR GET RANGE *hDlg, id& TO LoDatav&, HiDatav&***

The current range of the ProgressBar is retrieved and assigned to the variables designated by *LoDatav&* and *HiDatav&*. Upon ProgressBar creation, the default range is 0 to 100.

**PROGRESSBAR SET POS *hDlg, id&, position&***

The current position of the ProgressBar is set to the value of the parameter *position&*, and the bar is redrawn to reflect the new position.

**PROGRESSBAR SET RANGE *hDlg, id&, lolimit&, hilimit&***

The range for the ProgressBar is specified to be from *lolimit&* to *hilimit&*. If *lolimit&* is greater than *hilimit&*, the results are undefined.

**PROGRESSBAR SET STEP *hDlg, id&, step&***

The default increment value to be used by PROGRESSBAR STEP is specified by the *stepval&* parameter.

**PROGRESSBAR STEP *hDlg, id& [,incramt&]***

The ProgressBar is "stepped". The current position is advanced by the step increment, and the bar is redrawn to reflect the new position. If the optional *incramt&* expression is included, the position is advanced by that amount instead. The default step increment is 10, and the default range is from 0 to 100.

See also [Dynamic Dialog Tools](#), [CONTROL ADD PROGRESSBAR](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#)

**PROGRESSBAR GET RANGE statement**

## Keyword Template

**Purpose****Syntax****Remarks****See also****Example**

## PROGRESSBAR statement

**Purpose** Manipulate a [PROGRESSBAR](#) control. A ProgressBar is a rectangle that is gradually filled, left to right, as some work progresses.

**Syntax**

```

PROGRESSBAR GET POS hDlg, id& TO datav&
PROGRESSBAR GET RANGE hDlg, id& TO LoDatav&, HiDatav&
PROGRESSBAR SET POS hDlg, id&, position&
PROGRESSBAR SET RANGE hDlg, id&, lolimit&, hilimit&
PROGRESSBAR SET STEP hDlg, id&, stepval&
PROGRESSBAR STEP hDlg, id& [,incramt&]

```

*hDlg* [Handle](#) of the [dialog](#) that owns the ProgressBar.

*id&* The [control identifier](#) assigned with [CONTROL ADD PROGRESSBAR](#).

**Remarks** In each of the following samples and descriptions, the PROGRESSBAR control that is the subject of the statement is identified by the handle of the dialog that owns the ProgressBar (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD PROGRESSBAR. To alter the [color](#) of the bar or the background, use [CONTROL SET COLOR](#).

#### **PROGRESSBAR GET POS *hDlg, id& TO datav&***

The current position of the ProgressBar is retrieved and assigned to the variable designated by *datav&*.

#### **PROGRESSBAR GET RANGE *hDlg, id& TO LoDatav&, HiDatav&***

The current range of the ProgressBar is retrieved and assigned to the variables designated by *LoDatav&* and *HiDatav&*. Upon ProgressBar creation, the default range is 0 to 100.

#### **PROGRESSBAR SET POS *hDlg, id&, position&***

The current position of the ProgressBar is set to the value of the parameter *position&*, and the bar is redrawn to reflect the new position.

#### **PROGRESSBAR SET RANGE *hDlg, id&, lolimit&, hilimit&***

The range for the ProgressBar is specified to be from *lolimit&* to *hilimit&*. If *lolimit&* is greater than *hilimit&*, the results are undefined.

#### **PROGRESSBAR SET STEP *hDlg, id&, step&***

The default increment value to be used by PROGRESSBAR STEP is specified by the *stepval&* parameter.

#### **PROGRESSBAR STEP *hDlg, id& [,incramt&]***

The ProgressBar is "stepped". The current position is advanced by the step increment, and the bar is redrawn to reflect the new position. If the optional *incramt&* expression is included, the position is advanced by that amount instead. The default step increment is 10, and the default range is from 0 to 100.

**See also** [Dynamic Dialog Tools](#), [CONTROL ADD PROGRESSBAR](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#)

## PROGRESSBAR SET POS statement

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

# PROGRESSBAR statement

**Purpose** Manipulate a [PROGRESSBAR](#) control. A ProgressBar is a rectangle that is gradually

filled, left to right, as some work progresses.

**Syntax**

```
PROGRESSBAR GET POS hDlg, id& TO datav&
PROGRESSBAR GET RANGE hDlg, id& TO LoDatav&, HiDatav&
PROGRESSBAR SET POS hDlg, id&, position&
PROGRESSBAR SET RANGE hDlg, id&, lolimit&, hilimit&
PROGRESSBAR SET STEP hDlg, id&, stepval&
PROGRESSBAR STEP hDlg, id& [,incramt&]
```

***hDlg***

[Handle](#) of the [dialog](#) that owns the ProgressBar.

***id&***

The [control identifier](#) assigned with [CONTROL ADD PROGRESSBAR](#).

**Remarks**

In each of the following samples and descriptions, the PROGRESSBAR control that is the subject of the statement is identified by the handle of the dialog that owns the ProgressBar (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD PROGRESSBAR. To alter the [color](#) of the bar or the background, use [CONTROL SET COLOR](#).

**PROGRESSBAR GET POS *hDlg, id&* TO *datav&***

The current position of the ProgressBar is retrieved and assigned to the variable designated by *datav&*.

**PROGRESSBAR GET RANGE *hDlg, id&* TO *LoDatav&, HiDatav&***

The current range of the ProgressBar is retrieved and assigned to the variables designated by *LoDatav&* and *HiDatav&*. Upon ProgressBar creation, the default range is 0 to 100.

**PROGRESSBAR SET POS *hDlg, id&, position&***

The current position of the ProgressBar is set to the value of the parameter *position&*, and the bar is redrawn to reflect the new position.

**PROGRESSBAR SET RANGE *hDlg, id&, lolimit&, hilimit&***

The range for the ProgressBar is specified to be from *lolimit&* to *hilimit&*. If *lolimit&* is greater than *hilimit&*, the results are undefined.

**PROGRESSBAR SET STEP *hDlg, id&, step&***

The default increment value to be used by PROGRESSBAR STEP is specified by the *stepval&* parameter.

**PROGRESSBAR STEP *hDlg, id& [,incramt&]***

The ProgressBar is "stepped". The current position is advanced by the step increment, and the bar is redrawn to reflect the new position. If the optional *incramt&* expression is included, the position is advanced by that amount instead. The default step increment is 10, and the default range is from 0 to 100.

**See also**

[Dynamic Dialog Tools](#), [CONTROL ADD PROGRESSBAR](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#)

**PROGRESSBAR SET RANGE statement**

# Keyword Template

**Purpose****Syntax****Remarks**

See also

Example

## PROGRESSBAR statement

**Purpose** Manipulate a [PROGRESSBAR](#) control. A ProgressBar is a rectangle that is gradually filled, left to right, as some work progresses.

**Syntax**

```
PROGRESSBAR GET POS hDlg, id& TO datav&
PROGRESSBAR GET RANGE hDlg, id& TO LoDatav&, HiDatav&
PROGRESSBAR SET POS hDlg, id&, position&
PROGRESSBAR SET RANGE hDlg, id&, lolimit&, hilimit&
PROGRESSBAR SET STEP hDlg, id&, stepval&
PROGRESSBAR STEP hDlg, id& [,incramt&]
```

*hDlg* [Handle](#) of the [dialog](#) that owns the ProgressBar.

*id&* The [control identifier](#) assigned with [CONTROL ADD PROGRESSBAR](#).

**Remarks** In each of the following samples and descriptions, the PROGRESSBAR control that is the subject of the statement is identified by the handle of the dialog that owns the ProgressBar (*hDlg*), and the unique control identifier you gave it upon creation in [CONTROL ADD PROGRESSBAR](#). To alter the [color](#) of the bar or the background, use [CONTROL SET COLOR](#).

### **PROGRESSBAR GET POS *hDlg, id&* TO *datav&***

The current position of the ProgressBar is retrieved and assigned to the variable designated by *datav&*.

### **PROGRESSBAR GET RANGE *hDlg, id&* TO *LoDatav&, HiDatav&***

The current range of the ProgressBar is retrieved and assigned to the variables designated by *LoDatav&* and *HiDatav&*. Upon ProgressBar creation, the default range is 0 to 100.

### **PROGRESSBAR SET POS *hDlg, id&, position&***

The current position of the ProgressBar is set to the value of the parameter *position&*, and the bar is redrawn to reflect the new position.

### **PROGRESSBAR SET RANGE *hDlg, id&, lolimit&, hilimit&***

The range for the ProgressBar is specified to be from *lolimit&* to *hilimit&*. If *lolimit&* is greater than *hilimit&*, the results are undefined.

### **PROGRESSBAR SET STEP *hDlg, id&, step&***

The default increment value to be used by PROGRESSBAR STEP is specified by the *stepval&* parameter.

### **PROGRESSBAR STEP *hDlg, id& [,incramt&]***

The ProgressBar is "stepped". The current position is advanced by the step increment, and the bar is redrawn to reflect the new position. If the optional *incramt&* expression is included, the position is advanced by that amount instead. The default step increment is 10, and the default range is from 0 to 100.

**See also** [Dynamic Dialog Tools](#), [CONTROL ADD PROGRESSBAR](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#)

## PROGRESSBAR SET STEP statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## PROGRESSBAR statement

**Purpose** Manipulate a [PROGRESSBAR](#) control. A ProgressBar is a rectangle that is gradually filled, left to right, as some work progresses.

**Syntax**

```
PROGRESSBAR GET POS hDlg, id& TO datav&
PROGRESSBAR GET RANGE hDlg, id& TO LoDatav&, HiDatav&
PROGRESSBAR SET POS hDlg, id&, position&
PROGRESSBAR SET RANGE hDlg, id&, lolimit&, hilimit&
PROGRESSBAR SET STEP hDlg, id&, stepval&
PROGRESSBAR STEP hDlg, id& [,incramt&]
```

*hDlg* [Handle](#) of the [dialog](#) that owns the ProgressBar.

*id&* The [control identifier](#) assigned with [CONTROL ADD PROGRESSBAR](#).

**Remarks** In each of the following samples and descriptions, the PROGRESSBAR control that is the subject of the statement is identified by the handle of the dialog that owns the ProgressBar (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD PROGRESSBAR. To alter the [color](#) of the bar or the background, use [CONTROL SET COLOR](#).

### **PROGRESSBAR GET POS *hDlg, id&* TO *datav&***

The current position of the ProgressBar is retrieved and assigned to the variable designated by *datav&*.

### **PROGRESSBAR GET RANGE *hDlg, id&* TO *LoDatav&, HiDatav&***

The current range of the ProgressBar is retrieved and assigned to the variables designated by *LoDatav&* and *HiDatav&*. Upon ProgressBar creation, the default range is 0 to 100.

### **PROGRESSBAR SET POS *hDlg, id&, position&***

The current position of the ProgressBar is set to the value of the parameter *position&*, and the bar is redrawn to reflect the new position.

### **PROGRESSBAR SET RANGE *hDlg, id&, lolimit&, hilimit&***

The range for the ProgressBar is specified to be from *lolimit&* to *hilimit&*. If *lolimit&* is greater than *hilimit&*, the results are undefined.

### **PROGRESSBAR SET STEP *hDlg, id&, step&***

The default increment value to be used by PROGRESSBAR STEP is specified by the *stepval&* parameter.

### **PROGRESSBAR STEP *hDlg, id& [,incramt&]***

The ProgressBar is "stepped". The current position is advanced by the step increment,

and the bar is redrawn to reflect the new position. If the optional *incramt&* expression is included, the position is advanced by that amount instead. The default step increment is 10, and the default range is from 0 to 100.

See also [Dynamic Dialog Tools](#), [CONTROL ADD PROGRESSBAR](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#)

## PROGRESSBAR STEP statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

# PROGRESSBAR statement

**Purpose** Manipulate a [PROGRESSBAR](#) control. A ProgressBar is a rectangle that is gradually filled, left to right, as some work progresses.

**Syntax**

```
PROGRESSBAR GET POS hDlg, id& TO datav&
PROGRESSBAR GET RANGE hDlg, id& TO LoDatav&, HiDatav&
PROGRESSBAR SET POS hDlg, id&, position&
PROGRESSBAR SET RANGE hDlg, id&, lolimit&, hilimit&
PROGRESSBAR SET STEP hDlg, id&, stepval&
PROGRESSBAR STEP hDlg, id& [,incramt&]
```

*hDlg* [Handle](#) of the [dialog](#) that owns the ProgressBar.

*id&* The [control identifier](#) assigned with [CONTROL ADD PROGRESSBAR](#).

**Remarks** In each of the following samples and descriptions, the PROGRESSBAR control that is the subject of the statement is identified by the handle of the dialog that owns the ProgressBar (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD PROGRESSBAR. To alter the [color](#) of the bar or the background, use [CONTROL SET COLOR](#).

### **PROGRESSBAR GET POS *hDlg, id&* TO *datav&***

The current position of the ProgressBar is retrieved and assigned to the variable designated by *datav&*.

### **PROGRESSBAR GET RANGE *hDlg, id&* TO *LoDatav&, HiDatav&***

The current range of the ProgressBar is retrieved and assigned to the variables designated by *LoDatav&* and *HiDatav&*. Upon ProgressBar creation, the default range is 0 to 100.

### **PROGRESSBAR SET POS *hDlg, id&, position&***

The current position of the ProgressBar is set to the value of the parameter *position&*, and the bar is redrawn to reflect the new position.

### **PROGRESSBAR SET RANGE *hDlg, id&, lolimit&, hilimit&***

The range for the ProgressBar is specified to be from *lolimit&* to *hilimit&*. If *lolimit&* is greater than *hilimit&*, the results are undefined.

**PROGRESSBAR SET STEP *hDlg, id&, step&***

The default increment value to be used by PROGRESSBAR STEP is specified by the *stepval&* parameter.

**PROGRESSBAR STEP *hDlg, id& [,incramt&]***

The ProgressBar is "stepped". The current position is advanced by the step increment, and the bar is redrawn to reflect the new position. If the optional *incramt&* expression is included, the position is advanced by that amount instead. The default step increment is 10, and the default range is from 0 to 100.

See also [Dynamic Dialog Tools](#), [CONTROL ADD PROGRESSBAR](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#)

**PROPERTY / END PROPERTY statement**

## Keyword Template

Purpose

Syntax

Remarks

See also

Example

## PROPERTY/END PROPERTY statements

**IMPROVED**

**Purpose** Define a [PROPERTY](#) procedure within a [class](#).

**Syntax**

```
[OVERRIDE] PROPERTY GET|SET name [<DispID>] [ALIAS "altname"] (var AS
type...) [THREADSAFE] [AS type]
 [statements]
 PROPERTY = expression
END PROPERTY
```

**Remarks** PROPERTY/END PROPERTY is used to define a PROPERTY procedure within a class. Properties can only be called through a virtual function table on an active [object](#). A PROPERTY is a special type of [METHOD](#), which is only used to set or retrieve data in an object. While the work of a PROPERTY could readily be accomplished with a standard METHOD, this distinction is convenient to emphasize the concept of encapsulation of instance data within an object. There are two forms of PROPERTY procedures: PROPERTY GET and PROPERTY SET. As implied by the names, the first form is used to retrieve a data value from the object, while the second form is used to assign a value. Properties must be defined within a [CLASS Block](#), and may only be declared within a DECLARE CLASS Block. Properties are defined:

```
PROPERTY GET name [ALIAS "altname"] (BYVAL var AS type...) [THREADSAFE]
AS type
 [statements]
 PROPERTY = expression
END PROPERTY

PROPERTY SET name [ALIAS "altname"] (BYVAL var AS type...) [THREADSAFE]
 [statements]
 variable = value
END PROPERTY
```

When you use PROPERTY SET, the value to be assigned is passed to the right of an

equal sign, just like a normal assignment to a variable:

Properties can only be called through a virtual function table on an active object. Property parameters may be of any variable type.

```
ObjVar.Prop1 = NewValue
```

A PROPERTY may be considered "Read-Only" or "Write-Only" by simply omitting one of the two definitions. However, if both GET and SET forms are defined for a particular property, all parameters and the property data type must be identical in both forms, and they must be paired. That is, the PROPERTY SET must immediately follow the PROPERTY GET.

Property parameters may be of any variable type.

You can access a PROPERTY GET with:

```
DIM ObjVar AS MyInterface
LET ObjVar = NEWCOM Prgid$
1. ObjVar.Prop1(param) TO var
2. CALL ObjVar.Prop1(param) TO var
3. var = ObjVar.Prop1(param)
```

You can access a PROPERTY SET with:

```
DIM ObjVar AS MyInterface
LET ObjVar = NEWCOM Prgid$
1. ObjVar.Prop1(param) = expr
2. CALL ObjVar.Prop1(param) = expr
```

Note that the choice of Property procedure is syntax directed. In other words, depending upon the way you use the name, PowerBASIC will automatically decide whether the GET or SET PROPERTY should be called.

In every Method and Property, PowerBASIC automatically defines a pseudo-variable named [ME](#), which is treated as a reference to the current object. Using ME, it's possible to call any other Method or Property which is a member of the class: `var = ME.Method1(param)`

Methods may be declared (using AS *type*...) to return a

, any of the types, a specific class of object variable (AS MyClass), a [Variant](#), or a [user defined Type](#).

**Type Libraries only support the following data types: [BYTE](#), [WORD](#), [DWORD](#), [INTEGER](#), [LONG](#), [QUAD](#), [SINGLE](#), [DOUBLE](#), [CURRENCY](#), [OBJECT](#), [STRING](#), and [VARIANT](#). If any Methods or Properties use data types not supported by Type Libraries, you will receive a [Error 581 - Type Library creation error](#), when using the [#COM TLIB ON](#) metastatement.**

In addition to the explicit return value which you declare, all [COM](#) Methods and Properties have another "Hidden Return Value", which is cryptically named [hResult](#). While the name would imply a handle for a result, it's really not a handle at all, but just a [long integer](#) value, used to indicate success or failure of the Method. After calling a Method or Property, you can retrieve the hResult value with the PowerBASIC function [OBJRESULT](#).

The most significant bit of the value is known as the severity bit. That bit is 0 (value is positive) for success, or 1 (value is negative) for failure. The remaining bits are used to convey error codes and additional status information. If you call any object Method/Property (either [Dispatch](#) or [Direct](#)), and the severity bit in the returned hResult is set, PowerBASIC generates Run-Time [error 99](#): Object error. When you create a Method or Property, PowerBASIC automatically returns an hResult of zero, which implies success. You can return a non-zero hResult value by executing a METHOD OBJRESULT = *expr* within a Method, or PROPERTY OBJRESULT = *expr* within a Property.

Every method and property in a [dual interface](#) needs a positive, long integer value to identify it. That integer value is known as a *DispID* (Dispatch ID), and it's used internally by COM services to call the correct function on a Dispatch interface. You can optionally specify particular *DispID* by enclosing it in angle brackets immediately following the

Method/Property name:

```
METHOD MethodOne <76> ()
```

If you don't specify a *DispID*, PowerBASIC will assign a random value for you. This is fine for internal objects, but may cause a failure for published [COM objects](#), as the *DispID* could change each time you compile your program. It is particularly important that you specify a *DispID* for each Method/Property in a COM [Event Interface](#).

### **Override Properties**

You can add to, or replace, the functionality of a particular method or property of an [inherited base class](#) by coding a replacement which is preceded by the word **OVERRIDE**. The overriding method must have the same name and signature (parameters, return value, etc.) as the one it replaces.

### **BYREF and BYVAL parameters**

- BYVAL A copy of the data value is placed on the [stack](#) as a parameter. The copy is destroyed when the PROPERTY ends. BYVAL parameters default to an IN attribute, if no explicit direction is specified.
- BYREF A pointer to the data is placed on the stack as a parameter. This option may not be used with an internal PROPERTY parameter.

### **Direction attributes**

PROPERTY parameters also specify the direction in which data is passed between the caller and callee:

- IN Data is passed from the caller to the PROPERTY. Generally speaking, you'll find that almost all IN parameters are passed BYVAL, and that is highly recommended. However, it is possible to pass them BYREF if necessary.
- OUT Data is passed from the PROPERTY back to the caller. All OUT parameters must be passed BYREF.
- INOUT Data is passed from the caller to the PROPERTY, and results are returned to the caller in the same parameter. All INOUT parameters must be passed BYREF.

In many cases, the direction of a parameter can be inferred directly from the BYVAL/BYREF attribute (BYVAL=IN, BYREF=OUT). However, we recommend that you include the direction attribute as an added means of self-documentation. Each METHOD parameter name may be preceded by one of BYVAL/BYREF, and one of IN/OUT/INOUT, in any sequence.

You should note an interesting rule of COM objects: **IN parameters are read-only. They may not be altered.**

IN parameters are considered by COM rules to be "constant" which may not be altered, because they are values which are not returned to the caller. However, since this is not a rule normally applied to a standard [SUB](#) or [FUNCTION](#), it can allow programming bugs which are most difficult to find and correct. For this reason, PowerBASIC automatically protects you from this issue with no action needed on your part. When writing METHOD or PROPERTY code in PowerBASIC, you may freely assign new values to BYVAL/IN parameters. They will simply be discarded when the METHOD exits. Of course, not every programming language protects you in this way, so you must use caution if you create a COM METHOD in another compiler.

### **Using OPTIONAL/OPT**

PROPERTY statements may specify one or more parameters as optional by preceding the parameter with either the keyword

(or the abbreviation OPT). When a parameter is declared optional, all subsequent parameters in the declaration are optional as well, whether or not they specify an

explicit **OPTIONAL** or **OPT** directive.

VARIANT variables are particularly well suited for use as an optional parameter. If the calling code omits an optional VARIANT parameter, (BYVAL or BYREF), PowerBASIC (and most other compilers) substitute a variant of type %VT\_ERROR which contains an error value of %DISP\_E\_PARAMNOTFOUND (&H80020004). In this case, you can check for this value directly, or use the [ISMISSING](#) function to determine whether the parameter was physically passed or not.

When optional parameters (other than VARIANT) are omitted from the calling code, the stack area normally reserved for those parameters is zero-filled.

If the parameter is defined as a BYVAL parameter, it will have the value zero. For [TYPE](#) or [UNION](#) variables passed BYVAL, the compiler will pass a string of binary zeroes of length [SIZEOF](#)(*Type\_or\_union\_var*).

If the parameter is defined as a BYREF parameter, [VARPTR](#)(*Vaname*) will equal zero; when this is true, any attempt to use *Vaname* in your code will result in a General Protection Fault or memory corruption. You should use the [ISMISSING](#)() function first to determine whether it is safe to access the parameter.

### **THREADSAFE Option Descriptor**

If you include the option THREADSAFE, PowerBASIC automatically establishes a semaphore which allows only one

to execute it at a time. Others must wait until the first thread exits the THREADSAFE procedure before they are allowed to begin.

#### **See also**

[#COM](#), [CLASS](#), [INSTANCE](#), [INTERFACE \(Direct\)](#), [INTERFACE \(IDBind\)](#), [ISINTERFACE](#), [ISNOTHING](#), [ISMISSING](#), [ISOBJECT](#), [Just what is COM?](#), [LET \(with Objects\)](#), [ME](#), [METHOD](#), [OBJECTIVE](#), [OBJPTR](#), [OBJRESULT](#), [What is an object, anyway?](#)

#### **Example**

```

CLASS cMyClass
 INSTANCE Value AS LONG

 INTERFACE iMyClass
 INHERIT IDISPATCH

 PROPERTY GET Value <1> AS LONG
 PROPERTY = Value
 END PROPERTY

 PROPERTY SET Value <1> (BYVAL NewValue AS LONG)
 Value = NewValue
 END PROPERTY

 END INTERFACE
END CLASS

```

## **PUT statement**

# **PUT statement**

**Purpose** Write a record to a [random-access file](#) or a [variable/array](#) to a [binary file](#).

**Syntax** *Random-Access and Binary files:*  
 PUT [#] *FileNum&*, [*RecPos*], [*ABS*] *Var*  
 PUT [#] *FileNum&* [, *RecPos*]  
*Binary files:*  
 PUT [#] *FileNum&*, [*RecPos*], *Arr()*

**Remarks** If a

variable is specified as *Var*, the CHR mode of the variable determines whether the data is written as [ANSI](#) or [WIDE](#) characters. That is, ANSI string variables are always written as 1-[byte](#) characters, while WIDE string variables are written as 2-byte WIDE characters. The data is always written to the file in the same format as it appears in the variable.

*FileNum*&

The file number under which the file was [opened](#).

*RecPos*

Identifies the position in the file to write the data. If *RecPos* is greater than the number of existing records or [bytes](#) in the file, the file is extended to the appropriate length, and the record is written at the specified position.

**For random access files**, *RecPos* is the record to be written, in the range 1 to  $(2^{63})-1$ . If *RecPos* is omitted, the next record in sequence (following the one specified by the most recent [GET](#), [PUT](#) or [SEEK](#)) is written. If the file was only just opened, the first record is written.

**For binary files**, *RecPos* is the starting byte position where *VarName* should be written. The default byte position is 1, unless the `BASE = 0` clause was used in the OPEN statement. *RecPos* may be no larger than  $2^{63}-1$ . *RecPos* is optional. If it is omitted, PowerBASIC uses the current file pointer position.

*Var*

The name of a variable to write to the file. *VarName* can specify a simple variable, an element in an array, or a variable of [User-Defined Type](#) (UDT).

When writing a [dynamic string](#) to a random access file, PUT writes a 2-byte descriptor containing the string's length, before the actual string data. This descriptor reduces the available space in a record by two bytes. The descriptor is written as a [WORD](#) value. If *Var* contains more characters than record, *Var* is truncated at record length less two bytes, and the descriptor is written to reflect the truncated string size.

When writing a dynamic string to a binary file, PUT only writes the actual string data: no length descriptor is written.

PUT is complementary to GET; it writes one record to a file. It is possible to PUT to records out of contiguous order, as in:

```
PUT #1, 1, MyVar
PUT #1, 100, MyVar
```

which creates a random-access file 100 records long. The data in records 2 through 99, however, are undefined until you explicitly PUT something there. PUT writes the contents of *Var* to the specified record or byte positions.

(no *VarName*)

When the second form of PUT is used (without a *VarName* source string), PUT writes the data from an internal buffer into the file at the point where the file pointer indicates. This data must first be assigned to the file buffer using [FIELD string](#) variables.

ABS

When PUT is used to write a dynamic string to a random file, it normally precedes the actual data with a two-byte binary length Word to define the number of valid bytes in the record. If you precede the variable name with ABS (i.e., `PUT #1, , ABS x$`), no length Word is written: only the actual data, subject to the defined random record length. This offers greater compatibility with the actual operation of other versions of BASIC, such as [PowerBASIC for DOS](#).

**The record length in a random access file is limited to 32768 bytes, in order to ensure consistent behavior across all Win32 platforms.**

*Arr()*

When PUT is used on a binary file, the entire array specified by *Arr()* is written to the file. With dynamic strings, the file is written in the PowerBASIC and/or VB packed string format. If the string is shorter than 65535 bytes, a 2-byte length Word is followed by the string data. Otherwise, a 2-byte value of 65535 is followed by a length [Double-word](#) (DWORD), then finally the string data.

With other data types, the entire data area is written as a single block. In either case, it is presumed the file will be read with the complementary GET Array statement.

**See also**

[CSET](#), [CSETS](#), [FIELD](#), [GET](#), [GETS](#), [GET\\$\\$](#), [LOE](#), [LSET](#), [PUTS](#), [PUT\\$\\$](#), [RSET](#), [SETEOF](#),

[TYPE, WRITE#](#)**Example**

```
' Random-access PUT example
TYPE TestRec
 uName AS STRING * 10
 uNumber AS INTEGER
END TYPE

DIM Rec AS TestRec, Record AS QUAD

OPEN "RANDOM.DTA" FOR RANDOM AS #1 LEN = LEN(TestRec)

FOR Record = 1 TO 100
 Rec.uName = "Joe" + STR$(Record)
 Rec.uNumber = Record
 PUT #1,Record, Rec
NEXT Record

CLOSE #1

' Binary PUT Array example
DIM TheData$(1 TO count&)
TheData$(1) = "text"
' Assign more array values...
OPEN "Data file to write.dat" FOR BINARY AS #1
PUT #1, 1, TheData$()
CLOSE #1
```

**PUT\$ statement****PUT\$ statement** IMPROVED**Purpose**

Writes an [ANSI](#) string to a file [opened](#) in [binary](#) mode.

**Syntax**

```
PUT$ [#] filenum&, StrgExpr
```

**Remarks**

PUT\$ first evaluates the [string expression](#). If it results in a [WIDE](#) Unicode string, it is converted to ANSI [byte](#) characters. PUT\$ then writes the ANSI string to the file specified by *FileNum&* at the current file pointer position. [GET\\$](#), [PUT\\$](#), and [SEEK](#) provide a low-level alternative to [sequential](#) and [random-access](#) file processing techniques, allowing you to deal with files on a byte by byte basis.

File *filenum&* must have been opened in binary mode. Bytes are written starting at the current file pointer position, which can be set with the [SEEK](#) statement. When the file is first opened, the pointer is at the beginning of the file (position 1, by default, unless [BASE=0](#) was specified in the [OPEN](#) statement). After PUT\$, the file pointer position is automatically advanced to the point which immediately follows the just written data. You can use

[SEEK](#) to retrieve or change the file pointer position.

*FileNum&*

The file number under which the file was opened.

*StrgExpr*

A string expression which is written to the file.

**See also**

[GET](#), [GET\\$](#), [GET\\$\\$](#), [OPEN](#), [PUT](#), [PUT\\$\\$](#), [SEEK function](#), [SEEK statement](#), [SETEOF](#), [WRITE#](#)

**Example**

```
' Open a binary file and write the alphabet to it
OPEN "SEEK.DTA" FOR BINARY AS #1 BASE = 1
FOR I& = ASC("A") TO ASC("Z") ' 65 TO 90
 PUT$ #1, CHR$(I&)
```

```
NEXT
CLOSE #1
```

## PUT\$\$ statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## PUT\$\$ statement **New!**

**Purpose** Writes a [WIDE](#) Unicode to a file [opened](#) in [binary](#) mode.

**Syntax** `PUT$$ [#] fileNum&, StrgExpr`

**Remarks** PUT\$\$ first evaluates the [string expression](#). If it results in an [ANSI](#) string, it is converted to WIDE Unicode characters. PUT\$\$ then writes the WIDE string to the file specified by *FileNum&* at the current file pointer position. [GET\\$\\$](#) and PUT\$\$ provide a low-level alternative to [sequential](#) and [random-access](#) file processing techniques, allowing you to deal with files on a character by character basis.

File *fileNum&* must have been opened in binary mode. Characters are written starting at the current file pointer position, which can be set with the [SEEK](#) statement. When the file is first opened, the pointer is at the beginning of the file (position 1, by default, unless `BASE=0` was specified in the [OPEN](#) statement). After PUT\$\$, the file pointer position is automatically advanced to the point which immediately follows the just written data. You can use

to retrieve or change the file pointer position.

*FileNum&* The file number under which the file was opened.

*StrgExpr* A string expression which is written to the file.

**See also** [GET](#), [GET\\$](#), [GET\\$\\$](#), [OPEN](#), [PUT](#), [PUT\\$](#), [SEEK function](#), [SEEK statement](#), [SETEOF](#), [WRITE#](#)

## RAISEEVENT statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## RAISEEVENT statement

**Purpose** Call [Event](#) Handler code.

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>   | <code>RAISEEVENT ObjVar.Method()</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Remarks</b>  | <p>The RAISEEVENT statement is used to call event handler code from an Event Source. RAISEEVENT may only appear within a <a href="#">class</a> which declares the <a href="#">Event Source</a> interface. The concept of RAISEEVENT is very similar to the <a href="#">CALL</a> statement, but it may only be used to execute event procedures:</p> <pre>RaiseEvent Status.Progress(10) ' advise the code is 10% done</pre> <p>It should be noted that RAISEEVENT does not reference an <a href="#">object</a> variable at all, because it calls any and all Direct, V-Table event handlers which are currently subscribed to these events. Instead, it references the interface name (in this case "Status"), followed by the name of the Event Method to be executed (in this case "Progress"). If your program is using a Dispatch event handler you should use the <a href="#">OBJECT RAISEEVENT</a> statement instead.</p> |
| <b>See also</b> | <a href="#">CLASS</a> , <a href="#">EVENT SOURCE</a> , <a href="#">EVENTS</a> , <a href="#">INTERFACE (Direct)</a> , <a href="#">INTERFACE (IDBind)</a> , <a href="#">Just what is COM?</a> , <a href="#">EVENTS</a> , <a href="#">OBJECT RAISEEVENT</a> , <a href="#">What is an object, anyway?</a> , <a href="#">What are Connection Points?</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Example</b>  | See the <a href="#">EVENT SOURCE</a> statement for an example of RAISEEVENT.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

## RANDOMIZE statement

# RANDOMIZE statement

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Seed the random number generator.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Syntax</b>   | <code>RANDOMIZE [number]</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Remarks</b>  | <p><i>number</i> is a seed value that may be any type. If <i>number</i> is not specified, the value returned by the <a href="#">TIMER</a> function is used. Values returned by the random number generator (<a href="#">RND</a>) depend on an initial seed value. For a given seed value, RND always returns the same sequence of values, yielding a predictable pseudo-random number sequence. Thus, any program that depends on RND will run exactly the same way each time unless a different seed is given.</p> <p>The default seed can be duplicated with the following statement:</p> <pre>RANDOMIZE CVS(CHR\$(255,255,255,255))</pre> <p>Note that each <a href="#">thread</a> has its own, independent random number seed.</p> |
| <b>See also</b> | <a href="#">RND</a> , <a href="#">TIMER</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Example</b>  | <pre>' Seed generator and get 5 random values RANDOMIZE 1.5! FOR I&amp; = 1 TO 5   Table(I&amp;) = RND(1,100) NEXT I&amp;  ' Reseeding with the same starting value ' means you get the same sequence of values! RANDOMIZE 1.5! FOR I&amp; = 1 TO 5   Table(I&amp;) = RND(1,100) NEXT I&amp;  ' Now reseed from the TIMER and we get ' a completely different set of values: RANDOMIZE TIMER FOR I&amp; = 1 TO 5   Table(I&amp;) = RND(1,100) NEXT I&amp;</pre>                                                                                                                                                                                                                                                                        |

## READ\$ function

# READ\$ function

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>      | Retrieve data from a local <a href="#">DATA</a> list.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Syntax</b>       | <code>value\$ = READ\$(n%)</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Remarks</b>      | The READ\$ function is used to retrieve a specified string data item from a local DATA list, and returns the data in string format. READ\$ offers a simple technique for random-access of local DATA.                                                                                                                                                                                                                                                                                                                                                 |
| <b>n%</b>           | An expression, <a href="#">constant</a> , or <a href="#">variable</a> , which specifies an index position in the local DATA list. $n\% = 1$ for the first data item, $n\% = 2$ for the second, and so on. READ\$ accesses the DATA statements in the order in which they appear in the source program, from left to right.<br>If $n\%$ is greater than <a href="#">DATACOUNT</a> , READ\$ returns an empty string, but no <a href="#">run-time error</a> occurs.                                                                                      |
| <b>value\$</b>      | READ\$ places the DATA string into <code>value\$</code> .<br><br>If the target DATA statement is enclosed in quotes, READ\$ preserves any leading or trailing spaces that it may contain; otherwise, READ\$ trims leading and trailing spaces and returns a trimmed string. See <a href="#">DATA</a> for more information on data item formatting.<br><br>If numeric data needs to be stored in DATA statements and retrieved with READ\$, the <a href="#">VAL</a> function can be used to convert the return values from READ\$ into numeric values. |
| <b>Restrictions</b> | There is a limit of 64 Kilobytes and 16384 separate data items per <a href="#">Sub</a> , <a href="#">Function</a> , <a href="#">Method</a> , or <a href="#">Property</a> , and it is not possible to read DATA from outside of the scope of current procedure. Restrictions apply to using colon and underscore characters in DATA statements - see <a href="#">DATA</a> for more information.                                                                                                                                                        |
| <b>See also</b>     | <a href="#">DATA</a> , <a href="#">DATACOUNT</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Example</b>      | ' The following returns the day of the week string.<br><pre> FUNCTION WeekDayName\$(BYVAL DayNum%)   IF DayNum% &lt; 1 OR DayNum% &gt; DATACOUNT THEN     WeekDayName\$ = ""   ELSE     WeekDayName\$ = READ\$(DayNum%)   END IF   DATA Sun, Mon, Tue, Wed, Thu, Fri, Sat END FUNCTION </pre>                                                                                                                                                                                                                                                         |

## REDIM statement

# REDIM statement

|                |                                                                                                                                                                                                                                                                                                    |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Used at the to declare dynamic <a href="#">array</a> variables and allocate, deallocate, or reallocate storage space.                                                                                                                                                                              |
| <b>Syntax</b>  | <code>REDIM [PRESERVE] array([subscripts]) [AS type] [AT address] [, ...]</code>                                                                                                                                                                                                                   |
| <b>Remarks</b> | The REDIM statement allows dynamic arrays (including <a href="#">string arrays</a> ) to be erased and re-dimensioned. It is really just a shortcut for the two-step process <a href="#">ERASE</a> x(), followed by <a href="#">DIM</a> x(). REDIM uses the same basic syntax as the DIM statement. |

*array* is the name of the array, and *subscripts* is either a group of single [integers](#) (one per dimension of a particular array), or a group of ranges (REDIM arr1(5 TO 25, 1 TO 4, 3 TO 8)), separated by commas.

**AS type** The AS *type* clause is optional, but recommended for the purposes of clarity.

**AT address** The AT *address* clause indicates the array is to be an absolute array. Absolute arrays are not reset by the REDIM statement, nor are they reset when the [Sub/Function/Method/Property](#) exits, but they can be reset with the [RESET](#) statement. See the discussion in the [DIM](#) topic for more information on absolute arrays.

**PRESERVE** The PRESERVE keyword tells the compiler to preserve the values of all existing elements in the array. For example, if you REDIM PRESERVE an array with 10 elements to 20 elements, the first 10 elements will retain their original value. The remaining 10 elements will be initialized to zero (or null/empty in the case of a string array). If the array is resized to be smaller, the specified number of elements is preserved, and the remaining elements are discarded. **When PRESERVE is specified, you can resize only the upper boundary of the last (outer) dimension of the array.** Arrays of only one dimension can always be resized.

In a procedure, you can use REDIM to re-dimension an array that was passed as an argument. That is, when the complete array was passed to the procedure:

```
CALL RemoveDuplicates(CustomerNames$())
' more code here
SUB RemoveDuplicates(a$())
' Remove duplicate array values
REDIM PRESERVE a$(1 TO NewCount&)
END SUB
```

REDIM may also be used to alter the size of [Static](#), [Global](#), and [Instance](#) arrays.

When used with no subscript parameters, REDIM will erase all contents of an array and deallocate the memory used:

```
REDIM xyz&() ' Equivalent to ERASE xyz&()
```

**Restrictions** **When PRESERVE is specified, only the upper bound of the last (outer) dimension may be redefined.**

When a REDIM statement is executed, the location of the array elements always moves in memory; however, the array's *Descriptor* location ([VARPTR\(arrayname\(\)\)](#)) will remain fixed at the original location. When using REDIM, your code must be sure to refresh any pointers that target the array data memory locations ([STRPTR\(arrayname\(subscript\)\)](#) for [dynamic string](#) arrays, and [VARPTR\(arrayname\(subscript\)\)](#) for all other array types).

While PowerBASIC supports lower boundary values that are non-zero, PowerBASIC generates the most efficient code if the lower boundary parameter is omitted (i.e., the array uses the default lower boundary of zero).

**See also** [ARRAYATTR](#), [DIM](#), [ERASE](#), [RESET](#)

**Example**  

```
DIM MyData(40), Names$(100)
REDIM MyData(5 TO 50), Names$(10)
```

## REGEXPR statement

# REGEXPR statement

**Purpose** Scan a  
 for a matching "wildcard" or regular expression.

**Syntax** REGEXPR *mask\$* IN *target\$* [AT *start&*] TO *iPos&* [, *iLen&*]

**Remarks** REGEXPR scans *target\$* for a matching expression specified in *mask\$*. If found, it returns the position of the match in the *iPos&* variable (indexed to the first character position), and optionally, the length of the matching expression in *iLen&*.

If a match is made, the *iPos&* and *iLen&* results can be immediately used with subsequent string operations such as [MID\\$](#) to extract the matched portion of *target\$*, and/or to continue the search through the remainder of *target\$*. If no matching expression is found, both *iPos&* (and *iLen&* if specified) are set to zero.

If specified, the search begins at the character position *target&* in *target\$*; however, *start&* must be between 1 and the length of *target\$*. If *start&* is less than 1, the *start&* parameter is ignored.

While it is possible for more than one match to be found in a particular target string, REGEXPR first selects one or more matches which start at the leftmost possible position, then returns the longest of those. Use the `\s` special escape operator to force a match on the shortest match (see below).

The `^` and `$` operators match on both the actual string start/end, or the previous/next embedded line-delimiter characters ([CHR\\$\(13,10\)](#) or [\\$CRLF](#)) in *target\$*. This enables REGEXPR to treat the *target\$* string as containing a set of "logical lines" of text. In this situation, the *start&* character position plays a crucial role in identifying which logical delimited line that should be examined by REGEXPR.

By default, search expressions are assumed to be case-insensitive, so capitalization is ignored.

*mask\$*

The regular (*wildcard*) expression specified in *mask\$* may contain a combination of standard text characters and/or the *metacharacters* which are defined as follows:

| Char | Definition                                                                                                                                                                                                                                                                                                                                                                                                              |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| .    | <b>(period)</b> Matches any character, <i>except</i> the end-of-line.                                                                                                                                                                                                                                                                                                                                                   |
| ^    | (caret) Matches the actual beginning-of-line position or the preceding line-delimiter character pair ( <code>CHR\$(13,10)</code> or <code>\$CRLF</code> ), as taken from the <i>start&amp;</i> character position. The line-delimiter characters themselves are not included in the <i>iLen&amp;</i> result. (also see <code>[^]</code> below for usage within a character class definition).                           |
| \$   | <b>(dollar)</b> Matches the end-of-line position, which may be either the first line-delimiter character pair ( <code>CHR\$(13,10)</code> or <code>\$CRLF</code> ) that is encountered in the search to the right of the <i>start&amp;</i> position, or the actual end of the <i>target\$</i> string, whichever occurs first. The line-delimiter characters themselves are not included in the <i>iLen&amp;</i> result. |
|      | <b>(stile)</b> Specifies alternation (the <a href="#">OR</a> operator), so that an expression on either side can match. Precedence is from left-to-right, as encountered in the expression.                                                                                                                                                                                                                             |
| ?    | <b>(question mark)</b> Specifies that zero or one match of the preceding sub-pattern is allowed. Cannot be used with a Tag.                                                                                                                                                                                                                                                                                             |
| +    | <b>(plus)</b> Specifies that one or more matches of the preceding sub-pattern are allowed. Cannot be used with a Tag.                                                                                                                                                                                                                                                                                                   |
| *    | (asterisk) Specifies that zero or more matches of the preceding sub-pattern are allowed. Cannot be used with a Tag.                                                                                                                                                                                                                                                                                                     |

**Character classes**

- [ ] **(square brackets)** Identifies a user-defined class of characters, any of which will match: [abc] will match a, b, or c. Only three special metacharacters are recognized within a class definition, the caret ^ for complemented characters, the hyphen - for a range of characters, or one of the following \ backslash escape sequences:  
 \\ \- \] \e \f \n \q \r \t \v \x##  
 Any other use of a backslash within a class definition yields an undefined operation that should be avoided.
- [-] **(hyphen)** The hyphen identifies a range of characters to match. For example, [a-f] will match a, b, c, d, e, or f. Characters in an individual range must occur in the natural order as they appear in the character set. For example, [f-a] will match nothing. Lists of characters, and one or more ranges of characters, may be intermixed in a single class definition. The start and end of a range may be specified by a literal character, or one of the \ backslash escape sequences:  
 \\ \- \] \e \f \n \q \r \t \v \x##  
 Any other use of a backslash within a class definition yields an undefined operation. Multiple ranges in a class are valid. For example, [a-d2-5] matches a, b, c, d, 2, 3, 4, or 5. When the hyphen is escaped, it is treated as a literal. For example, [a\-c] is a list, not a range, and matches a, -, or c due to the \ backslash escape sequence.
- [^] **(caret)** When the caret appears as the first item in a class definition, it identifies a complemented class of characters, which will not match. For example, [^abc] matches any character *except* a, b, or c. A range can also be specified for the complemented class. For example, [^a-z] matches any character except a through z. A caret located in any position other than the first is treated as a literal character.

**Tags/sub-patterns**

- () **(parentheses)** Parentheses are used to match a Tag, or sub-pattern, within the full search pattern, and remember the match. The matched sub-pattern can be retrieved later in the mask (or in a replace operation with REGREPL), with \01 through \99, based upon the left-to-right position of the opening parentheses. Parentheses may also be used to force precedence of evaluation with the alternation operator. For example, "(Begin)|(End)File" would match either "BeginFile" or "EndFile", but without the Tag designations, "Begin|EndFile" would only match either "BeginndFile" or "BegiEndFile".

**Escaped characters**

- \ **(backslash)**. The escape operator (single-character quote). The following character will be treated as a literal value rather than being interpreted as a special character. Note that the character following the backslash must actually be a special character, as follows:
- \b **A word boundary**. The start or end of a word, where a word is defined as one or more characters that include an alphabetic character (A-Z or a-z), a numeric character (0-9), and an underscore. For example, "abc\_123" is considered a single word and "abc-123" is considered two words.
- \c **Case-sensitive search**. Without the \c operator, the default is to ignore case when matching. Unlike some other implementations of regular expressions, case-insensitivity is recognized in all operations, even a range of characters such as "[6-Z]". The \c operator may appear at any position in the mask.
- \e **Escape character**: CHR\$(27) or [\\$ESC](#).
- \f **Formfeed character**: CHR\$(12) or [\\$FF](#).
- \n **Linefeed (or new-line) character**: CHR\$(10) or [\\$LF](#).
- \q **Double-quote mark (")**: CHR\$(34) or [\\$DQ](#). \q is included for ease of inclusion within a literal string. For example: "\qHello\q".
- \r **Carriage-return character**: CHR\$(13) or [\\$CR](#).

- \s** **Shortest match character:** The `\s` flag causes the shortest matching string to be returned, rather than the longest (the default). For example, when searching for the mask "abc.\*abc" in "abcdabcabc", the default setting would return position 1 and length 10. With the `\s` switch set, it returns position 1 and length 7. This option may cause a slight increase in processing time. The `\s` flag must appear at the beginning of the mask string.
- \t** **Horizontal tab character:** `CHR$(9)` or [\\$TAB](#).
- \v** **Vertical tab character:** `CHR$(11)` or [\\$VT](#).
- \x##** **Hex character code:** Indicates that an [ASCII](#) code follows, given by two hexadecimal digits. For example, `\xFF` = `CHR$(&HFF)` (which is equivalent to `CHR$(255)`). `XX` must be in the range 0 through 255.

**Restrictions** To maximize performance, avoid overuse of the `*`, `+` and `?` metacharacters.

**See also** [REGREPL](#), [Online Regular Expression Tester](#)

**Example**

```
a$ = "please send email to support@powerbasic.com"
b$ = "([a-z0-9._/+-]+)(@[a-z0-9.-]+)"
REGEXPR b$ IN a$ TO position&, length&
email_address$ = MID$(a$, position&, length&)
```

```
a$ = "Amount owed: $42.75 and is overdue!"
b$ = "\$[0-9.]+)"
REGEXPR b$ IN a$ TO position&, length&
amount$ = MID$(a$, position&, length&)
```

```
a$ = "Open 24 Hours"
b$ = "[^a-z]+"
REGEXPR b$ IN a$ TO position&, length&
hours$ = MID$(a$, position&, length&)
```

```
a$ = "Line 1" + $CRLF + "Line 2" + $CRLF
b$ = "([0-9])$"
RESET position& : RESET length&
DO
 position& = position& + length&
 REGEXPR b$ IN a$ AT position& TO _
 position&, length&
 c$ = "Match at " + STR$(position&)
LOOP WHILE position&
```

## REGISTER statement

# REGISTER statement

**Purpose** To define [Register](#) variables, which are [local](#) to a [Sub](#), [Function](#), [Method](#), or [Property](#). The REGISTER statement provides an optimization hint to the compiler.

**Syntax** `REGISTER variable [AS type] [, variable [AS type]]`

**Remarks** The REGISTER statement is used to define certain local variables as Register [variables](#) - that is, variables which are stored directly in specific CPU registers, rather than in application memory. Since data in a [CPU register](#) can be accessed much faster, and with less code, Register variables are valuable optimization tools.

Register variables are always local to the procedure where they appear. In the current version of PowerBASIC, there may be up to two integral-class variables ([Word/Dword/Integer/Long](#)) and up to four [Extended-precision floats](#). It is possible that future versions of the compiler will change these limits, so you may declare an unlimited number of them. Any "extra" Register variables are automatically reclassified as locals during compilation.

The REGISTER statement allows you to choose which variables will be classified as Register variables. If you do not make the choice in a particular procedure, the compiler will attempt to choose for you. By default, the compiler will always assign any integral-class local variables available. Extended-precision float variables will be automatically assigned only in Functions that contain no external Function calls.

Integral class Register variables are most efficient for variables that are updated or used often, such as [For/Next](#) loop counter variables, and variables that are used repeatedly as [array](#) indexes.

Floating-point Register variables should generally be chosen with a bit more caution, since the compiler must generate code to save and restore them to conventional memory around each call to a procedure. In some rather rare cases, it is possible that floating-point Register variables could actually reduce execution speed. However, they are extremely valuable with intensive floating-point calculations in Functions that have few references to other procedures.

Due to the design of FPUs (floating point units), and the instruction sets available, the first float register variable declared in your program has far more optimization possibilities than the others do. Use care in choosing the variable which is used most within floating-point expressions (that is, on the right side of the '=' assignment operator), in order to gain the greatest advantage in execution speed. Also, remember it is typically valuable to assign floating-point [constants](#) to Register variables when they are used in repetitive or intensive calculations.

You must use care with [Inline Assembler](#) floating-point [opcodes](#) in Functions that enable Register variables. Floating-point Register variables may occupy up to four of the [FPU](#) registers, so you must limit your use of the x87 registers to the remaining four. Further, floating-point Register variables may never be [referenced by name](#) from Inline Assembler code, as the compiler cannot always track the register locations with absolute certainty.

**Restrictions** [VARPTR](#) cannot be used on a Register variable.

PowerBASIC transparently prevents the *automatic* register conversion of the variable used in the TO clause of the [DIALOG SHOW MODAL](#) and [DIALOG SHOW MODELESS](#) statements. If the target variable is *explicitly* declared as a register variable, PowerBASIC raises a compile-time [Error 491](#) ("Invalid register variable"). This is necessary as the result values stored in such variables may be assigned from the context of other procedures, and this may only occur with a memory variable.

**See also** [#REGISTER](#), [Optimizing your code](#)

**Example**

```
SUB ReindexDatabase() AS LONG
 #REGISTER NONE ' I'll choose my own register vars.
 REGISTER i AS LONG
 REGISTER fVar AS EXT
 ' do something
END FUNCTION
```

## REGREPL statement

# REGREPL statement

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Scan a<br>for a matching "wildcard" or regular expression, and replace it with a new value.                                                                                                                                                                                                                                                                                                                                         |
| <b>Syntax</b>  | REGREPL <i>mask\$</i> IN <i>target\$</i> WITH <i>repl\$</i> [AT <i>start&amp;</i> ] TO <i>iPos&amp;</i> , <i>newtarget\$</i>                                                                                                                                                                                                                                                                                                        |
| <b>Remarks</b> | REGREPL scans <i>target\$</i> for a matching regular expression specified in <i>mask\$</i> . If a match is made, REGREPL replaces the matched text with the contents of <i>repl\$</i> , and assigns the new text to <i>newtarget\$</i> . Additionally, REGREPL sets <i>iPos&amp;</i> to reflect the character position immediately following the matched text in <i>newtarget\$</i> , so the operation can be repeated, if desired. |

If no matching expression is found, *iPos*& will be set to zero, and *newtarget*\$ receives a direct copy of *target*\$. In either case, *target*\$ remains unchanged.

*mask*\$ may contain literal characters and *metacharacters* (wildcards) to form the regular expression, and *repl*\$ may only contain literal characters and tags specified by \##. Each tag from \01 through \99 is replaced by the text actually matched for that tag. \00 is replaced by the entire matched text.

If specified, the search begins at the character position *start*& in *target*\$; however, *start*& must be between 1 and the length of *target*\$. If *start*& is less than 1, the *start*& parameter is ignored.

While it is possible for more than one match to be found in a particular target string, REGREPL first selects one or more matches which start at the leftmost possible position, then returns the longest of those. Use the \s special escape operator to force a match on the shortest match (see below).

The ^ and \$ operators match on both the actual string start/end, or the previous/next embedded line-delimiter characters ([CHR\\$\(13,10\)](#) or [\\$CRLF](#)) in *target*\$. This enables REGREPL to treat the *target*\$ string as containing a set of "logical lines" of text. In this situation, the *start*& character position plays a crucial role in identifying which logical delimited line that should be examined by REGREPL.

By default, search expressions are assumed to be case-insensitive, so capitalization is ignored.

*mask*\$

The regular (*wildcard*) expression specified in *mask*\$ may contain a combination of standard text characters and/or the *metacharacters* which are defined as follows:

| Char | Definition                                                                                                                                                                                                                                                                                                                                                                   |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| .    | <b>(period)</b> Matches any character, <i>except</i> the end-of-line.                                                                                                                                                                                                                                                                                                        |
| ^    | <b>(caret)</b> Matches the actual beginning-of-line position or the preceding line-delimiter character pair (CHR\$(13,10) or \$CRLF), as taken from the <i>start</i> & character position. The line-delimiter characters themselves are not replaced by <i>repl</i> \$. (also see [^] below for usage within a character class definition).                                  |
| \$   | <b>(dollar)</b> Matches the end-of-line position, which may be either the first line-delimiter character pair (CHR\$(13,10) or \$CRLF) that is encountered in the search to the right of the <i>start</i> & position, or the actual end of the <i>target</i> \$ string, whichever occurs first. The line-delimiter characters themselves are not replaced by <i>repl</i> \$. |
|      | <b>(stile)</b> Specifies alternation (the <a href="#">OR</a> operator), so that an expression on either side can match. Precedence is from left-to-right, as encountered in the expression.                                                                                                                                                                                  |
| ?    | <b>(question mark)</b> Specifies that zero or one match of the preceding sub-pattern is allowed. Cannot be used with a Tag.                                                                                                                                                                                                                                                  |
| +    | <b>(plus)</b> Specifies that one or more matches of the preceding sub-pattern are allowed. Cannot be used with a Tag.                                                                                                                                                                                                                                                        |
| *    | <b>(asterisk)</b> Specifies that zero or more matches of the preceding sub-pattern are allowed. Cannot be used with a Tag.                                                                                                                                                                                                                                                   |

#### Character classes

[ ]

**(square brackets)** Identifies a user-defined

class of characters, any of which will match: [abc] will match a, b, or c. Only three special metacharacters are recognized within a class definition, the caret (^) for complemented characters, the hyphen (-) for a range of characters, or one of the following \ backslash escape sequences:

\\ \- \] \e \f \n \q \r \t \v \x##

Any other use of a backslash within a class definition yields an undefined operation that should be avoided.

[ - ]

**(hyphen)** The hyphen identifies a range of characters to match. For example, [a-f] will match a, b, c, d, e, or f.

Characters in an individual range must occur in the natural order as they appear in the character set. For example, [f-a] will match nothing.

Lists of characters, and one or more ranges of characters, may be intermixed in a single class definition. The start and end of a range may be specified by a literal character, or one of the \ backslash escape sequences:

\\ \- \] \e \f \n \q \r \t \v \x##

Any other use of a backslash within a class definition yields an undefined operation.

Multiple ranges in a class are valid. For example, [a-d2-5] matches a, b, c, d, 2, 3, 4, or 5.

When the hyphen is escaped, it is treated as a literal. For example, [a\-c] is a list, not a range, and matches a, -, or c due to the \ backslash escape sequence.

[ ^ ]

**(caret)** When the caret appears as the first item in a class definition, it identifies a complemented class of characters, which will not match. For example, [^abc] matches any character *except* a, b, or c. A range can also be specified for the complemented class. For example, [^a-z] matches any character except a through z. A caret located in any position other than the first is treated as a literal character.

## Tags/sub-patterns

( )

**(parentheses)** Parentheses are used to match a Tag, or sub-pattern, within the full search pattern, and remember the match. The matched sub-pattern can be retrieved later in the mask, or in a replace operation, with \01 through \99, based upon the left-to-right position of the opening parentheses. Parentheses may also be used to force precedence of evaluation with the alternation operator. For example, "(Begin)|(End)File" would match either "BeginFile" or "EndFile", but without the

Tag designations, "Begin|EndFile" would only match either "BeginndFile" or "BegjEndFile".

Note: Parentheses may not be used with ? + \* as any match repetition could cause the tag value to be ambiguous. To match repeated expressions, use parentheses followed by \01\*.

## Escaped characters

|      |                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| \    | (backslash). The escape operator (single-character quote). The following character will be treated as a literal value rather than being interpreted as a special character. Note that the character following the backslash must actually be a special character, as follows:                                                                                                                                                                                |
| \b   | <b>A word boundary.</b> The start or end of a word, where a word is defined as one or more characters that include an alphabetic character (A-Z or a-z), a numeric character (0-9), and an underscore. For example, "abc_123" is considered a single word and "abc-123" is considered two words.                                                                                                                                                             |
| \c   | <b>Case-sensitive search.</b> Without the \c operator, the default is to ignore case when matching. Unlike some other implementations of regular expressions, case-insensitivity is recognized in all operations, even a range of characters such as "[6-Z]". The \c operator may appear at any position in the mask.                                                                                                                                        |
| \e   | <b>Escape character:</b> CHR\$(27) or <a href="#">\$ESC</a> .                                                                                                                                                                                                                                                                                                                                                                                                |
| \f   | <b>Formfeed character:</b> CHR\$(12) or <a href="#">\$FF</a> .                                                                                                                                                                                                                                                                                                                                                                                               |
| \n   | <b>Linefeed (or newline) character:</b> CHR\$(10) or <a href="#">\$LF</a> .                                                                                                                                                                                                                                                                                                                                                                                  |
| \q   | <b>Double-quote mark ("):</b> CHR\$(34) or <a href="#">\$DQ</a> . \q is included for ease of inclusion within a literal string. For example: "\qHello\q".                                                                                                                                                                                                                                                                                                    |
| \r   | <b>Carriage-return character:</b> CHR\$(13) or <a href="#">\$CR</a> .                                                                                                                                                                                                                                                                                                                                                                                        |
| \s   | <b>Shortest match character:</b> The \s flag causes the shortest matching string to be returned, rather than the longest (the default). For example, when searching for the mask "abc.*abc" in "abcdabcabc", the default setting would return position 1 and length 10. With the \s switch set, it returns position 1 and length 7. This option may cause a slight increase in processing time. The \S flag must appear at the beginning of the mask string. |
| \t   | <b>Horizontal tab character:</b> CHR\$(9) or <a href="#">\$TAB</a> .                                                                                                                                                                                                                                                                                                                                                                                         |
| \v   | <b>Vertical tab character:</b> CHR\$(11) or <a href="#">\$VT</a> .                                                                                                                                                                                                                                                                                                                                                                                           |
| \x## | <b>Hex character code:</b> Indicates that an <a href="#">ASCII</a> code follows, given by two hexadecimal digits. For example, \xFF = CHR\$(&HFF) (which is equivalent to                                                                                                                                                                                                                                                                                    |

CHR\$(255)). XX must be in the range 0 through 255.

\##

**Tag number:** Evaluated as the characters matched by tag number ## (where ## is in the range 01 through 99, in decimal). Tags are implicitly numbered from 01 through 99, based upon the left-to-right position of the left parenthesis. "(...)w\01" would match "abcwabc" or "456w456".

Tags cannot be forward-referenced - that is, if a reference is made to any Tag that is not yet defined, a non-match is presumed.

**Restrictions** To maximize performance, avoid overuse of the \*, + and ? metacharacters.

**See also** [REGEXPR](#)

**Example**

```
#COMPILE EXE
FUNCTION PBMAIN
 a$ = "please email support@powerbasic.com"
 b$ = "([a-z0-9._/+-]+)(@[a-z0-9.-]+)"
 c$ = "sales\02"
 REGREPL b$ IN a$ WITH c$ TO position&, d$
 ' d$ -> "please email sales@powerbasic.com"

 a$ = "Line 1" + $CRLF + "Line 2" + $CRLF
 b$ = "([0-9])$"
 c$ = "\01.0"
 position& = 1
 DO
 REGREPL b$ IN a$ WITH c$ AT position& TO position&, a$
 LOOP WHILE position&
 ' a$ -> " Line 1.0" + $CRLF + "Line 2.0" + $CRLF
END FUNCTION
```

## REM statement

# REM statement

**Purpose** Indicate that the remainder of a line in source code files is to be regarded as a Remark or Comment, and excluded from the compiled code.

**Syntax** *REM comment text*  
' *comment text*  
; *comment in an Inline Assembler statement*

**Remarks** The PowerBASIC compiler ignores Remarks; they do not take up space in your generated code, so use them abundantly - useful comments greatly increase the readability and maintainability of source code.

*Comment text* is any sequence of characters. A comment can appear on a line with other statements, but it must be the last thing on that line, and a colon must precede it. For example, the assignment below will not be compiled or executed because the compiler cannot tell where the comment ends and the statement begins:

```
REM now add the numbers: a = b + c
```

The following works:

```
a = b + c : REM now add the numbers
```

The apostrophe ( ' ) is an alternate form of REM. When you use an apostrophe, you do not need a colon to separate the remark from the other statements on the same line.

When using the [Inline Assembler](#), use the semi-colon ( ; ) to indicate that the remainder of the line should be ignored. An apostrophe ( ' ) can still be used for comments, however.

In addition, the compiler treats text that appears after the line continuation character as a remark. However, we still recommend that such comments are preceded by a REM or an apostrophe ( ' ) symbol to clearly distinguish remarks from the actual code. For example:

```
DECLARE FUNCTION Call32& _ The prototype
LIB "CALL32.DLL" _ The DLL name
ALIAS "Call32" _ ' The exported name
(Param1 AS ANY, _ ' 1st parameter
BYVAL id&) ' 2nd parameter
```

For situations where a large section of code needs to be REMmed out (yet preserved within the source code file), it is often easier to enclose the code with [#IF 0/#ENDIF](#) metastatements. For example:

```
#IF 0 ' Exclude the following lines
Code and text in between the #IF 0 and #ENDIF
metastatements is ignored by the compiler.
DIM a$(1 TO 1000) ' This line is ignored too.
INCR x& ' As is this line!
#ENDIF
```

Since the #IF expression evaluates to false (zero), this forces the compiler to exclude the enclosed block of code from the compilation process, in exactly the same way as if a REM statement had been prefixed to each line.

See also [Long Lines](#)

**Example**

```
x% = 10 : REM This is a comment
y% = 20 ' This is another form of comment
! MOV EAX,"ABCD" ; An Inline Assembler comment
```

## REMAIN\$ function

# REMAIN\$ function

**Purpose** Return the portion of a following the first occurrence of a character or group of characters.

**Syntax** `a$ = REMAIN$([Start,] MainStr, [ANY] MatchStr)`

**Remarks** REMAIN\$ is a complement to the [EXTRACT\\$](#) function. *MainStr* is searched for the string specified in *MatchStr*. If found, all characters after *MatchStr* are returned. If *MatchStr* is not present in *MainStr*, or either string parameter is nul, then a nul (zero-length) is returned.

*Start* is an optional starting position to begin searching. If *Start* is not specified, position 1 will be used. If *Start* is zero, a nul string is returned. If *Start* is negative, the starting position is counted from right to left: if -1, the search begins at the last character; if -2, the second to last, and so forth.

If the ANY keyword is included, *MatchStr* specifies a list of single characters to be searched for individually. A match on any one of them will cause the operation to be performed up to that character.

See also [EXTRACT\\$](#), [LEFT\\$](#), [LTRIM\\$](#), [MID\\$](#), [REMOVE\\$](#), [REPLACE](#), [RIGHT\\$](#), [RTRIM\\$](#), [TALLY](#), [TRIM\\$](#), [VERIFY](#)

**Example**

```
a$ = REMAIN$("I think, therefore I am hungry", ",")
Result " therefore I am hungry"
```

## REMOVE\$ function

# REMOVE\$ function

|                     |                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>      | Return a copy of a<br>with characters or strings removed.                                                                                                                                                                                                                                                                                                             |
| <b>Syntax</b>       | <code>x\$ = REMOVE\$(MainString, [ANY] MatchString)</code>                                                                                                                                                                                                                                                                                                            |
| <b>Remarks</b>      | The REMOVE\$ function has the following parts:                                                                                                                                                                                                                                                                                                                        |
| <i>MainString</i>   | The <a href="#">string expression</a> from which to remove characters.                                                                                                                                                                                                                                                                                                |
| <i>MatchString</i>  | The string expression to remove all occurrences of. If <i>MatchString</i> is not present in <i>MainString</i> , all of <i>MainString</i> is returned intact.                                                                                                                                                                                                          |
| ANY                 | If the ANY keyword is included, <i>MatchString</i> specifies a list of single characters to be searched for individually, a match on any one of which will cause that character to be removed from the result.                                                                                                                                                        |
| <b>Restrictions</b> | REMOVE is case-sensitive.                                                                                                                                                                                                                                                                                                                                             |
| <b>See also</b>     | <a href="#">CLIP\$</a> , <a href="#">EXTRACT\$</a> , <a href="#">INSTR</a> , <a href="#">LTRIM\$</a> , <a href="#">MID\$</a> , <a href="#">REPLACE</a> , <a href="#">RETAIN\$</a> , <a href="#">RIGHT\$</a> , <a href="#">RTRIM\$</a> , <a href="#">SHRINK\$</a> , <a href="#">TALLY</a> , <a href="#">TRIM\$</a> , <a href="#">UNWRAP\$</a> , <a href="#">VERIFY</a> |
| <b>Example</b>      | <pre>' The following returns "aadabra", ' removing the string "bac" x\$ = REMOVE\$("abacadabra", "bac")  ' The following returns "dr", ' removing all "b", "a", and "c" x\$ = REMOVE\$("abacadabra", ANY "bac")</pre>                                                                                                                                                 |

## REPEAT\$ function

# REPEAT\$ function

|                    |                                                                                                                                                                                                                                                                           |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>     | Return a<br>consisting of multiple copies of the specified string.                                                                                                                                                                                                        |
| <b>Syntax</b>      | <code>s\$ = REPEAT\$(count&amp;, string_expr)</code>                                                                                                                                                                                                                      |
| <b>Remarks</b>     | The REPEAT\$ function has the following parts:                                                                                                                                                                                                                            |
| <i>count&amp;</i>  | Is an<br>expression, <a href="#">constant</a> or <a href="#">variable</a> , specifying the number of copies of <i>string_expr</i> to be included in the result. REPEAT\$ is very similar to <a href="#">STRING\$</a> (which makes multiple copies of a single character). |
| <i>string_expr</i> | The string to be duplicated.                                                                                                                                                                                                                                              |
| <b>See also</b>    | <a href="#">BUILD\$</a> , <a href="#">CHR\$</a> , <a href="#">GUID\$</a> , <a href="#">NUL\$</a> , <a href="#">SPACE\$</a> , <a href="#">STRING\$</a>                                                                                                                     |
| <b>Example</b>     | <code>x\$ = REPEAT\$(5, "&lt;*&gt; ")</code>                                                                                                                                                                                                                              |
| <b>Result</b>      | <code>&lt;*&gt; &lt;*&gt; &lt;*&gt; &lt;*&gt; &lt;*&gt;</code>                                                                                                                                                                                                            |

## REPLACE statement

# REPLACE statement

|                |                                                                                                                                                                                                                                                                                                               |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Within a specified<br>, replace all occurrences of one string with another string.                                                                                                                                                                                                                            |
| <b>Syntax</b>  | <code>REPLACE [ANY] MatchString WITH NewString IN MainString</code>                                                                                                                                                                                                                                           |
| <b>Remarks</b> | The REPLACE statement replaces all occurrences of <i>MatchString</i> in <i>MainString</i> with <i>NewString</i> . The replacement can cause <i>MainString</i> to grow or condense in size. <i>MainString</i> must be a string variable; <i>MatchString</i> and <i>NewString</i> may be <a href="#">string</a> |

[expressions](#). REPLACE is case-sensitive. When a match is found, the scan for the next match begins at the position immediately following the prior match.

**ANY** If you use the ANY option, within *MainString*, each occurrence of each character in *MatchString* will be replaced with the corresponding character in *NewString*. In this case, *MatchString* and *NewString* must be the same length, because there is a one-to-one correspondence between their characters.

**See also** [EXTRACT\\$, INSTR, LTRIM\\$, MID\\$, REMOVE\\$, RETAIN\\$, RIGHT\\$, RTRIM\\$, SHRINK\\$, TALLY, TRIM\\$, UNWRAP\\$, VERIFY](#)

**Example**

```
A$ = "abacadabra"
'now replace "bac" with "----bac----"
REPLACE "bac" WITH "----bac----" IN A$
```

```
A$ = "abacadabra"
'now replace all "b", "a", and "c" with ""
REPLACE ANY "bac" WITH "" IN A$
```

## RESET statement

# RESET statement

**Purpose** Set a scalar (non-array) [variable](#), [Variant](#), [User-Defined Type](#), individual [array](#) element (or an entire array) to zero or null/empty. RESET does not deallocate the actual memory used (with the exception of [dynamic string](#) array data, which is automatically deallocated).

**Syntax**

```
RESET variable [, ...]
RESET array() [, ...]
RESET array(index) [, ...]
```

**Remarks** If *variable* is numeric, it is set to zero. If *variable* is a dynamic string, it is set to null (""; an empty string). If *variable* is a [nul-terminated string](#), the first byte is set to nul ([\\$NUL](#)). If *variable* is a [fixed-length string](#) or User-Defined Type/[Union](#), all bytes in *variable* are set to nul, or [CHR\\$\(0\)](#). If *variable* is a Variant, it is cleared and set to data type [%VT\\_EMPTY](#).

If *array*() is

, all elements are set to zero; otherwise all elements are set to zero/null. If an array *index* value is specified within the parentheses, just that array element is set to zero/null, as if it were a scalar (non-array) variable.

RESET also works with *absolute arrays*, clearing the contents to zeroes or empty strings. For more information on absolute arrays, please refer to the [DIM](#) statement.

**See also** [ARRAYATTR](#), [DIM](#), [ERASE](#), [LET](#), [LET \(with Types\)](#), [LET \(with Variants\)](#), [REDIM](#)

## RESOURCE\$ function

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## RESOURCE\$ function New!

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Returns predefined <a href="#">resource</a> data.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Syntax</b>   | <code>r\$ = RESOURCE\$(RCDATA, ResID)</code><br><code>s\$\$ = RESOURCE\$(STRING, ResID%)</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Remarks</b>  | You can embed data into your EXE or <a href="#">DLL</a> with the <a href="#">#RESOURCE</a> metastatement. While the data can be represented in several different data types, two are designed to be retrieved directly for your own purposes: RCDATA and STRING. In both cases, this data is returned as a <a href="#">variable-length string</a> so you can manipulate it and use it as you wish. The specific resource you wish to retrieve is specified by the <i>ResID</i> . If the ID you request is not present, a nul (zero-length) string is returned. |
| RCDATA          | This resource contains raw data of any type. It is always stored <a href="#">byte</a> -by-byte, just as it was originally created at the time of compilation. Generally speaking, this type of data should be assigned to an <a href="#">ANSI</a> string variable so no <a href="#">Unicode</a> conversions are performed. The <i>ResID</i> which identifies this resource may be a numeric value between 0 and 65535, or an alphanumeric label which is passed to the function as a <a href="#">string expression</a> (string literal, variable, etc.)        |
| STRING          | This resource contains predefined strings in a string table. Each string is identified by a resource ID number in the range of 0 to 65535. This number is used as the <i>ResID%</i> to determine which string will be retrieved. Because of the format in which Windows stores the strings in tables, only integral numeric ID's may be used. All resource strings are saved internally in wide Unicode format.                                                                                                                                                |
| <b>See also</b> | <a href="#">#RESOURCE</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

## RESUME statement

## RESUME statement IMPROVED

|                |                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Restart program execution after <a href="#">error handling</a> with <a href="#">ON ERROR GOTO</a> .                                                                                                                                                                                                                                                                                                                           |
| <b>Syntax</b>  | <code>RESUME</code><br><code>RESUME NEXT</code><br><code>RESUME FLUSH</code><br><code>RESUME &lt;Label&gt;</code>                                                                                                                                                                                                                                                                                                             |
| <b>Remarks</b> | The RESUME statement is used to continue execution of a program after a <a href="#">run-time error</a> has been trapped and processed with an ON ERROR handler. RESUME (in any form) tells PowerBASIC that error processing has been completed, and it is now time to continue normal execution of the programming. Whenever an error is trapped and processed by ON ERROR GOTO, execution of a matching RESUME is mandatory. |

### RESUME

If the first form of RESUME is used (without any modifier), the statement which generated the error is executed again and program flow continues normally. Be certain that you've corrected the condition which generated the error in the first place before you do this!

### RESUME NEXT

If you execute RESUME NEXT, program execution continues on the line immediately following the one which generated the error. Program flow continues normally after that. Be certain that your error handler did whatever was necessary to substitute new actions to replace what was expected from the code which errored.

### RESUME FLUSH

If you execute RESUME FLUSH, there is no transfer of control to a different line.

Program execution simply continues on the line immediately following the RESUME FLUSH.

### **RESUME <Label>**

If a [label](#) is specified, program execution continues at the specified label location. The label must be "local"; that is, it must be located within the same procedure as the RESUME.

**Restrictions** [ON ERROR](#) and RESUME may not be used within a [TRY/END TRY](#) block or a [FASTPROC](#) procedure.

**See also** [ERL](#), [ERR](#), [ERROR](#), [Error Overview](#), [ERROR\\$](#), [Error Trapping](#), [ON ERROR](#)

**Example** See the examples in [Error Trapping](#).

## RESUME FLUSH statement

# RESUME statement IMPROVED

**Purpose** Restart program execution after [error handling](#) with [ON ERROR GOTO](#).

**Syntax**

```
RESUME
RESUME NEXT
RESUME FLUSH
RESUME <Label>
```

**Remarks** The RESUME statement is used to continue execution of a program after a [run-time error](#) has been trapped and processed with an ON ERROR handler. RESUME (in any form) tells PowerBASIC that error processing has been completed, and it is now time to continue normal execution of the programming. Whenever an error is trapped and processed by ON ERROR GOTO, execution of a matching RESUME is mandatory.

### **RESUME**

If the first form of RESUME is used (without any modifier), the statement which generated the error is executed again and program flow continues normally. Be certain that you've corrected the condition which generated the error in the first place before you do this!

### **RESUME NEXT**

If you execute RESUME NEXT, program execution continues on the line immediately following the one which generated the error. Program flow continues normally after that.

Be certain that your error handler did whatever was necessary to substitute new actions to replace what was expected from the code which errored.

### **RESUME FLUSH**

If you execute RESUME FLUSH, there is no transfer of control to a different line.

Program execution simply continues on the line immediately following the RESUME FLUSH.

### **RESUME <Label>**

If a [label](#) is specified, program execution continues at the specified label location. The label must be "local"; that is, it must be located within the same procedure as the RESUME.

**Restrictions** [ON ERROR](#) and RESUME may not be used within a [TRY/END TRY](#) block or a [FASTPROC](#) procedure.

**See also** [ERL](#), [ERR](#), [ERROR](#), [Error Overview](#), [ERROR\\$](#), [Error Trapping](#), [ON ERROR](#)

**Example** See the examples in [Error Trapping](#).

## RESUME NEXT statement

# RESUME statement

**IMPROVED**

|                |                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Restart program execution after <a href="#">error handling</a> with <a href="#">ON ERROR GOTO</a> .                                                                                                                                                                                                                                                                                                                           |
| <b>Syntax</b>  | RESUME<br>RESUME NEXT<br>RESUME FLUSH<br>RESUME <Label>                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Remarks</b> | The RESUME statement is used to continue execution of a program after a <a href="#">run-time error</a> has been trapped and processed with an ON ERROR handler. RESUME (in any form) tells PowerBASIC that error processing has been completed, and it is now time to continue normal execution of the programming. Whenever an error is trapped and processed by ON ERROR GOTO, execution of a matching RESUME is mandatory. |

### RESUME

If the first form of RESUME is used (without any modifier), the statement which generated the error is executed again and program flow continues normally. Be certain that you've corrected the condition which generated the error in the first place before you do this!

### RESUME NEXT

If you execute RESUME NEXT, program execution continues on the line immediately following the one which generated the error. Program flow continues normally after that. Be certain that your error handler did whatever was necessary to substitute new actions to replace what was expected from the code which errored.

### RESUME FLUSH

If you execute RESUME FLUSH, there is no transfer of control to a different line. Program execution simply continues on the line immediately following the RESUME FLUSH.

### RESUME <Label>

If a [label](#) is specified, program execution continues at the specified label location. The label must be "local"; that is, it must be located within the same procedure as the RESUME.

|                     |                                                                                                                                                                                          |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Restrictions</b> | <a href="#">ON ERROR</a> and RESUME may not be used within a <a href="#">TRY/END TRY</a> block or a <a href="#">FASTPROC</a> procedure.                                                  |
| <b>See also</b>     | <a href="#">ERL</a> , <a href="#">ERR</a> , <a href="#">ERROR</a> , <a href="#">Error Overview</a> , <a href="#">ERROR\$</a> , <a href="#">Error Trapping</a> , <a href="#">ON ERROR</a> |
| <b>Example</b>      | See the examples in <a href="#">Error Trapping</a> .                                                                                                                                     |

## RESUME <Label> statement

# RESUME statement

**IMPROVED**

|                |                                                                                                     |
|----------------|-----------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Restart program execution after <a href="#">error handling</a> with <a href="#">ON ERROR GOTO</a> . |
| <b>Syntax</b>  | RESUME<br>RESUME NEXT<br>RESUME FLUSH<br>RESUME <Label>                                             |

**Remarks** The RESUME statement is used to continue execution of a program after a [run-time error](#) has been trapped and processed with an ON ERROR handler. RESUME (in any form) tells PowerBASIC that error processing has been completed, and it is now time to continue normal execution of the programming. Whenever an error is trapped and processed by ON ERROR GOTO, execution of a matching RESUME is mandatory.

### **RESUME**

If the first form of RESUME is used (without any modifier), the statement which generated the error is executed again and program flow continues normally. Be certain that you've corrected the condition which generated the error in the first place before you do this!

### **RESUME NEXT**

If you execute RESUME NEXT, program execution continues on the line immediately following the one which generated the error. Program flow continues normally after that. Be certain that your error handler did whatever was necessary to substitute new actions to replace what was expected from the code which errored.

### **RESUME FLUSH**

If you execute RESUME FLUSH, there is no transfer of control to a different line. Program execution simply continues on the line immediately following the RESUME FLUSH.

### **RESUME <Label>**

If a [label](#) is specified, program execution continues at the specified label location. The label must be "local"; that is, it must be located within the same procedure as the RESUME.

**Restrictions** [ON ERROR](#) and RESUME may not be used within a [TRY/END TRY](#) block or a [FASTPROC](#) procedure.

**See also** [URL](#), [ERR](#), [ERROR](#), [Error Overview](#), [ERROR\\$](#), [Error Trapping](#), [ON ERROR](#)

**Example** See the examples in [Error Trapping](#).

## **RETAIN\$ function**

# **RETAIN\$ function**

**Purpose** Return a string containing only the characters contained in a specified match string. All other characters are removed.

**Syntax** `sResult$ = RETAIN$(mainstr$, [ANY] matchstr$)`

**Remarks** RETAIN\$ returns a string consisting of zero or more copies of the complete expression *matchstr\$* which are found in *mainstr\$*. All other characters are removed.

**ANY** If the ANY option is included, *matchstr\$* specifies a list of single characters to be retained, if they are found in *mainstr\$*.

**Restrictions** If *matchstr\$* is an empty string, RETAIN\$ returns an empty string.

**See also** [EXTRACT\\$](#), [REMAINS\\$](#), [REMOVES\\$](#), [REPLACE](#)

**Example**

```
a$ = "<p>1234567890<ak;lk;1>1234567890</p>"
b$ = RETAIN$(a$, ANY "</p>")
c$ = RETAIN$(a$, ANY "0123456789")
```

**Result**

```
b$ contains "<p><;></p>"
c$ contains "12345678901234567890"
```

## RETURN statement

# RETURN statement

**IMPROVED**

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Return from a ( <a href="#">GOSUB</a> ) subroutine to its caller.                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Syntax</b>   | <code>RETURN</code><br><code>RETURN FLUSH</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Remarks</b>  | <p>RETURN terminates the execution of a subroutine, and passes control to the statement directly following the calling GOSUB statement.</p> <p>RETURN FLUSH removes the most recent return address from the system <a href="#">stack</a> and program flow continues normally after the RETURN FLUSH.</p> <p>Performing either form of RETURN without a corresponding GOSUB can cause unpredictable behavior and difficult-to-track errors. This includes the possibility of a General Protection Fault (GPF).</p> |
| <b>See also</b> | <a href="#">CALL</a> , <a href="#">GOSUB</a> , <a href="#">GOTO</a> , <a href="#">ON ERROR</a> , <a href="#">SUB/END SUB</a>                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Example</b>  | See the example in <a href="#">GOSUB</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

## RETURN FLUSH statement

# RETURN statement

**IMPROVED**

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Return from a ( <a href="#">GOSUB</a> ) subroutine to its caller.                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Syntax</b>   | <code>RETURN</code><br><code>RETURN FLUSH</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Remarks</b>  | <p>RETURN terminates the execution of a subroutine, and passes control to the statement directly following the calling GOSUB statement.</p> <p>RETURN FLUSH removes the most recent return address from the system <a href="#">stack</a> and program flow continues normally after the RETURN FLUSH.</p> <p>Performing either form of RETURN without a corresponding GOSUB can cause unpredictable behavior and difficult-to-track errors. This includes the possibility of a General Protection Fault (GPF).</p> |
| <b>See also</b> | <a href="#">CALL</a> , <a href="#">GOSUB</a> , <a href="#">GOTO</a> , <a href="#">ON ERROR</a> , <a href="#">SUB/END SUB</a>                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Example</b>  | See the example in <a href="#">GOSUB</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

## RGB function

# RGB function

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Create an RGB <a href="#">color</a> value from 3 primary color values or from a <a href="#">BGR</a> value.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Syntax</b>  | <code>result&amp; = RGB(<i>red&amp;</i>, <i>green&amp;</i>, <i>blue&amp;</i>)</code><br><code>result&amp; = RGB(<i>bgrexp&amp;</i>)</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Remarks</b> | <p>An RGB value is a <a href="#">long integer</a> value in the range of 0 to &amp;H00FFFFFF. It is used to specify a very precise color to various PowerBASIC functions and Windows API functions.</p> <p>The lowest three <a href="#">bytes</a> of the value each specify the intensity of a primary color which combine to form the resultant color. Byte 1 (lowest) represents the red component, byte 2 the green, and byte 3 the blue. They can each take on a value in the range of 0 to 255. Byte 4 (highest) is always 0. When used with 3 parameters, the RGB() function creates</p> |

an RGB value from the three component values.

Some Windows API functions, namely those which reference Device Independent Bitmaps (DIB), require that the colors be specified in the reverse sequence (Blue-Green-Red instead of Red-Green-Blue). In order to maximize performance and execution speed, PowerBASIC statements and functions which reference these structures also use the BGR format. These include [GRAPHIC GET BITS](#) and [GRAPHIC SET BITS](#).

When used with one parameter, this function translates a BGR value to its RGB equivalent by swapping the first byte with the third byte, and returning the result.

For example, the BGR value of red is &HFF0000. RGB() translates it to &H0000FF. Calling BGR() with that value converts it back to &HFF0000.

**See also** [Built In RGB Color Equates](#), [BGR](#)

## RIGHT\$ function

# RIGHT\$ function

**Purpose** Return the rightmost *n* characters of a

**Syntax** `s$ = RIGHT$(string_expression, n&)`

**Remarks** If *n&* is positive, RIGHT\$ returns the indicated number of characters from the string, starting from the right and working left. If *n&* greater than the length of *string\_expression*, all of *string\_expression* is returned.

If *n&* is 0, RIGHT\$ returns an empty string. If *n&* is negative, it is interpreted as `(LEN(string_expression) - ABS(n&))`. For example, `RIGHT$("1234567890", -2)` returns "34567890".

**See also** [EXTRACT\\$](#), [INSTR](#), [LEFT\\$](#), [LTRIM\\$](#), [MID\\$](#), [REMOVES\\$](#), [REPLACE](#), [RTRIM\\$](#), [SPLIT](#), [TALLY](#), [TRIM\\$](#), [VERIFY](#)

**Example**

```
' Demonstrate LEFT$ and RIGHT$ functions
DIM aString$, x$, n AS LONG
aString$ = "ABCDEFGHJKLMNPO"
FOR n = 1 TO 14 STEP 2
 x$ = LEFT$(aString, n) + SPACE$(28 - n * 2) + RIGHT$(aString, n)
NEXT n
```

## RMDIR statement

# RMDIR statement

**Purpose** Delete a disk directory (like the DOS RMDIR command).

**Syntax** `RMDIR path`

**Remarks** *path* is a directory path, which may include a drive specification. RMDIR deletes the directory indicated by *path*.

This statement works like the DOS "RMDIR" or "RD" commands. As with the DOS commands, the *path* must specify a valid, empty directory, other than the default (current) directory. Otherwise, a run-time [Error 75](#) occurs ("Path/file access error").

**RMDIR can use Long File Names (LFNs).**

**See also** [CHDIR](#), [KILL](#), [MKDIR](#)

**Example**

```
DirectoryName$ = "\TEMP"
RMDIR DirectoryName$
```

## RND function

# RND function

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Return a random number.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Syntax</b>  | <pre> y = RND y = RND(a, b) y = RND(numeric_expression) </pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Remarks</b> | <p>Floating point mode: RND returns a random value that is less than 1, but greater than or equal to 0. Numbers generated by RND aren't really random, but are the result of applying a pseudo-random transformation algorithm to a starting ("seed") value. Given the same seed, PowerBASIC's RND algorithm always produces the same sequence of "random" numbers. The pseudo-random value is calculated internally as a <a href="#">single precision</a> value, but returned as an <a href="#">extended precision</a> representation so it can be readily used in any situation.</p> <p>Integral Range mode: RND(<i>a</i>, <i>b</i>) returns a <a href="#">Long-integer</a> in the range of <i>a</i> to <i>b</i> inclusive. <i>a</i> and <i>b</i> can each be a numeric <a href="#">literal</a> or a numeric expression that evaluates within the range of a Long-integer (-2,147,483,648 to 2,147,483,647).</p> <p>Special effects mode: When used with a single numeric expression argument, the value returned by RND depends on the optional numeric value you supply as the argument, as follows:</p> <p>With no argument, or with a positive argument, RND generates the next number in sequence based on the initial seed value. With an argument of 0, RND repeats the last number generated. A negative argument causes the random number generator to be re-seeded, so subsequent uses of RND with no argument or with a positive argument result in a new sequence of values.</p> <p>Do not use 0 or negative value arguments in special effects mode unless you are looking for the special effects those argument values produce.</p> <p>The random number generator can be reset back to the default seed using the following statement:</p> <pre>RANDOMIZE CVS(CHR\$(255,255,255,255))</pre> <p>Note that each <a href="#">thread</a> has its own, independent random number seed. See the discussion under <a href="#">RANDOMIZE</a> for additional information on seeding the random number generator.</p> |
| <b>Example</b> | See the example under <a href="#">RANDOMIZE</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

## ROTATE statement

# ROTATE statement

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Rotate the bits in an<br>variable.                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Syntax</b>   | ROTATE {LEFT   RIGHT} <i>ivar</i> , <i>count</i>                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Remarks</b>  | <i>ivar</i> must be one of the integral-class variable types: <a href="#">Byte</a> , <a href="#">Word</a> , <a href="#">Integer</a> , <a href="#">Double-word</a> , <a href="#">Long-integer</a> , or <a href="#">Quad-integer</a> . <i>count</i> is the number of bits by which to rotate <i>ivar</i> . ROTATE rotates all the bits in <i>ivar</i> without special regard to the sign bit of a signed integral-class variable. |
| <b>See also</b> | <a href="#">BIT function</a> , <a href="#">BIT statement</a> , <a href="#">BITS</a> , <a href="#">SHIFT</a>                                                                                                                                                                                                                                                                                                                     |
| <b>Example</b>  | <pre> i? = 221          ' binary: 1 1 0 1 1 1 0 1 ROTATE RIGHT i?, 1 ' binary: 1 1 1 0 1 1 1 0 </pre>                                                                                                                                                                                                                                                                                                                           |

## ROUND function

# ROUND function

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Round a numeric value to a specified number of decimal places.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Syntax</b>   | <code>x = ROUND(<i>numeric_expression</i>, <i>n</i>)</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Remarks</b>  | <p><i>n</i> is an expression specifying the number of decimal places required in the result. ROUND is especially useful in cases where you have a variable in <a href="#">Single</a>, <a href="#">Double</a>, or <a href="#">Extended-precision</a>, and you want to put it into a <a href="#">Currency</a> variable or display it, rounded to a specific number of decimal places.</p> <p>Rounding is done according to the "banker's rounding" principle: if the fractional digit being rounded off is exactly five, with no trailing digits, the number is rounded to the nearest even number. This provides better results, on average, than the simple "round up at five" approach.</p> <pre> A% = ROUND(0.5, 0)           ' 0 A% = ROUND(1.5, 0)         ' 2 A% = ROUND(2.5, 0)         ' 2 A% = ROUND(2.51, 0)        ' 3 </pre> |
| <b>See also</b> | <a href="#">CEIL</a> , <a href="#">FIX</a> , <a href="#">FORMAT\$</a> , <a href="#">INT</a> , <a href="#">USING\$</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

## RSET statement

# RSET statement

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Right justify a<br>into the space of a string <a href="#">variable</a> or <a href="#">User-Defined Type</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Syntax</b>   | <code>RSET [ABS] <i>result_var</i> = <i>string_expression</i> [USING <i>ustring_expression</i>]</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Remarks</b>  | RSET right-aligns a string within the space of another string, or within a variable of a User-Defined Type (UDT).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>ABS</b>      | If ABS is specified, or <i>ustring_expression</i> is null (empty), RSET leaves the padding positions unchanged from their original content, rather than replacing them with spaces.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>USING</b>    | <p>If <i>string_expression</i> is shorter than <i>result_var</i>, RSET right-justifies <i>string_expression</i> within <i>result_var</i>, and pads remaining character positions on the left side using the first character in <i>ustring_expression</i> or spaces if not specified or is null (empty).</p> <p>If <i>string_expression</i> is longer than <i>result_var</i>, RSET truncates <i>string_expression</i> from the right until it fits in <i>result_var</i>.</p> <p>RSET can be used to assign the content of a User-Defined Type to a User-Defined Type variable of a different class, or assign a <a href="#">dynamic string</a> to a User-Defined Type. For example:</p> <pre> RSET MyUDT = STRING\$(LEN(MyUDT), 0) RSET MyUDT = b\$ </pre> <p><a href="#">LSET</a> works in a similar manner, but left-aligns <i>string_expression</i>; <a href="#">CSET</a> performs center-justification.</p> |
| <b>See also</b> | <a href="#">CSET</a> , <a href="#">CSET\$</a> , <a href="#">GET</a> , <a href="#">LET</a> , <a href="#">LET (with Types)</a> , <a href="#">LSET</a> , <a href="#">LSET\$</a> , <a href="#">PUT</a> , <a href="#">RESET</a> , <a href="#">RSET\$</a> , <a href="#">STRINSERT\$</a> , <a href="#">TYPE SET</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Example</b>  | <pre> a\$ = SPACE\$(20) RSET a\$ = "Right-align" ' result "           Right-align" </pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

```
RSET a$ = "Right-align" USING ""
' result "*****Right-align"
```

## RSET\$ function

# RSET\$ function

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Return a<br>containing a right-justified (padded) string.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Syntax</b>   | <code>a\$ = RSET\$(string_expression, strlen&amp; [USING ustring_expression])</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Remarks</b>  | RSET\$ right-aligns the string <i>string_expression</i> into a string of <i>strlen&amp;</i> characters.                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>USING</b>    | If <i>ustring_expression</i> is null (empty) or is not specified, RSET\$ pads <i>string_expression</i> with space characters. Otherwise, RSET\$ pads the string with the first character of <i>ustring_expression</i> .<br><br>If <i>string_expression</i> is shorter than <i>strlen&amp;</i> , RSET\$ right-justifies <i>string_expression</i> within the assigned string variable ( <i>a\$</i> ), padding the left side as described above; otherwise, RSET\$ returns the left-most <i>strlen&amp;</i> bytes of <i>string_expression</i> . |
| <b>See also</b> | <a href="#">CSET</a> , <a href="#">CSET\$</a> , <a href="#">GET</a> , <a href="#">LET</a> , <a href="#">LSET</a> , <a href="#">LSET\$</a> , <a href="#">PUT</a> , <a href="#">RESET</a> , <a href="#">RSET</a> , <a href="#">STRINSERT\$</a> , <a href="#">TYPE SET</a>                                                                                                                                                                                                                                                                      |
| <b>Example</b>  | <pre>a\$ = RSET\$("PowerBASIC", 20) ' result: "          PowerBASIC"  a\$ = RSET\$("PowerBASIC",20 USING "") ' result: "*****PowerBASIC"</pre>                                                                                                                                                                                                                                                                                                                                                                                               |

## RTRIM\$ function

# RTRIM\$ function

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Return a copy of a<br>with trailing characters or strings removed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Syntax</b>   | <code>x\$ = RTRIM\$(MainString [, [ANY] MatchString])</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Remarks</b>  | <i>MainString</i> is the <a href="#">string expression</a> from which to remove characters, and <i>MatchString</i> is the string expression specifying the characters that should be removed from the right hand side of <i>MainString</i> .<br><br>If <i>MatchString</i> is not specified, RTRIM\$ removes trailing spaces. RTRIM\$ returns a substring of <i>MainString</i> , from the beginning of the string to the character preceding the consecutive occurrences of <i>MatchString</i> (or space), which continues to the end of the original string. If <i>MatchString</i> (or a space) is not present at the end of <i>MainString</i> , all of <i>MainString</i> is returned.<br><br>RTRIM\$ is case-sensitive. |
| <b>ANY</b>      | If the ANY keyword is included, <i>MatchString</i> specifies a list of single characters to be searched for individually - a match on any one of which as a trailing character will cause the character to be removed from the result.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>See also</b> | <a href="#">CLIP\$</a> , <a href="#">EXTRACT\$</a> , <a href="#">INSTR</a> , <a href="#">LEFT\$</a> , <a href="#">LTRIM\$</a> , <a href="#">MID\$</a> , <a href="#">REMOVE\$</a> , <a href="#">REPLACE</a> , <a href="#">RIGHT\$</a> , <a href="#">STRDELETE\$</a> , <a href="#">STRINSERT\$</a> , <a href="#">STRREVERSE\$</a> , <a href="#">TALLY</a> , <a href="#">TRIM\$</a> , <a href="#">VERIFY</a>                                                                                                                                                                                                                                                                                                                |
| <b>Example</b>  | <pre>' returns "abacadabra" (match on spaces) x\$ = RTRIM\$("abacadabra  ")  ' returns "abacadabra  " (no match on " cad") x\$ = RTRIM\$("abacadabra  ", " cad")</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

```
' returns "abacadabr" (match on " " and "a")
x$ = RTRIM$("abacadabra ", ANY " cad")
```

## SCROLLBAR GET PAGESIZE statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

# SCROLLBAR statement

**Purpose** Manipulate a [SCROLLBAR](#) control. A ScrollBar is a control that allows the user to scroll a data object to bring into view portions of the object that extend beyond the borders of the window.

**Syntax**

```
SCROLLBAR GET PAGESIZE hDlg, id& TO datav&
SCROLLBAR GET POS hDlg, id& TO datav&
SCROLLBAR GET RANGE hDlg&, id& TO LoDatav&, HiDatav&
SCROLLBAR GET TRACKPOS hDlg, id& TO datav&
SCROLLBAR SET PAGESIZE hDlg, id&, pagesize&
SCROLLBAR SET POS hDlg, id&, position&
SCROLLBAR SET RANGE hDlg, id&, lolimit&, hilimit&
```

*hDlg* [Handle](#) of the [dialog](#) that owns the ScrollBar.

*id&* The [control identifier](#) assigned with [CONTROL ADD SCROLLBAR](#).

**Remarks** In each of the following samples and descriptions, the SCROLLBAR control that is the subject of the statement is identified by the handle of the dialog that owns the ScrollBar (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD SCROLLBAR. To alter the [color](#) of the bar or the background, use [CONTROL SET COLOR](#).

### **SCROLLBAR GET PAGESIZE hDlg, id& TO datav&**

The current page size of the ScrollBar is retrieved and assigned to the [variable](#) designated by *datav&*. Upon ScrollBar creation, the default page size is 10.

### **SCROLLBAR GET POS hDlg, id& TO datav&**

The current position of the ScrollBar is retrieved and assigned to the variable designated by *datav&*. Upon ScrollBar creation, the default position is 0.

### **SCROLLBAR GET RANGE hDlg, id& TO LoDatav&, HiDatav&**

The current range of the ScrollBar is retrieved and assigned to the variables designated by *LoDatav&* and *HiDatav&*. Upon ScrollBar creation, the default ScrollBar range is 0 to 100.

### **SCROLLBAR GET TRACKPOS hDlg, id& TO datav&**

The current position of the scroll box, being dragged by the user, is retrieved and assigned to the variable designated by *datav&*. This is normally read while responding to the %SB\_THUMBPOSITION or the %SB\_THUMBTRACK messages. The TRACKPOS is then used to move the scroll position with SCROLLBAR SET POS.

**SCROLLBAR SET PAGESIZE *hDlg, id&, pagesize&***

The current page size of the ScrollBar is set to the value of the parameter *pagesize&*, and the bar is redrawn to reflect the new position.

**SCROLLBAR SET POS *hDlg, id&, position&***

The current position of the ScrollBar is set to the value of the parameter *position&*, and the bar is redrawn to reflect the new position.

**SCROLLBAR SET RANGE *hDlg, id&, lolimit&, hilimit&***

The range for the ScrollBar is specified to be from *lolimit&* to *hilimit&*. If *lolimit&* is greater than *hilimit&*, the results are undefined.

See also [Dynamic Dialog Tools](#), [CONTROL ADD SCROLLBAR](#), [CONTROL SET COLOR](#)

**SCROLLBAR GET POS statement**

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

# SCROLLBAR statement

**Purpose** Manipulate a [SCROLLBAR](#) control. A ScrollBar is a control that allows the user to scroll a data object to bring into view portions of the object that extend beyond the borders of the window.

**Syntax**

```
SCROLLBAR GET PAGESIZE hDlg, id& TO datav&
SCROLLBAR GET POS hDlg, id& TO datav&
SCROLLBAR GET RANGE hDlg&, id& TO LoDatav&, HiDatav&
SCROLLBAR GET TRACKPOS hDlg, id& TO datav&
SCROLLBAR SET PAGESIZE hDlg, id&, pagesize&
SCROLLBAR SET POS hDlg, id&, position&
SCROLLBAR SET RANGE hDlg, id&, lolimit&, hilimit&
```

*hDlg* [Handle](#) of the [dialog](#) that owns the ScrollBar.

*id&* The [control identifier](#) assigned with [CONTROL ADD SCROLLBAR](#).

**Remarks** In each of the following samples and descriptions, the SCROLLBAR control that is the subject of the statement is identified by the handle of the dialog that owns the ScrollBar (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD SCROLLBAR. To alter the [color](#) of the bar or the background, use [CONTROL SET COLOR](#).

**SCROLLBAR GET PAGESIZE *hDlg, id&* TO *datav&***

The current page size of the ScrollBar is retrieved and assigned to the [variable](#) designated by *datav&*. Upon ScrollBar creation, the default page size is 10.

**SCROLLBAR GET POS *hDlg, id&* TO *datav&***

The current position of the ScrollBar is retrieved and assigned to the variable designated

by *datav&*. Upon ScrollBar creation, the default position is 0.

### **SCROLLBAR GET RANGE *hDlg, id& TO LoDatav&, HiDatav&***

The current range of the ScrollBar is retrieved and assigned to the variables designated by *LoDatav&* and *HiDatav&*. Upon ScrollBar creation, the default ScrollBar range is 0 to 100.

### **SCROLLBAR GET TRACKPOS *hDlg, id& TO datav&***

The current position of the scroll box, being dragged by the user, is retrieved and assigned to the variable designated by *datav&*. This is normally read while responding to the %SB\_THUMBPOSITION or the %SB\_THUMBTRACK messages. The TRACKPOS is then used to move the scroll position with SCROLLBAR SET POS.

### **SCROLLBAR SET PAGESIZE *hDlg, id&, pagesize&***

The current page size of the ScrollBar is set to the value of the parameter *pagesize&*, and the bar is redrawn to reflect the new position.

### **SCROLLBAR SET POS *hDlg, id&, position&***

The current position of the ScrollBar is set to the value of the parameter *position&*, and the bar is redrawn to reflect the new position.

### **SCROLLBAR SET RANGE *hDlg, id&, lolimit&, hilimit&***

The range for the ScrollBar is specified to be from *lolimit&* to *hilimit&*. If *lolimit&* is greater than *hilimit&*, the results are undefined.

See also [Dynamic Dialog Tools](#), [CONTROL ADD SCROLLBAR](#), [CONTROL SET COLOR](#)

## SCROLLBAR GET RANGE statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## SCROLLBAR statement

**Purpose** Manipulate a [SCROLLBAR](#) control. A ScrollBar is a control that allows the user to scroll a data object to bring into view portions of the object that extend beyond the borders of the window.

**Syntax**

```
SCROLLBAR GET PAGESIZE hDlg, id& TO datav&
SCROLLBAR GET POS hDlg, id& TO datav&
SCROLLBAR GET RANGE hDlg, id& TO LoDatav&, HiDatav&
SCROLLBAR GET TRACKPOS hDlg, id& TO datav&
SCROLLBAR SET PAGESIZE hDlg, id&, pagesize&
SCROLLBAR SET POS hDlg, id&, position&
SCROLLBAR SET RANGE hDlg, id&, lolimit&, hilimit&
```

*hDlg* [Handle](#) of the [dialog](#) that owns the ScrollBar.

*id&* The [control identifier](#) assigned with [CONTROL ADD SCROLLBAR](#).

**Remarks**

In each of the following samples and descriptions, the SCROLLBAR control that is the subject of the statement is identified by the handle of the dialog that owns the ScrollBar (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD SCROLLBAR. To alter the [color](#) of the bar or the background, use [CONTROL SET COLOR](#).

**SCROLLBAR GET PAGESIZE *hDlg, id& TO datav&***

The current page size of the ScrollBar is retrieved and assigned to the [variable](#) designated by *datav&*. Upon ScrollBar creation, the default page size is 10.

**SCROLLBAR GET POS *hDlg, id& TO datav&***

The current position of the ScrollBar is retrieved and assigned to the variable designated by *datav&*. Upon ScrollBar creation, the default position is 0.

**SCROLLBAR GET RANGE *hDlg, id& TO LoDatav&, HiDatav&***

The current range of the ScrollBar is retrieved and assigned to the variables designated by *LoDatav&* and *HiDatav&*. Upon ScrollBar creation, the default ScrollBar range is 0 to 100.

**SCROLLBAR GET TRACKPOS *hDlg, id& TO datav&***

The current position of the scroll box, being dragged by the user, is retrieved and assigned to the variable designated by *datav&*. This is normally read while responding to the %SB\_THUMBPOSITION or the %SB\_THUMBTRACK messages. The TRACKPOS is then used to move the scroll position with SCROLLBAR SET POS.

**SCROLLBAR SET PAGESIZE *hDlg, id&, pagesize&***

The current page size of the ScrollBar is set to the value of the parameter *pagesize&*, and the bar is redrawn to reflect the new position.

**SCROLLBAR SET POS *hDlg, id&, position&***

The current position of the ScrollBar is set to the value of the parameter *position&*, and the bar is redrawn to reflect the new position.

**SCROLLBAR SET RANGE *hDlg, id&, lolimit&, hilimit&***

The range for the ScrollBar is specified to be from *lolimit&* to *hilimit&*. If *lolimit&* is greater than *hilimit&*, the results are undefined.

**See also**

[Dynamic Dialog Tools](#), [CONTROL ADD SCROLLBAR](#), [CONTROL SET COLOR](#)

**SCROLLBAR GET TRACKPOS statement****Keyword Template**

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

**SCROLLBAR statement**

**Purpose** Manipulate a [SCROLLBAR](#) control. A ScrollBar is a control that allows the user to scroll a data object to bring into view portions of the object that extend beyond the borders of the window.

**Syntax**

```
SCROLLBAR GET PAGESIZE hDlg, id& TO datav&
SCROLLBAR GET POS hDlg, id& TO datav&
SCROLLBAR GET RANGE hDlg&, id& TO LoDatav&, HiDatav&
SCROLLBAR GET TRACKPOS hDlg, id& TO datav&
SCROLLBAR SET PAGESIZE hDlg, id&, pagesize&
SCROLLBAR SET POS hDlg, id&, position&
SCROLLBAR SET RANGE hDlg, id&, lolimit&, hilimit&
```

*hDlg* [Handle](#) of the [dialog](#) that owns the ScrollBar.

*id&* The [control identifier](#) assigned with [CONTROL ADD SCROLLBAR](#).

**Remarks** In each of the following samples and descriptions, the SCROLLBAR control that is the subject of the statement is identified by the handle of the dialog that owns the ScrollBar (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD SCROLLBAR. To alter the [color](#) of the bar or the background, use [CONTROL SET COLOR](#).

#### **SCROLLBAR GET PAGESIZE *hDlg, id&* TO *datav&***

The current page size of the ScrollBar is retrieved and assigned to the [variable](#) designated by *datav&*. Upon ScrollBar creation, the default page size is 10.

#### **SCROLLBAR GET POS *hDlg, id&* TO *datav&***

The current position of the ScrollBar is retrieved and assigned to the variable designated by *datav&*. Upon ScrollBar creation, the default position is 0.

#### **SCROLLBAR GET RANGE *hDlg, id&* TO *LoDatav&, HiDatav&***

The current range of the ScrollBar is retrieved and assigned to the variables designated by *LoDatav&* and *HiDatav&*. Upon ScrollBar creation, the default ScrollBar range is 0 to 100.

#### **SCROLLBAR GET TRACKPOS *hDlg, id&* TO *datav&***

The current position of the scroll box, being dragged by the user, is retrieved and assigned to the variable designated by *datav&*. This is normally read while responding to the %SB\_THUMBPOSITION or the %SB\_THUMBTRACK messages. The TRACKPOS is then used to move the scroll position with SCROLLBAR SET POS.

#### **SCROLLBAR SET PAGESIZE *hDlg, id&, pagesize&***

The current page size of the ScrollBar is set to the value of the parameter *pagesize&*, and the bar is redrawn to reflect the new position.

#### **SCROLLBAR SET POS *hDlg, id&, position&***

The current position of the ScrollBar is set to the value of the parameter *position&*, and the bar is redrawn to reflect the new position.

#### **SCROLLBAR SET RANGE *hDlg, id&, lolimit&, hilimit&***

The range for the ScrollBar is specified to be from *lolimit&* to *hilimit&*. If *lolimit&* is greater than *hilimit&*, the results are undefined.

**See also** [Dynamic Dialog Tools](#), [CONTROL ADD SCROLLBAR](#), [CONTROL SET COLOR](#)

## SCROLLBAR SET PAGESIZE statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## SCROLLBAR statement

**Purpose** Manipulate a [SCROLLBAR](#) control. A ScrollBar is a control that allows the user to scroll a data object to bring into view portions of the object that extend beyond the borders of the window.

**Syntax**

```

SCROLLBAR GET PAGESIZE hDlg, id& TO datav&
SCROLLBAR GET POS hDlg, id& TO datav&
SCROLLBAR GET RANGE hDlg&, id& TO LoDatav&, HiDatav&
SCROLLBAR GET TRACKPOS hDlg, id& TO datav&
SCROLLBAR SET PAGESIZE hDlg, id&, pagesize&
SCROLLBAR SET POS hDlg, id&, position&
SCROLLBAR SET RANGE hDlg, id&, lolimit&, hilimit&

```

*hDlg* [Handle](#) of the [dialog](#) that owns the ScrollBar.

*id&* The [control identifier](#) assigned with [CONTROL ADD SCROLLBAR](#).

**Remarks** In each of the following samples and descriptions, the SCROLLBAR control that is the subject of the statement is identified by the handle of the dialog that owns the ScrollBar (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD SCROLLBAR. To alter the [color](#) of the bar or the background, use [CONTROL SET COLOR](#).

### **SCROLLBAR GET PAGESIZE *hDlg, id&* TO *datav&***

The current page size of the ScrollBar is retrieved and assigned to the [variable](#) designated by *datav&*. Upon ScrollBar creation, the default page size is 10.

### **SCROLLBAR GET POS *hDlg, id&* TO *datav&***

The current position of the ScrollBar is retrieved and assigned to the variable designated by *datav&*. Upon ScrollBar creation, the default position is 0.

### **SCROLLBAR GET RANGE *hDlg, id&* TO *LoDatav&, HiDatav&***

The current range of the ScrollBar is retrieved and assigned to the variables designated by *LoDatav&* and *HiDatav&*. Upon ScrollBar creation, the default ScrollBar range is 0 to 100.

### **SCROLLBAR GET TRACKPOS *hDlg, id&* TO *datav&***

The current position of the scroll box, being dragged by the user, is retrieved and assigned to the variable designated by *datav&*. This is normally read while responding to the %SB\_THUMBPOSITION or the %SB\_THUMBTRACK messages. The TRACKPOS is then used to move the scroll position with SCROLLBAR SET POS.

### **SCROLLBAR SET PAGESIZE *hDlg, id&, pagesize&***

The current page size of the ScrollBar is set to the value of the parameter *pagesize&*, and the bar is redrawn to reflect the new position.

### **SCROLLBAR SET POS *hDlg, id&, position&***

The current position of the ScrollBar is set to the value of the parameter *position&*, and the bar is redrawn to reflect the new position.

### **SCROLLBAR SET RANGE *hDlg, id&, lolimit&, hilimit&***

The range for the ScrollBar is specified to be from *lolimit&* to *hilimit&*. If *lolimit&* is greater than *hilimit&*, the results are undefined.

See also [Dynamic Dialog Tools](#), [CONTROL ADD SCROLLBAR](#), [CONTROL SET COLOR](#)

## SCROLLBAR SET POS statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

# SCROLLBAR statement

**Purpose** Manipulate a [SCROLLBAR](#) control. A ScrollBar is a control that allows the user to scroll a data object to bring into view portions of the object that extend beyond the borders of the window.

**Syntax**

```
SCROLLBAR GET PAGESIZE hDlg, id& TO datav&
SCROLLBAR GET POS hDlg, id& TO datav&
SCROLLBAR GET RANGE hDlg&, id& TO LoDatav&, HiDatav&
SCROLLBAR GET TRACKPOS hDlg, id& TO datav&
SCROLLBAR SET PAGESIZE hDlg, id&, pagesize&
SCROLLBAR SET POS hDlg, id&, position&
SCROLLBAR SET RANGE hDlg, id&, lolimit&, hilimit&
```

*hDlg* [Handle](#) of the [dialog](#) that owns the ScrollBar.

*id&* The [control identifier](#) assigned with [CONTROL ADD SCROLLBAR](#).

**Remarks** In each of the following samples and descriptions, the SCROLLBAR control that is the subject of the statement is identified by the handle of the dialog that owns the ScrollBar (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD SCROLLBAR. To alter the [color](#) of the bar or the background, use [CONTROL SET COLOR](#).

### **SCROLLBAR GET PAGESIZE *hDlg, id&* TO *datav&***

The current page size of the ScrollBar is retrieved and assigned to the [variable](#) designated by *datav&*. Upon ScrollBar creation, the default page size is 10.

### **SCROLLBAR GET POS *hDlg, id&* TO *datav&***

The current position of the ScrollBar is retrieved and assigned to the variable designated by *datav&*. Upon ScrollBar creation, the default position is 0.

### **SCROLLBAR GET RANGE *hDlg, id&* TO *LoDatav&, HiDatav&***

The current range of the ScrollBar is retrieved and assigned to the variables designated by *LoDatav&* and *HiDatav&*. Upon ScrollBar creation, the default ScrollBar range is 0 to 100.

**SCROLLBAR GET TRACKPOS *hDlg, id& TO datav&***

The current position of the scroll box, being dragged by the user, is retrieved and assigned to the variable designated by *datav&*. This is normally read while responding to the %SB\_THUMBPOSITION or the %SB\_THUMBTRACK messages. The TRACKPOS is then used to move the scroll position with SCROLLBAR SET POS.

**SCROLLBAR SET PAGESIZE *hDlg, id&, pagesize&***

The current page size of the ScrollBar is set to the value of the parameter *pagesize&*, and the bar is redrawn to reflect the new position.

**SCROLLBAR SET POS *hDlg, id&, position&***

The current position of the ScrollBar is set to the value of the parameter *position&*, and the bar is redrawn to reflect the new position.

**SCROLLBAR SET RANGE *hDlg, id&, lolimit&, hilimit&***

The range for the ScrollBar is specified to be from *lolimit&* to *hilimit&*. If *lolimit&* is greater than *hilimit&*, the results are undefined.

See also [Dynamic Dialog Tools](#), [CONTROL ADD SCROLLBAR](#), [CONTROL SET COLOR](#)

**SCROLLBAR SET RANGE statement****Keyword Template**

Purpose

Syntax

Remarks

See also

Example

**SCROLLBAR statement**

**Purpose** Manipulate a [SCROLLBAR](#) control. A ScrollBar is a control that allows the user to scroll a data object to bring into view portions of the object that extend beyond the borders of the window.

**Syntax**

```
SCROLLBAR GET PAGESIZE hDlg, id& TO datav&
SCROLLBAR GET POS hDlg, id& TO datav&
SCROLLBAR GET RANGE hDlg, id& TO LoDatav&, HiDatav&
SCROLLBAR GET TRACKPOS hDlg, id& TO datav&
SCROLLBAR SET PAGESIZE hDlg, id&, pagesize&
SCROLLBAR SET POS hDlg, id&, position&
SCROLLBAR SET RANGE hDlg, id&, lolimit&, hilimit&
```

*hDlg* [Handle](#) of the [dialog](#) that owns the ScrollBar.

*id&* The [control identifier](#) assigned with [CONTROL ADD SCROLLBAR](#).

**Remarks** In each of the following samples and descriptions, the SCROLLBAR control that is the subject of the statement is identified by the handle of the dialog that owns the ScrollBar (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD SCROLLBAR. To alter the [color](#) of the bar or the background, use [CONTROL SET COLOR](#).

**SCROLLBAR GET PAGESIZE *hDlg, id& TO datav&***

The current page size of the ScrollBar is retrieved and assigned to the [variable](#) designated by *datav&*. Upon ScrollBar creation, the default page size is 10.

**SCROLLBAR GET POS *hDlg, id& TO datav&***

The current position of the ScrollBar is retrieved and assigned to the variable designated by *datav&*. Upon ScrollBar creation, the default position is 0.

**SCROLLBAR GET RANGE *hDlg, id& TO LoDatav&, HiDatav&***

The current range of the ScrollBar is retrieved and assigned to the variables designated by *LoDatav&* and *HiDatav&*. Upon ScrollBar creation, the default ScrollBar range is 0 to 100.

**SCROLLBAR GET TRACKPOS *hDlg, id& TO datav&***

The current position of the scroll box, being dragged by the user, is retrieved and assigned to the variable designated by *datav&*. This is normally read while responding to the %SB\_THUMBPOSITION or the %SB\_THUMBTRACK messages. The TRACKPOS is then used to move the scroll position with SCROLLBAR SET POS.

**SCROLLBAR SET PAGESIZE *hDlg, id&, pagesize&***

The current page size of the ScrollBar is set to the value of the parameter *pagesize&*, and the bar is redrawn to reflect the new position.

**SCROLLBAR SET POS *hDlg, id&, position&***

The current position of the ScrollBar is set to the value of the parameter *position&*, and the bar is redrawn to reflect the new position.

**SCROLLBAR SET RANGE *hDlg, id&, lolimit&, hilimit&***

The range for the ScrollBar is specified to be from *lolimit&* to *hilimit&*. If *lolimit&* is greater than *hilimit&*, the results are undefined.

See also [Dynamic Dialog Tools](#), [CONTROL ADD SCROLLBAR](#), [CONTROL SET COLOR](#)

## SEEK function

# SEEK function

**Purpose** Return the location within a [file](#) where the next I/O operation will take place.

**Syntax** *position&& = SEEK([#] *filenum&*)*

**Remarks** If file *filenum&* was opened in [random-access](#) mode, SEEK returns the record number of the next record to be written or read as a [Quad-integer](#) (64-bit) value. If the file was opened in any other mode, SEEK returns the byte position of the next byte to be written or read, as a Quad-integer (64-bit) value. The Number symbol (#) is optional, but recommended for clarity.

The beginning byte position (for [binary](#) and [sequential](#) files) or record position (for random-access files) may be 0 or 1, depending on the [BASE](#) option used when the file was initially Opened. The default, if no BASE is specified, is a starting position of 1.

PowerBASIC recommends using the SEEK function over the (more complex) [LOC](#) function used in prior versions of PowerBASIC. LOC remains supported for compatibility with older versions of BASIC, but it is likely that LOC may be removed in future versions of PowerBASIC.

See also [EOF](#), [FILEATTR](#), [GET\\$](#), [GET\\$\\$](#), [LOC](#), [LOF](#), [OPEN](#), [PUT\\$](#), [PUT\\$\\$](#), [SEEK statement](#)

**Example**

```

RANDOMIZE TIMER
OPEN "OUTPUT.TXT" FOR OUTPUT AS #1
PRINT #1, STRING$(RND * 80, RND * 255);
position&& = SEEK(1)
CLOSE #1

```

## SEEK statement

# SEEK statement

**Purpose** Set the position in a [file](#) for the next input or output operation.

**Syntax** `SEEK [#] filenum&, position&&`

**Remarks** SEEK sets the file pointer position of file *filenum&* to *position&&*. *position&&* is a [Quad-integer](#) variable, [constant](#), or expression.

The next [GET\\$](#) or [PUT\\$](#) performed on the file *filenum&* will occur *position&&* bytes (or records) deep into the file. If file *filenum&* was opened in [binary](#) or [sequential](#) mode, *position&&* indicates the new file position in bytes; for [random-access](#) files, *position* is in records.

The first byte position (for binary and sequential files) or record position (for random-access files) may be 0 or 1, depending on the [BASE](#) option used when the file was initially Opened. If no BASE was specified, the default position is 1.

Use the [SEEK function](#) to determine a binary file's current pointer position, and [LOF](#) to determine its length. Seeking past the end of a file does not produce an error, but no data can be read from beyond the true end of the file.

**See also** [EOF](#), [FILEATTR](#), [GET\\$](#), [GET\\$\\$](#), [LOC](#), [LOF](#), [OPEN](#), [PUT\\$](#), [PUT\\$\\$](#), [SEEK function](#), [SETEOF](#)

**Example**

```

SUB CreateFile
' Open a binary file and writes 75 chars to it.
LOCAL I&
OPEN "SEEK.DTA" FOR BINARY AS #1
FOR I& = 48 TO 122
 PUT$ 1, CHR$(I&)
NEXT I&
END SUB

FUNCTION ReadIt$(Start&&, qSize&&)
' SEEK to the correct position in the file,
' which was previously opened in the CreateFile SUB.
SEEK 1, Start&&
I&& = 1
TempStr$ = ""
' Read in the indicated data - don't read past end of file.
WHILE (ISFALSE EOF(1)) AND (I&& <= qSize&&)
 GET$ 1, 1, Char$
 TempStr$ = TempStr$ + Char$
 INCR I&&
WEND
ReadIt$ = TempStr$ ' assign function's result
END FUNCTION

```

## SELECT CASE/END SELECT block

# SELECT CASE/END SELECT block

IMPROVED

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Control program flow based on the value of an expression.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Syntax</b>  | <pre> SELECT CASE [AS] [LONG   CONST   CONST\$   CONST\$\$] <i>expression</i> CASE [IS] <i>testlist</i>     [<i>statements</i>] [CASE [IS] <i>testlist</i>     [<i>statements</i>]] [CASE ELSE     [<i>statements</i>]] END SELECT </pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Remarks</b> | <p><i>testlist</i> is one or more tests, separated by commas, to be performed on <i>expression</i>. <i>expression</i> can be either</p> <p>OR .</p> <p>When a SELECT statement is encountered, <i>expression</i> is evaluated using the <i>testlist</i> in the first CASE clause. If the evaluation is FALSE, the evaluation is repeated using the next <i>testlist</i>. As soon as an evaluation is TRUE (non-zero), the statements following that CASE clause are executed, up to the next CASE clause.</p> <p>Execution then passes to the statement following the END SELECT statement. If none of the evaluations is TRUE, the statements following the optional CASE ELSE clause are executed.</p> <p>The tests that may be performed by a CASE clause include: equality, inequality, greater than, less than, and range ("from-to") testing. The SELECT CASE block can do string or numeric tests, but these cannot be interchanged.</p> |

Examples of numeric CASE clause tests include:

```

SELECT CASE numeric_expression
CASE > b ' relational; is expression > b?
CASE 14 ' equality (= is assumed); is expression equal to
14?
CASE b TO 99 ' range; is expression between the value of the
' variable b and 99 (inclusive)?
CASE 14, b ' two equality tests; is expression equal to
' 14 or equal to b?
CASE 25 TO 99,14 ' combination range and equality; is expression
' between 25 and 99 (inclusive) or equal to 14?

```

Examples of string CASE clause tests include:

```

SELECT CASE string_expression
CASE > b$ ' relational; is expression > b$?
CASE "X" ' equality (= is assumed); is expression equal
' to "X"?
CASE "A" TO "C" ' range; is expression between "A" and
' "C"(inclusive)?
CASE "Y", b$ ' two equality tests; is expression equal to
' "Y" or equal to b$?
CASE "A" TO "C","Q" ' combination range and equality; is expression
' between "A" and "C" (inclusive) or equal
' to "Q"?

```

When a CASE clause contains multiple tests separated by commas, a logical [OR](#) is performed. That is, if any one (or more) of the tests is TRUE, the entire clause is deemed to be TRUE.

Use [EXIT SELECT](#) to jump out of a SELECT block prematurely.

PowerBASIC now offers four optional modifiers to provide highly optimized code generation for specific circumstances. By default, numeric expressions are evaluated either as

values (to offer the widest range of compatibility for any possible circumstance) or as (for example, if PowerBASIC can establish that all case clauses are integer class

values, etc). Further, [string expressions](#) are evaluated dynamically to allow virtually any data. However, if limits on the type *and* range of the data used for CASE comparison are restricted, performance can be dramatically enhanced with the LONG, CONST, CONST\$, or CONST\$\$ clauses.

**AS LONG** In this case, the controlling expression and the CASE expressions must evaluate in the range of a [Long-integer](#). Each of these expressions are calculated dynamically, so all of the normal operators are still available. Performance is enhanced by the integral class of code generation, rather than floating-point. For example, [DWORD](#) values are treated as Long-integer values, so &H0FFFFFFF?? and -1& would be considered equal values. This can help eliminate the need to use functions such as [BITS](#) when performing comparisons between signed and unsigned values.

**AS CONST** In this case, the controlling expression must evaluate in the range of a Long-integer. However, each of the case values must be strictly specified by a [numeric literal](#) (or [numeric equate](#)) in the range of a Long-integer. Multiple case values may be given (CASE 2,3,7), but operators and ranges of values are not allowed. CASE ELSE is permitted. Performance is enhanced by the internal creation of a vector [jump](#) table, one entry for each number from the smallest to the largest case value.

While this form of the structure offers the utmost performance possible, the execution speed must be carefully weighed against the increased program size, particularly when using sparse case values. For example, with just two CASE values of 2 and 1000, the generated jump table would need 999 table entries (3996 bytes in size). The largest allowed jump table for this form is approximately 3200 entries (12K bytes). If exceeded, an [Error 402](#) is generated ("Statement too long/complex").

**AS CONST\$** In this case, the controlling expression must evaluate to an [ANSI](#) string of length zero through 255 bytes. However, each of the case values must be strictly specified by a string literal (a quoted ANSI string, or an ANSI string equate). Multiple case values may be given (CASE "a","Bob",\$value), but operators and ranges of values are not allowed. Performance is enhanced by the internal creation of a vectored scan table, eight bytes for each case value specified.

**AS CONST\$\$** In this case, the controlling expression must evaluate to a [WIDE](#) (Unicode) string of length zero through 127 characters. However, each of the case values must be strictly specified by a string literal (a quoted wide string, or a wide string equate). Multiple case values may be given (CASE "a\$\$","Bob\$\$\$\$value), but operators and ranges of values are not allowed. Performance is enhanced by the internal creation of a vectored scan table, eight bytes for each case value specified.

**See also** [CHOOSE](#), [CHOOSE&](#), [CHOOSE\\$](#), [EXIT SELECT](#), [IF](#), [IF block](#), [IIF](#), [IIF&](#), [IIF\\$](#), [MAX](#), [MAX&](#), [MAX\\$](#), [MIN](#), [MIN&](#), [MIN\\$](#), [ON GOTO](#), [ON GOSUB](#), [SWITCH](#), [SWITCH&](#), [SWITCH\\$](#)

**Example**

```
DIM DwrD AS DWORD
DIM Lint AS LONG

DwrD = &H0FFFFFFF??
Lint = -1&

SELECT CASE Lint
CASE DwrD
 a$ = "A Match!"
CASE ELSE
 a$ = "*No Match"
END SELECT

SELECT CASE AS LONG Lint
CASE DwrD
 a$ = "*A Match!"
CASE ELSE
 a$ = "No Match"
```

```

END SELECT

SELECT CASE AS CONST Dword
 CASE -1&
 a$ = "**A Match!"
 CASE 0
 a$ = "No Match"
END SELECT

```

**Result**

```

*No Match
*A Match!
*A Match!

```

## SETATTR statement

# SETATTR statement

**Purpose** Set the file system attribute(s) of a disk file or directory.

**Syntax** `SETATTR filespec$, attribute`

**Remarks** *filespec\$* specifies a filename (optionally including a drive letter and directory path). *attribute* is a standard operating system attribute code:

| Attribute | Description | Equate    |
|-----------|-------------|-----------|
| 0         | Normal      | %NORMAL   |
| 1         | Read-only   | %READONLY |
| 2         | Hidden      | %HIDDEN   |
| 4         | System      | %SYSTEM   |
| 32        | Archived    | %ARCHIVE  |

The attribute code of a given file or directory may be constructed from a combination of individual attribute values. For example, if you use an *attribute* of 0, *filespec\$* will be a regular file: not read-only, not hidden, not system, and not archived.

**See also** [DIR\\$](#), [FILEATTR](#), [GETATTR](#)

**Example**

```

Files$ = "MYTEST.DAT"
SETATTR Files$, %HIDDEN + %SYSTEM
IF ISFALSE ERR THEN a$ = Files$ + " has been hidden!"

```

## SETEOF statement

# SETEOF statement

**Purpose** Truncate or extend an [open file](#) to its current file pointer (read/write) position.

**Syntax** `SETEOF [#] filenum&`

**Remarks** SETEOF will truncate or extend an open file to its current file pointer (read/write) position, which may be set explicitly with the [SEEK](#) statement.

Unlike 16-bit Windows and [DOS BASIC](#), Win32 will not truncate a file if you simply write an empty string to it, so the SETEOF statement is provided to cater for this need.

**See also** [CLOSE](#), [FILEATTR](#), [FLUSH](#), [OPEN](#), [SEEK function](#), [SEEK statement](#)

**Example**

```

FUNCTION PBMAIN
 OPEN "Temp.dat" FOR BINARY AS #1 BASE = 1
 A$ = SPACE$(50)
 PUT$ #1, A$
 ' File is now 50 bytes
 SEEK #1, 15
 ' Move to the 15th byte and truncate there

```

```

SETEOF #1
' File is now 14 bytes
CLOSE #1
END FUNCTION

```

## SGN function

# SGN function

- Purpose** Return the sign of a numeric expression.
- Syntax**  $y = \text{SGN}(\text{numeric\_expression})$
- Remarks** If *numeric\_expression* is positive, SGN returns 1. If *numeric\_expression* is zero, SGN returns 0. If *numeric\_expression* is negative, SGN returns -1.
- In conjunction with the [ON GOTO](#) and [ON GOSUB](#) statements, SGN can produce a FORTRAN-like three-way branch:
- ```

ON SGN(balance) + 2 GOTO InTheRed, BreakingEven, InTheMoney

```
- See also** [ABS](#), [IE](#), [ON GOSUB](#), [ON GOTO](#), [SELECT](#)
- Example**
- ```

' ON SGN value, GOSUB appropriate subroutine
ON SGN (value) + 2 GOSUB Minus, Zero, Plus
' more code here
Minus:
x$ = "The product is negative" : RETURN
Zero:
x$ = "The product is zero" : RETURN
Plus:
x$ = "The product is positive" : RETURN

```

## SHELL function

# SHELL function

- Purpose** Run an executable program asynchronously (as a separate process), while execution of the original application continues uninterrupted.
- Syntax**  $\text{ProcessId} = \text{SHELL}([\text{HANDLES},] \text{CmdString} [, \text{WndStyle}])$
- Remarks** The SHELL function has the following parts:
- CmdString* The name of the program to execute ("child process"), along with and any required arguments or command-line switches.
- WndStyle* A number corresponding to the style of the window in which the child process is to be executed. If *WndStyle* is omitted, the program is opened *normal with focus*, the same as *WndStyle* = 1.

The following table identifies the values for *WndStyle* and the resulting style of window:

| WndStyle | Window style                |
|----------|-----------------------------|
| 0        | Hide window                 |
| 1        | Normal with focus (default) |
| 2        | Minimized with focus        |
| 3        | Maximized with focus        |
| 4        | Normal without focus        |
| 6        | Minimized without focus     |

SHELL returns the *process id* of the child process. The process id is a 32-bit [LONG](#) or [DWORD](#) value that identifies the child process, if it's a 32-bit or 64-bit process. If the process id is zero, the child process is not a 32-bit or 64-bit process, or an error occurred.

Use [ERR](#) to detect the success of the SHELL function. The HANDLES option allows the child process to inherit the file handles opened by your program. This affects only Windows handles, not PowerBASIC file identifiers. It is an advanced option, for those who know it works and why they need it.

**Restrictions** Child processes run asynchronously, or independently of the program that SHELLs. So, the child process is, probably, still running after control returns from SHELL to your program. Also, if your program ends before the child process, the child process will continue to run.

To use internal DOS commands like DIR and COPY, you must run the DOS command processor, passing the DOS command as a parameter. See the example below.

If the program name in *CmdString* does not include an explicit path, Windows will search for the file in the following paths: the directory where the current program is located, the default directory, the 32-bit Windows system directory, the 16-bit Windows system directory, the Windows directory, and any directories listed in the PATH environment variable.

**See also** [ERR](#), [SHELL statement](#)

**Example**

```
pid??? = SHELL(MyApp$,1)
pid??? = SHELL(ENVIRON$("COMSPEC") + " /C DIR *.* > filename.txt")
```

## SHELL statement

# SHELL statement

**Purpose** Run an executable program synchronously. The SHELLing thread of the calling program is suspended until the SHELLED program ends.

**Syntax** SHELL [HANDLES,] *CmdString* [, *WndStyle*, EXIT TO *exitcode&*]

**Remarks** The SHELL statement has the following parts:

**HANDLES** This option, if present, allows the child process to inherit (and access) the Windows file handles of all open files in the parent process. These are not PowerBASIC file numbers, but system file handles and you must use [OPEN HANDLE](#) to access them.

**CmdString** The name of the program to execute ("child process"), along with and any required arguments or command-line switches.

**WndStyle** A number corresponding to the style of the window in which the program is to be executed. If *WndStyle* is omitted, the program is opened *normal with focus*, the same as *WndStyle* = 1.

The following table identifies the values for *WndStyle* and the resulting style of window:

| WndStyle | Window style                |
|----------|-----------------------------|
| 0        | Hide window                 |
| 1        | Normal with focus (default) |
| 2        | Minimized with focus        |
| 3        | Maximized with focus        |
| 4        | Normal without focus        |
| 6        | Minimized without focus     |

Use [ERR](#) to detect the success of the SHELL function. The HANDLES option allows the child process to inherit the file handles opened by your program. This affects only Windows handles, not PowerBASIC file identifiers. It is an advanced option, for those who know it works and why they need it.

**exitcode&** The exit code of the child process (the value returned by the WinMain function) is assigned to the [long integer](#) variable specified by *exitcode&*.

**Restrictions** The SHELL statement executes the child process synchronously. That is, SHELL will not return control to your program until the child program finishes.

To use internal DOS commands like DIR and COPY, you must run the DOS command processor, passing the DOS command as a parameter. See the example below.

If the program name in *CmdString* does not include an explicit path, Windows will search for the file in the following paths: the directory where the current program is located, the default directory, the 32-bit Windows system directory, the 16-bit Windows system directory, the Windows directory, and any directories listed in the PATH environment variable.

If the SHELL statement is not executed successfully, an appropriate error is generated. The [ERR](#) function can be used to detect it.

**See also** [ERR](#), [SHELL function](#)

**Example**

```
SHELL MyApp$,1, EXIT TO exitvar&
SHELL ENVIRON$("COMSPEC") + " /C DIR *.* > filename.txt"
```

## SHIFT statement

# SHIFT statement

**Purpose** Shift the bits in an [variable](#).

**Syntax** `SHIFT [SIGNED] {LEFT | RIGHT} ivar, countexpr`

**Remarks** *ivar* must be one of the integral-class variable types: [Byte](#), [Word](#), [Integer](#), [Double-word](#), [Long-integer](#), or [Quad-integer](#). *countexpr* is an integral-class expression specifying the number of bits by which to shift *ivar*.

SHIFT shifts all the bits in *ivar* without special regard to the sign bit of a signed integral-class variable.

**SIGNED** The SIGNED option shifts everything, but does not allow the sign (positive or negative) of the value to change.

**LEFT | RIGHT** The LEFT or RIGHT option determines the direction of the bit SHIFT operation. SHIFT LEFT shifts the bits toward the high-order end of *ivar*, and SHIFT RIGHT shifts bits toward the low-order end of *ivar*.

**See also** [AND](#), [BIT function](#), [BIT statement](#), BITS functions, [NOT](#), [OR](#), [ROTATE](#), [XOR](#)

**Example**

```
DIM i AS BYTE
n = 221
SHIFT LEFT n, 1 ' binary 1 1 0 1 1 1 0 1
' n = 186 ' binary 1 0 1 1 1 0 1 0

n = 221
SHIFT RIGHT n, 1 ' binary 1 1 0 1 1 1 0 1
' n = 110 ' binary 0 1 1 0 1 1 1 0

n = 221
SHIFT SIGNED RIGHT n, 1 ' binary 1 1 0 1 1 1 0 1
n = 238 ' binary 1 1 1 0 1 1 1 0
```

## SHRINK\$ function

# Keyword Template

**Purpose**

**Syntax**

**Remarks****See also****Example**

## SHRINK\$ function New!

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Shrink a<br>to use a consistent single character delimiter.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Syntax</b>   | <i>NewString\$</i> = SHRINK\$( <i>OldString\$</i> )<br><i>NewString\$</i> = SHRINK\$( <i>OldString\$, Mask\$</i> )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Remarks</b>  | <p>The purpose of this function is to create a string with consecutive data items (words) separated by a consistent single character. This makes it very straightforward to parse the results as needed.</p> <p>In the first form, all leading spaces and trailing spaces are removed entirely. All occurrences of two or more spaces are changed to a single space. Therefore, the new string returned consists of zero or more words, each separated by a single space character.</p> <p>In the second form, <i>Mask\$</i> defines one or more delimiter characters to shrink. All leading and trailing mask characters are removed entirely. All occurrences of one or more mask characters are replaced with the first character of <i>Mask\$</i>. Therefore, the new string returned consists of zero or more words, each separated by the character found in the first position of <i>Mask\$</i>.</p> <p>WhiteSpace is generally defined as the four common non-printing characters: Space, Tab, Carriage-Return, and Line-Feed. This is pre-defined in PowerBASIC as <a href="#">string equates</a> for your convenience. The <a href="#">ANSI</a> version is named <a href="#">\$WHITESPACE</a>, while the <a href="#">WIDE</a> version is <a href="#">\$\$WHITESPACE</a>. This equate is particularly well suited to be used as <i>Mask\$</i> in this function.</p> |
| <b>See also</b> | <a href="#">CLIP\$</a> , <a href="#">INSTR</a> , <a href="#">LTRIM\$</a> , <a href="#">REMOVES\$</a> , <a href="#">REPLACE</a> , <a href="#">RTRIM\$</a> , <a href="#">TRIM\$</a> , <a href="#">UNWRAP\$</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

## SIN function

### SIN function

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Return the sine of its argument.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Syntax</b>  | <i>y</i> = SIN( <i>numeric_expression</i> )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Remarks</b> | <p><i>numeric_expression</i> is an angle specified in radians. SIN returns an <a href="#">Extended-precision</a> value between -1 and +1.</p> <p>To convert radians to degrees, multiply by 57.29577951308232###. To convert degrees to radians, multiply by 0.0174532925199433###. For more information on radians, see the <a href="#">ATN</a> function.</p> <p>The Inverse Sine (ARCSIN) of a value can be calculated as follows:</p> $\text{ArcSin} = \text{ATN}(\text{Value} / \text{SQR}(1 - \text{Value} * \text{Value}))$ <p>The Hyperbolic Sine (SINH) of a value can also be calculated:</p> $\text{SinH} = (\text{EXP}(\text{Value}) - \text{EXP}(-\text{Value})) / 2$ <p>The Inverse Hyperbolic Sine (ARCSINH) of a value can also be calculated:</p> $\text{ArcSinH} = \text{LOG}(\text{Value} + \text{SQR}(\text{Value} * \text{Value} + 1))$ <p>' Useful Macro functions</p> <pre>MACRO Pi = 3.141592653589793## MACRO DegreesToRadians(dpDegrees) = (dpDegrees * 0.0174532925199433##)</pre> |

```
MACRO RadiansToDegrees(dpRadians) = (dpRadians * 57.29577951308232##)
```

**See also**

[ATN](#), [COS](#), [TAN](#)

**Example**

```
pi## = 3.141592653589793##
FOR I& = 0 TO 360 STEP 45
 x$ = "The Sine of " + FORMAT$(I&,"* 0") + _
 " degrees =" + FORMAT$(SIN(pi## / 180 * _
 I&),"* 0.00")
NEXT I&
```

**Result**

```
The Sine of 0 degrees = 0.00
The Sine of 45 degrees = 0.71
The Sine of 90 degrees = 1.00
The Sine of 135 degrees = 0.71
The Sine of 180 degrees = 0.00
The Sine of 225 degrees = -0.71
The Sine of 270 degrees = -1.00
The Sine of 315 degrees = -0.71
The Sine of 360 degrees = 0.00
```

## SIZEOF function

# SIZEOF function

**Purpose**

Return the total or physical length of any PowerBASIC [variable](#).

**Syntax**

```
x& = SIZEOF(target)
```

**Remarks**

Particularly useful for determining the maximum length of a [fixed-length string](#), [nul-terminated string](#), or [User-Defined Type](#). It provides similar functionality to [LEN](#), which returns the current length of a data item.

*target* can be the name of any variable type (fixed-length string, nul-terminated string, User-Defined Type (UDT) variable or definition, etc).

When measuring the size of a padded (aligned) UDT variable or definition with the SIZEOF (or LEN) statement, the measured length includes any padding that was added to the structure. For example, the following UDT structure:

```
TYPE LengthTestType DWORD
 a AS INTEGER
END TYPE
' more code here
DIM abc AS LengthTestType
x& = SIZEOF(abc) ' or use SIZEOF(LengthTestType)
```

Returns a length of 4 bytes in x&, since the UDT was padded with 2 additional bytes to enforce DWORD alignment. Note that the SIZEOF of individual UDT members returns the true size of the member without regard to padding or alignment. In the previous example, SIZEOF(abc.a) returns 2.

When used on a dynamic (variable length) string, SIZEOF returns 4, which is the size of the string handle. To obtain the length of the string data in the dynamic string, use the LEN function. SIZEOF also returns 4 for [pointer](#) variables, since a pointer is always stored as a [DWORD](#).

### Pointers

When used with a dereferenced pointer (i.e., SIZEOF(@p), SIZEOF returns the size of the pointer target variable type, as defined in the DIM xAS y PTR [\* pSize] statement.

For example, with a dynamic string pointer, SIZEOF returns 4. If the pointer target is a fixed-length string, UDT, [Union](#), or nul-terminated string, SIZEOF returns the size of the target data structure. However, if the pointer is declared to reference an nul-terminated with no specific target size (i.e., DIM a AS STRINGZ PTR), SIZEOF returns 0.

Likewise, if `SIZEOF` is used on a

`STRINGZ` string that does not have an explicit length specification, `SIZEOF` will also return 0. For example:

```
SUB ProcessData(BYREF szText AS STRINGZ)
 ' Within this Sub, SIZEOF(szText) will return 0 because there is no
 explicit length specification
```

See also

[CHRBYTES](#), [DIM](#), [LEN](#)

Example

```
DIM Strval AS STRINGZ * 10
Strval = "test"
' SIZEOF(Strval) = 10, LEN(Strval) = 4

DIM Intval AS QUAD
Intval = 1
' SIZEOF(Intval) = 8, LEN(Strval) = 8

DIM CustName AS STRING
CustName = "Fred Dagg"
' SIZEOF(CustName) = 4, LEN(CustName) = 9

UNION Arrs
 m1(1 TO 1024) AS BYTE
END UNION
DIM p1 AS STRING PTR
DIM p2 AS STRING PTR * 1024
DIM p3 AS Arrs PTR
DIM p4 AS STRINGZ PTR
DIM p5 AS STRINGZ PTR * 64
' Results of SIZEOF on these pointers:
' SIZEOF(p1) = 4, SIZEOF(@p1) = 4
' SIZEOF(p2) = 4, SIZEOF(@p2) = 1024
' SIZEOF(p3) = 4, SIZEOF(@p3) = 1024
' SIZEOF(p4) = 4, SIZEOF(@p4) = 0
' SIZEOF(p5) = 4, SIZEOF(@p5) = 64
' SIZEOF(Arrs) = 1024
```

## SLEEP statement

# SLEEP statement

**Purpose** Pause the current thread of the application for a specified number of milliseconds (*mSec*), allowing other processes (or threads) to continue.

**Syntax** `SLEEP m&`

**Remarks** *m&* is the number of milliseconds (1 millisecond = 1/1000th of a second) to pause the application. Only the current

pauses. If other threads are present, they will continue to execute. During the SLEEP period, all time-slices for the current thread are given to other threads and processes. If *m&* is zero, the remainder of the current time-slice is relinquished. If there are no other threads of equal priority, execution continues immediately.

The time-slice duration (also known as the Quantum) can vary from version to version of Windows, ranging from 20 mSec to 120 mSec. Therefore, the Quantum can affect the performance of applications when SLEEP 0 is overused. That is, excessive use of SLEEP 0 can cause an application to cede much of its available processor time, causing a significant drop in application performance.

When code is running in a tight loop, it is quite possible to use up 100% of the available

CPU time, so the occasional use of SLEEP 0 within a tight loop is often beneficial to overall performance of the target PC. For example, it may not be necessary to use SLEEP 0 for *every* iteration of a loop, but every second or third instead.

**See also** [THREAD.CREATE](#), [TIMER](#)

**Example**

```
' Pause for 5 seconds
SLEEP 5000

' Release time-slice every 256 iterations
FOR x& = 0 TO &H0FFFFFFF&
 ' code goes here
 IF x& MOD 256 = 0 THEN SLEEP 0
NEXT x&
```

## SPACE\$ function

# SPACE\$ function

**Purpose** Return a  
consisting of a specified number of spaces.

**Syntax** `s$ = SPACE$(numeric_expression)`

**Remarks** *numeric\_expression* is a non-negative expression that specifies how many spaces the function is to return. SPACE\$ can be useful for formatting or prefilling strings.

**See also** [BUILD\\$](#), [CHR\\$](#), [CSET](#), [CSET\\$](#), [LSET](#), [NUL\\$](#), [REPEAT\\$](#), [RSET](#), [STRING\\$](#)

**Example** `A$ = SPACE$(1000000) ' fill A$ with 1000000 spaces`

## SPLIT statement

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## SPLIT statement **New!**

**Purpose** Splits a  
into two parts.

**Syntax** `SPLIT [WORD] MainStr, Part1Len TO Part1Var, Part2Var`

**Remarks** *MainStr* is separated into two parts, which are then assigned to the two string variables specified by *Part1Var* and *Part2Var*. *Part1Len* is a  
expression which specifies the number of characters to be assigned to Part1, while the remaining characters are assigned to Part2.

**WORD** If the WORD option is included, PowerBASIC guarantees that Part1 will not end on a partial word. This may require that *Part1Len* is adjusted to a smaller value. In that case, *Part2Var* would be assigned these characters to compensate. Depending upon the nature of the operation, it may be necessary to remove leading spaces from *Part2Var*.

See also [GRAPHIC SPLIT](#), [LTRIM\\$](#), [XPRINT SPLIT](#)

## SQR function

# SQR function

**Purpose** Return the square root of its argument.

**Syntax** `y = SQR(numeric_expression)`

**Remarks** *numeric\_expression* must be greater than or equal to zero. SQR calculates square roots using an optimized algorithm. That is,  $y = \text{SQR}(x)$  takes less time to execute than  $y = x^{0.5}$ .

Attempting to take the square root of a negative number does not produce any [run-time errors](#), but the results of such an operation are undefined.

SQR returns an [Extended-precision](#) result.

See also [EXP](#), [EXP2](#), [EXP10](#), [LOG](#), [LOG2](#), [LOG10](#)

## STATIC statement

# STATIC statement

**Purpose** Declare [static](#) variables inside a [Sub](#), [Function](#), [Method](#), or [Property](#). Static variables retain their values as long as the program is running.

**Syntax** `STATIC variable[()] [AS type] [, variable[()]]`  
`STATIC variable[()] [, variable[()]] [, ...] AS type`

**Remarks** The STATIC statement is valid only inside a procedure. Static variables retain their values even after the procedure ends. A static variable is local to its procedure, and can have the same name as other variables in other parts of the program without conflict.

To declare an [array](#) as a static variable, use an empty set of parentheses in the variable list: You can then use the [DIM](#) statement to dimension the array.

```
STATIC MyArray%()
STATIC StringArray() AS STRING
```

The STATIC statement may, optionally, accept a list of variables, all of which are defined by the type descriptor keyword that follows them. For example:

```
STATIC aaa, bbb, ccc AS INTEGER
STATIC vptr, aptr() AS LONG PTR
```

**Restrictions** [DEFtype](#) has no effect on variables defined by a STATIC statement.

See also [DIM](#), [GLOBAL](#), [LOCAL](#), [THREADED](#)

**Example**

```
#COMPILE EXE
#DIM ALL
#INCLUDE "WIN32API.INC"

DECLARE SUB DoMessage ()

FUNCTION PBMAIN
 DIM z%
 FOR z% = 1 TO 5
 DoMessage
 NEXT z%
END FUNCTION

SUB DoMessage ()
```

```

STATIC x AS INTEGER
STATIC Message() AS ASCIIZ * 256
DIM Message(1 TO 5) AS STATIC ASCIIZ * 256

INCR x 'add one to x
Message(x) = "X =" + STR$(x)

#IF %DEF(%PB_CC32)
 PRINT Message(x)
#ELSE
 MSGBOX Message(x)
#ENDIF
END SUB

```

## STATUSBAR SET PARTS statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## STATUSBAR statement

**Purpose** Manipulate a [STATUSBAR](#) control. A StatusBar is a horizontal window, typically at the bottom of a [dialog](#) client area, which displays various kinds of status information. It can be divided into parts to display multiple items.

**Syntax** `STATUSBAR SET PARTS hDlg, id&, x& [,x&...]`  
`STATUSBAR SET TEXT hDlg, id&, item&, style&, text$`

*hDlg* [Handle](#) of the dialog that owns the status bar.

*id&* The [control identifier](#) assigned with [CONTROL ADD STATUSBAR](#).

*item&* Position of data on the STATUSBAR. First item=1, second=2...

*style&* Style bits which specify the appearance of the status bar.

*text\$* A [string expression](#) passed as a parameter.

**Remarks** In each of the following samples and descriptions, the STATUSBAR control which is the subject of the statement is identified by the handle of the dialog that owns the STATUSBAR (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD STATUSBAR.

The value *item&* refers to the position of the text data item on the STATUSBAR, and is always indexed to one. The first string is position 1, the second is position 2, and so forth.

### **STATUSBAR SET PARTS *hDlg*, *id&*, *x&* [*,x&...*]**

The STATUSBAR control is partitioned into as many as 32 sections, each of which can be used to display some particular status data to the user. The statement contains from 1 to 32 width parameters (*x&*), which specify the [pixel](#) or [dialog unit](#) size of that section.

You can use a very large number for the last parameter to signify that the section should extend all the way to the right side of the window.

```
STATUSBAR SET PARTS hDlg, id&, 50, 50, 9999
```

For example, the above statement would create a status bar with 2 sections of 50 pixels each, and a third section of the remaining width.

### **STATUSBAR SET TEXT *hDlg, id&, item&, style&, text\$***

The text for the data item specified by *item&* is replaced with the new text in *text\$*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The status bar style value can be the default value of zero (0), or one of the other style values formed as a bitmask:

|                  |                                                      |
|------------------|------------------------------------------------------|
| Zero (0) default | Text with a border to appear lower than the window.  |
| %SBT_NOBORDERS   | The text is drawn without any borders.               |
| %SBT_POPOUT      | Text with a border to appear higher than the window. |

**See also** [Dynamic Dialog Tools](#), [CONTROL ADD STATUSBAR](#), [CONTROL SET FONT](#)

## STATUSBAR SET TEXT statement

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

# STATUSBAR statement

**Purpose** Manipulate a [STATUSBAR](#) control. A StatusBar is a horizontal window, typically at the bottom of a [dialog](#) client area, which displays various kinds of status information. It can be divided into parts to display multiple items.

**Syntax** `STATUSBAR SET PARTS hDlg, id&, x& [,x&...]`  
`STATUSBAR SET TEXT hDlg, id&, item&, style&, text$`

*hDlg* [Handle](#) of the dialog that owns the status bar.

*id&* The [control identifier](#) assigned with [CONTROL ADD STATUSBAR](#).

*item&* Position of data on the STATUSBAR. First item=1, second=2...

*style&* Style bits which specify the appearance of the status bar.

*text\$* A [string expression](#) passed as a parameter.

**Remarks** In each of the following samples and descriptions, the STATUSBAR control which is the subject of the statement is identified by the handle of the dialog that owns the STATUSBAR (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD STATUSBAR.

The value *item&* refers to the position of the text data item on the STATUSBAR, and is always indexed to one. The first string is position 1, the second is position 2, and so forth.

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STATUSBAR SET PARTS hDlg, id&, 50, 50, 9999
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For example, the above statement would create a status bar with 2 sections of 50 pixels each, and a third section of the remaining width.

### **STATUSBAR SET TEXT *hDlg, id&, item&, style&, text\$***

The text for the data item specified by *item&* is replaced with the new text in *text\$*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The status bar style value can be the default value of zero (0), or one of the other style values formed as a bitmask:

|                  |                                                      |
|------------------|------------------------------------------------------|
| Zero (0) default | Text with a border to appear lower than the window.  |
| %SBT_NOBORDERS   | The text is drawn without any borders.               |
| %SBT_POPOUT      | Text with a border to appear higher than the window. |

**See also** [Dynamic Dialog Tools](#), [CONTROL ADD STATUSBAR](#), [CONTROL SET FONT](#)

## STR\$ function

# STR\$ function

**Purpose** Return the

representation of a number in printable form.

**Syntax** *s\$* = STR\$(*numeric\_expression* [, *digits*])

**Remarks** STR\$ returns the string form of a

variable or expression in printable text form. *digits* is an optional expression specifying the maximum total number of digits to appear in the result. If *numeric\_expression* is greater than or equal to zero, STR\$ adds a leading space character; if *numeric\_expression* is less than zero, STR\$ adds a leading negation (minus) character.

For example, STR\$(14) returns a three-character string, of which the first character is a space, and the second and third are the [ASCII](#) characters "1" and "4". [LTRIM\\$](#) can be used to remove leading space characters.

*digits* specifies the maximum number of significant digits (1 to 18) desired in the result.

STR\$ can also be used to convert numeric values with more than 16 significant digits (i.e., [Extended-precision floating-point](#) and [Quad-integers](#)) to a printable form. For example:

```
a## = 2.0/3.0
x$ = STR$(a##,18)
```

returns 0.666666666666666667.

The complementary function is [VAL](#), which takes a string argument and returns the numeric equivalent. Thus, *number* = VAL(STR\$(*number*)).

An integer-class numeric value may also be converted to a string with the [FORMAT\\$](#) and [USING\\$](#) functions; however, FORMAT\$ can easily return a string that is free from leading space characters. For example, x\$ = FORMAT\$(a&).

**See also** [BIN\\$](#), [FORMAT\\$](#), [HEX\\$](#), [LTRIM\\$](#), [OCT\\$](#), [ROUND](#), [USING\\$](#), [VAL](#)

**Example**

```
x$ = STR$(-1,5)
x$ = STR$(5/3,2)
x$ = STR$(5/3,8)
x$ = STR$(10000## / 3##, 18)
```

**Result**

```
-1
1.7
1.6666667
33333.33333333333333
```

## STRDELETE\$ function

# STRDELETE\$ function

|                 |                                                                                                                                                                                                       |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Delete a specified number of characters from a <a href="#">string expression</a> .                                                                                                                    |
| <b>Syntax</b>   | <code>s\$ = STRDELETE\$(string_expression, start&amp;, count&amp;)</code>                                                                                                                             |
| <b>Remarks</b>  | Returns a<br>based on copying <i>string_expression</i> , but with <i>count&amp;</i> characters deleted starting at position <i>start&amp;</i> . The first character in the string is position 1, etc. |
| <b>See also</b> | <a href="#">CLIP\$</a> , <a href="#">STRINSERT\$</a> , <a href="#">STRREVERSE\$</a>                                                                                                                   |
| <b>Example</b>  | <code>a\$ = STRDELETE\$("PowerBASIC", 4, 2)</code>                                                                                                                                                    |
| <b>Result</b>   | POwBASIC                                                                                                                                                                                              |

## STRING\$ function

# STRING\$/STRING\$\$ function IMPROVED

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Return a<br>consisting of multiple copies of the specified character.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Syntax</b>   | <pre>s\$ = STRING\$(Count&amp;, Character%) s\$ = STRING\$(Count&amp;, Character\$) s\$\$ = STRING\$\$\$(Count&amp;, Character%) s\$\$ = STRING\$\$\$(Count&amp;, Character\$\$)</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Remarks</b>  | <p>This function creates a string which consists of multiple copies of a particular character. The STRING\$() form creates a string of <a href="#">ANSI</a> (1-byte) characters, or codes in the range of 0 to 255. The STRING\$\$() form of the function creates a string of <a href="#">WIDE</a> (2-byte) characters, or codes in the range of 0 to 65535.</p> <p>Generally speaking, PowerBASIC handles ANSI/WIDE conversions for you, automatically and transparently. However, there are just a few functions (<a href="#">CHR\$</a>, <a href="#">PEEK\$</a>, <a href="#">POKE\$</a>, <a href="#">STRING\$</a>, etc) which are ambiguous, by definition, and require that the programmer choose the appropriate result type (ANSI or WIDE). Use STRING\$ for ANSI results, or use STRING\$\$ for Unicode results. In the remainder of these remarks, STRING\$ is used to represent both STRING\$ and STRING\$\$. </p> <p>STRING\$ with a<br/>argument returns a string of <i>Count&amp;</i> copies of the character with the Character Code of <i>Character%</i>. STRING\$ with a string argument returns a string of <i>Count&amp;</i> copies of the first character in <i>Character\$</i> or <i>Character\$\$</i>.</p> <p>The following functions all return a string of 8 spaces:</p> <pre>A\$ = STRING\$(8, 32) A\$ = STRING\$(8, " ") A\$ = STRING\$(8, \$SPC) A\$ = SPACE\$(8) A\$ = REPEAT\$(8, " ") A\$ = REPEAT\$(8, \$SPC)</pre> <p>Use <a href="#">REPEAT\$</a> to make multiple copies of a multiple-character string, and <a href="#">SPACE\$</a> to return a string of space characters.</p> |
| <b>See also</b> | <a href="#">ASC</a> , <a href="#">BUILD\$</a> , <a href="#">CHR\$</a> , <a href="#">NUL\$</a> , <a href="#">REPEAT\$</a> , <a href="#">SPACE\$</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

## STRING\$\$ function

# STRING\$/STRING\$\$ function IMPROVED

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Return a<br>consisting of multiple copies of the specified character.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Syntax</b>   | <pre>s\$ = STRING\$(Count&amp;, Character%) s\$ = STRING\$(Count&amp;, Character\$) s\$\$ = STRING\$\$\$(Count&amp;, Character%) s\$\$ = STRING\$\$\$(Count&amp;, Character\$\$)</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Remarks</b>  | <p>This function creates a string which consists of multiple copies of a particular character. The STRING\$( ) form creates a string of <a href="#">ANSI</a> (1-byte) characters, or codes in the range of 0 to 255. The STRING\$\$\$( ) form of the function creates a string of <a href="#">WIDE</a> (2-byte) characters, or codes in the range of 0 to 65535.</p> <p>Generally speaking, PowerBASIC handles ANSI/WIDE conversions for you, automatically and transparently. However, there are just a few functions (<a href="#">CHR\$</a>, <a href="#">PEEK\$</a>, <a href="#">POKE\$</a>, <a href="#">STRING\$</a>, etc) which are ambiguous, by definition, and require that the programmer choose the appropriate result type (ANSI or WIDE). Use <a href="#">STRING\$</a> for ANSI results, or use <a href="#">STRING\$\$</a> for Unicode results. In the remainder of these remarks, <a href="#">STRING\$</a> is used to represent both <a href="#">STRING\$</a> and <a href="#">STRING\$\$</a>.</p> <p><a href="#">STRING\$</a> with a<br/>argument returns a string of <i>Count&amp;</i> copies of the character with the Character Code of <i>Character%</i>. <a href="#">STRING\$</a> with a string argument returns a string of <i>Count&amp;</i> copies of the first character in <i>Character\$</i> or <i>Character\$\$</i>.</p> <p>The following functions all return a string of 8 spaces:</p> <pre>A\$ = STRING\$(8, 32) A\$ = STRING\$(8, " ") A\$ = STRING\$(8, \$SPC) A\$ = SPACE\$(8) A\$ = REPEAT\$(8, " ") A\$ = REPEAT\$(8, \$SPC)</pre> <p>Use <a href="#">REPEAT\$</a> to make multiple copies of a multiple-character string, and <a href="#">SPACE\$</a> to return a string of space characters.</p> |
| <b>See also</b> | <a href="#">ASC</a> , <a href="#">BUILD\$</a> , <a href="#">CHR\$</a> , <a href="#">NUL\$</a> , <a href="#">REPEAT\$</a> , <a href="#">SPACE\$</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

## STRINSERT\$ function

# STRINSERT\$ function

|                 |                                                                                                                                                                                                                                                                                                                                        |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Insert a<br>at a specified position within another <a href="#">string expression</a> .                                                                                                                                                                                                                                                 |
| <b>Syntax</b>   | <pre>s\$ = STRINSERT\$(MainStr\$, NewStr\$, position&amp;)</pre>                                                                                                                                                                                                                                                                       |
| <b>Remarks</b>  | Returns a string consisting of the string expression <i>MainStr\$</i> , with the string expression <i>NewStr\$</i> inserted at <i>position&amp;</i> . If <i>position&amp;</i> is greater than the length of <i>MainStr\$</i> , <i>NewStr\$</i> is appended to <i>MainStr\$</i> . The first character in the string is position 1, etc. |
| <b>See also</b> | <a href="#">BUILD\$</a> , <a href="#">CLIP\$</a> , <a href="#">CSET</a> , <a href="#">CSET\$</a> , <a href="#">LSET</a> , <a href="#">RSET</a> , <a href="#">STRDELETE\$</a> , <a href="#">STRREVERSE\$</a> , <a href="#">WRAP\$</a>                                                                                                   |
| <b>Example</b>  | <pre>a\$ = STRINSERT\$("PowerBASIC", "ful", 6)</pre>                                                                                                                                                                                                                                                                                   |
| <b>Result</b>   | PowerfulBASIC                                                                                                                                                                                                                                                                                                                          |

## STRINGBUILDER Object

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## STRINGBUILDER Object **New!**

**Purpose** The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the [BUILD\\$\(\)](#) function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the StringBuilder Class also offers a few additional string operations to assist in building the string.

**Remarks** There are two forms of the StringBuilder object, one for [ANSI](#) strings, and one for [WIDE](#) (Unicode) strings. While they could have been combined into a single hybrid object, that would have added additional overhead not acceptable for PowerBASIC. To concatenate ANSI strings, use the StringBuilderA class and the IStringBuilderA interface. To concatenate WIDE (Unicode) strings, use the StringBuilderW class and the IStringBuilderW interface. The methods and mode of operation are identical for both forms.

If you choose the ANSI form, parameter strings must be ANSI, and result strings will be ANSI. With the WIDE (Unicode) form, parameter strings must be wide, and result strings will be wide. Keep those requirements in mind when reviewing the following method definitions. The Dispatch ID ([DisplD](#)) for each member method is displayed within angle brackets.

When you create a StringBuilder object, a dynamic string buffer is created to hold the target string. If you know the size of the result string (or even an approximation), it's usually prudent to use the CAPACITY method first, to establish a size at least as large as the final string. If it's not known, PowerBASIC will try to make appropriate decisions for you. Once the object is created, the ADD method is used to append string sections as many times as necessary. Finally, the STRING method is used to extract the combined items.

### StringBuilder Methods/Properties

**ADD** (*PowerString\$*)

**Method**<1>

The *PowerString\$* parameter is appended to the string held in the StringBuilder object. If the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an HRESULT of E\_OUTOFMEMORY (&H8007000E) is returned, and an [Object Error](#) (99) is generated.

**CAPACITY** ( ) AS Long

**Get Property**<2>

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

**CAPACITY** ( ) = Long

**Set Property**<2>

The internal string buffer is expanded to the number of characters specified by the Long

Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed.

**CHAR (*Index*&) AS Long** Get Property<3>

The numeric character code of the character at the position *Index*& is retrieved and returned to the caller. *Index*&=1 for the first character, 2 for the second, etc. If *Index*& is beyond the current length of the string, the value -1 is returned.

**CHAR (*Index*&) = Long** Set Property<3>

The character at the position *Index*& is changed to that specified by the Long Integer character code. *Index*&=1 for the first character, 2 for the second, etc.

**CLEAR** Method<4>

All data in the object is erased.

**DELETE (*Index*&, *Count*&)** Method<5>

*Count*& characters are removed starting at the position given by *Index*&. *Index*&=1 for the first character, 2 for the second, etc.

**INSERT (*PowerString*\$, *Index*&)** Method<6>

The *PowerString*\$ parameter is inserted in the string starting at the position given by *Index*&. *Index*&=1 for the first character, 2 for the second, etc. If *Index*& is beyond the current length of the string, no operation is performed.

**LEN () AS Long** Method<7>

The number of characters currently stored in the object is returned as a long integer value.

**STRING AS String** Method<8>

The string stored in the object is returned to the caller. This string will contain LEN characters.

**See also** [BUILD\\$](#), [CHR\\$](#), [CSET](#), [CSET\\$](#), [JOIN\\$](#), [LSET](#), [LSET\\$](#), [REPEAT\\$](#), [RSET](#), [RSET\\$](#), [STRING\\$](#), [STRINSERT\\$](#), [WRAP\\$](#)

## STRPTR function

# STRPTR function

**Purpose** Return the 32-bit [DWORD](#) address of the memory block used to store the data held by a [dynamic \(variable length\) string](#).

**Syntax** `xPtr = STRPTR(StringVar)`

**Remarks** *StringVar* is the name of a string variable. STRPTR returns the 32-bit address in memory, where the contents of *StringVar* are stored.

*Note* that STRPTR differs from [VARPTR](#). When used with a string variable, VARPTR returns the address of the string's *handle*, while STRPTR returns the address of the actual string *data*. Similarly, a [STRING POINTER](#) (or STRING PTR) is a pointer to a string handle - this important distinction should be recognized when working with the VARPTR and STRPTR operations.

STRPTR may not be used with [fixed-length](#) or [nul-terminated](#) strings, because they do not use string handles. Use VARPTR with fixed-length and nul-terminated strings.

When a dynamic string content is changed, the address of the string data will also change, but the string handle will remain in the same location. Therefore, it is important that your code refresh any pointers that target the string data memory locations directly.

**See also** [CODEPTR](#), [POKE\\$](#), [PEEK\\$](#), [VARPTR](#)

**Example**

```
DIM x AS ASCIIZ PTR, A$
A$ = "PowerBASIC"
x = STRPTR(A$) ' address of the string data
Message$ = A$ ' returns A$
Message$ = @x ' returns A$ as the target of x
```

```
A$ = "The power of BASIC!"
x = STRPTR(A$) ' Update string pointer address
Message$ = @x ' returns the target of x
```

**Result** As the code above runs, Message\$ is assigned the following strings:

```
PowerBASIC
PowerBASIC
The power of BASIC!
```

## STRREVERSE\$ function

# STRREVERSE\$ function

**Purpose** Reverse the contents of a expression.

**Syntax** `s$ = STRREVERSE$(MainStr$)`

**Remarks** Reverses the contents of *MainStr\$* and returns the result.

**See also** [STRDELETE\\$](#), [STRINSERT\\$](#)

**Example** `a$ = STRREVERSE$("PowerBASIC")`

**Result** CISABrewoP

## SUB/END SUB statements

# SUB/END SUB statements IMPROVED

**Purpose** Define a Sub code section.

**Syntax** `SUB ProcName [ALIAS "AliasName"] [(arguments)] <Descriptors> [statements] END SUB`

**Remarks** All executable code must reside in a Sub, [Function](#), [Method](#), [Property](#), or [FastProc](#) block. Subs may not be nested. That is, you cannot define a code block (Sub, Function, Method, FastProc, Property) inside another code block.

SUB and END SUB define a subroutine-like block of statements called a procedure (or subprogram), which is invoked with the [CALL](#) statement, and may be passed parameters by value or by reference. A Sub may also be invoked without the use of the CALL statement. If the CALL word is omitted, the parentheses around the arguments list must also be omitted.

Previous versions of PowerBASIC required that you create an explicit [DECLARE](#) statement if you wished to execute a SUB or FUNCTION which did not physically precede the reference to it. This extra work is no longer required, as PowerBASIC resolves all forward references to internal procedures automatically.

DECLARE statements for a Sub/Function imported from a [DLL](#) must still precede any reference to the procedure.

*ProcName* The name of the Sub. *ProcName* must be unique: no other variable, Function, Sub, Method, Property, FastProc or [label](#) can share it.

**ALIAS** [String literal](#) that identifies a case-sensitive alternative name for the sub. This lets you export a Sub by a different unique name. This can be useful if you want to abbreviate a long name, provide a more descriptive name, or if the exported name needs to contain characters that are illegal in PowerBASIC. *AliasName* is the routines actual name as it appears in the export table, and *ProcName* is the title that you can use in PowerBASIC. For example:

```
SUB ShortName ALIAS "LongProcName" () EXPORT STATIC
```

**The ALIAS clause is very important when exporting procedures. Omitting the ALIAS clause or incorrectly capitalizing the alias name are common causes of "Missing Export" errors. Please refer to the DECLARE topic for more information.**

## Descriptors

You may optionally add one or more descriptor words (Export, Common, Private, ThreadSafe, Local, Static, BDecl, CDecl, SDecl) to provide specific functionality. They may be added to the SUB as a comma delimited list. You should note that some of them are mutually exclusive.

- EXPORT** This descriptor identifies a Sub or Function which may be accessed between Dynamic Link Libraries (DLLs), and/or the main executable which links them. If a procedure is not marked EXPORT, it is hidden from these other modules. The EXPORT attribute may be added to a Sub/Function defined elsewhere, by specifying EXPORT in a DECLARE statement. EXPORT can even be added to a Sub/Function in an [SLL](#) with a DECLARE in the host module.
- COMMON** A COMMON Sub/Function is one which may be referenced by and between linked unit modules (Host or [SLL](#)). If you DECLARE a Common Sub or Function which is not present in this module, it is presumed to be found in a separate linked module (Host or SLL).
- PRIVATE** A PRIVATE Sub/Function is one which may only be accessed from within the current PowerBASIC program or library. Even if not specified, this is the default mode of operation.
- THREADSAFE** With the THREADSAFE option, PowerBASIC automatically establishes a semaphore which allows only one  
to execute the Sub/Function at a time. Other callers must wait until the first thread exits the THREADSAFE procedure before they are allowed to begin.
- LOCAL** This descriptor specifies that all undeclared variables in a sub are [LOCAL](#). This is the default condition if neither LOCAL nor [STATIC](#) is specified.  
Local variables and [arrays](#) variables are automatically deallocated when the procedure terminates. LOCAL scalar variables (except [dynamic strings](#)) are stored on the [stack](#), and visible only within the sub.
- STATIC** This descriptor specifies that all undeclared variables in a sub are STATIC. Static variables retain their values as long as the program is running. They are visible only within the sub.
- BDECL** Specifies that the declared procedure uses the legacy BASIC/Pascal calling convention. Parameters are pushed on the stack from left to right, and the called procedure is responsible for removing them. BDECL should only be used when necessary to match outside modules.
- CDECL** Specifies that the declared procedure uses the C calling convention. Parameters are pushed on the stack from right to left, and the calling code is responsible for removing them. CDECL should only be used when necessary to match outside modules.
- SDECL** This is the default convention, and should be used whenever possible. SDECL (and its synonym STDCALL), specifies the "Standard Calling Convention" for Windows. Parameters are pushed on the stack from right to left, and the called procedure is responsible for removing them.

## Passing Parameters

*Arguments* An optional, comma-delimited sequence of formal parameters. The parameters used in the arguments list serve only to define the Function; they have no relationship to other variables in the calling code with the same name.

Normally, PowerBASIC passes parameters to a Sub either by reference (BYREF) or by value (BYVAL). If you do not need to modify the parameters (true in many cases), you can speed up your calls by passing the parameters by value using the BYVAL keyword.

You can clarify that a parameter is passed by reference by using the optional BYREF keyword.

The type of the parameter is specified either by appending a [type-specifier](#) character to the name or by using an AS clause. For example:

```
SUB Test(A AS INTEGER) ' integer passed by reference
SUB Test(A%) ' integer passed by reference
SUB Test(BYREF A%) ' integer passed by reference
SUB Test(BYVAL A%) ' integer passed by value
```

## Parameter Restrictions

PowerBASIC compilers have a limit of 32 parameters per Sub. To pass more than 32 parameters to a FUNCTION, construct a User-Defined Type (UDT) and pass the UDT by reference (BYREF) instead.

## Pointer Parameters

When a Sub definition specifies either a BYREF parameter or a [pointer](#) variable parameter, the calling code may freely pass a BYVAL DWORD or a Pointer instead. Pointer variable parameters must always be declared as BYVAL parameters.

```
' Integer Pointer (passed by value)
SUB Test(BYVAL A AS INTEGER PTR)
 @A = 56
END SUB
```

Additional information on BYVAL/BYREF/BYCOPY parameter passing can be found in the CALL statement topic.

## Using OPTIONAL/OPT

SUB statements may specify one or more parameters as optional by preceding the parameter with either the keyword OPTIONAL or OPT. Optional parameters are only allowed with CDECL or SDECL calling conventions, not BDECL.

When a parameter is declared optional, all subsequent parameters in the declaration are optional as well, whether or not they specify an explicit OPTIONAL or OPT directive. The following two lines are equivalent, with both second and third parameters being optional:

```
SUB sABC(a&, OPTIONAL BYVAL b&, OPTIONAL BYVAL c&)
SUB sABC(a&, OPT BYVAL b&, BYVAL c&)
```

[VARIANT](#) variables are particularly well suited for use as an optional parameter. If the calling code omits an optional VARIANT parameter, (BYVAL or BYREF), PowerBASIC (and most other compilers) substitute a variant of type VT\_ERROR which contains an error value of %DISP\_E\_PARAMNOTFOUND (&H80020004). In this case, you can check for this value directly, or use the [ISMISSING\(\)](#) function to determine whether the parameter was physically passed or not.

When optional parameters (other than a VARIANT) are omitted in the calling code, the stack area normally reserved for those parameters is zero-filled. This allows you to test if an optional parameter was passed or not.

If the parameter is defined as a BYVAL parameter, it will have the value zero. For [TYPE](#) or [UNION](#) variables passed BYVAL, the compiler will pass a string of binary zeroes of length [SIZEOF](#)(Type\_or\_union\_var).

If the parameter is defined as a BYREF parameter, [VARPTR](#) (varname) will equal zero; when this is true, any attempt to use varname in your code will result in [Error #9](#) (null pointer); failure to detect this error using [error-trapping](#) may result in a General Protection Fault or memory corruption. You should use the ISMISSING() function first to determine whether it is safe to access the parameter.

Because the FUNCTION, SUB, FASTPROC, METHOD, or PROPERTY being called does not know how many parameters are being passed at the time it is called, you should pass the number of parameters as one of the required parameters in the list.

## Variables within Subs

LOCAL variables are created within the procedure stack frame. If a LOCAL variable exceeds the amount of [stack space](#) available, it may become necessary to use a STATIC or GLOBAL variable instead. For example, creating a LOCAL nul-terminated or LOCAL [fixed-length string](#) that is very large (say, approaching 1 MB) can trigger a General Protection Fault (GPF) because it may overrun the stack frame.

### Procedure definitions and program flow

The position of procedure definitions is mostly immaterial. They are usually grouped together in one region of the source code, but you cannot nest procedure definitions. That is, you cannot define a procedure within another procedure (although a procedure definition can contain calls to other procedures). Unlike subroutines (see [GOSUB](#)), program execution cannot accidentally "fall into" a procedure, even if it is located before the PBMAIN or WINMAIN Function in your code. For example:

```
#COMPILE EXE
SUB DisplayInfo(a$)
 ' Code goes here
END SUB
...
FUNCTION PBMAIN
 ' Main program code goes here
END FUNCTION
```

When this program is executed, the code in DisplayInfo is only executed if the procedure is explicitly called, even though it is located earlier in the source code file. Procedure definitions should be treated like isolated islands of code; do not jump in or out of them with [GOTO](#), [GOSUB](#) or [RETURN](#). Within a procedure block, such statements are legal.

#### See also

[CALL](#), [DECLARE](#), [EXIT SUB](#), [FASTPROC](#), [FUNCNAME\\$](#), [FUNCTION/END FUNCTION](#), [GLOBAL](#), [GOSUB](#), [ISMISSING](#), [LOCAL](#), [RETURN](#), [STATIC](#)

#### Example

```
SUB TestProcedure(I%, L&, S!, D#, E##, A())
 ' Code to process parameters
END SUB ' end procedure TestProcedure

DIM MyArray(20) ' declare array of numbers
IntegerVar% = 1
LongInt& = 2
SinglePre! = 3
DoublePre# = 4
MyArray(3) = 5
CALL TestProcedure(IntegerVar%, LongInt&, SinglePre!, DoublePre#,
IntegerVar%^2, MyArray())
```

## SWAP statement

# SWAP statement

**Purpose** Exchange the values of two [variables](#) of the same

.

**Syntax** `SWAP var1, var2`

**Remarks** var1 and var2 are two variables of the same type. If you try to swap variables of differing types (for example,

and , or [Single-precision](#) and [Double-precision](#)), a compile-time [Error 482](#) occurs ("Data type mismatch").

SWAP is handy because a simple trading of values in two consecutive assignment statements does not get the job done:

```
a = b
b = a
```

By the time you make the second assignment, variable *a* does not contain the value it used to. To do this without the SWAP statement requires a temporary variable and a third assignment:

```
temp = a
a = b
b = temp
```

SWAP *can* be used to swap the *target* values of [pointers](#). In addition, SWAP can also be used to swap the values of pointers themselves.

## SWITCH function

# SWITCH function

**Purpose** Return one of a series of values based upon a [TRUE/FALSE](#) evaluation of a corresponding series of expressions.

**Syntax**

```
var = SWITCH(expr1, val1 [, expr2, val2], ...)
```

```
var& = SWITCH&(expr1, val1& [, expr2, val2&], ...)
```

```
var$ = SWITCH$(expr1, val1$ [, expr2, val2$], ...)
```

**Remarks** SWITCH expects values of any type. SWITCH& expects values optimized for [Long-integer](#) type. SWITCH\$ expects values of type.

If *expr1* evaluates [TRUE](#), *val1* is returned, if *expr2* evaluates TRUE, *val2* is returned, etc.

Each control expression in the series is evaluated as a typical PowerBASIC Boolean expression, which offers short-circuit expression evaluation as needed. To force a bitwise evaluation of an expression, enclose it in parentheses. The value parameters may be expressions, [literals](#) or [variables](#) of the appropriate data type for the SWITCH function in use.

SWITCH returns the matching value parameter from the first TRUE evaluation of the control expressions, evaluated from left to right in the list. Therefore, it would be wise to place the most likely selections at the front of the SWITCH list to achieve the utmost efficiency. If no expressions evaluate to TRUE, then zero (0) is returned.

**Restrictions** Contrary to the implementation in some other languages, only the chosen value (one of *val1*, *val2*, *val3*...) is evaluated at run-time; the other value parameters are not. This ensures optimum execution speed, as well as the elimination of unanticipated side effects.

**See also** [CHOOSE](#), [IE](#), [IIF](#), [SELECT](#)

**Example**

```
' SWITCH with simple expressions
A$ = SWITCH$(x%=1, "Bob", x%=20, "Bruce", x% > 20, "Dan", x% < 1,
"Nobody!")
```

```
' SWITCH with complex expressions
FUNCTION z(i&) AS LONG
 INCR i&
 FUNCTION = i&
END FUNCTION

FUNCTION PBMAIN
 x& = -1
 Choice& = SWITCH&(z(x&), 1, z(x&), 2, z(x&), 3)
 ' Choice& will equal 2
END FUNCTION
```

## TAB\$ function

# TAB\$ function

|                     |                                                                                                                                                                                                                                                                                                                                          |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>      | Return a<br>with embedded TAB ( <a href="#">\$TAB</a> ) characters expanded with spaces to a given tab stop.                                                                                                                                                                                                                             |
| <b>Syntax</b>       | <i>sResult\$</i> = TAB\$( <i>strtotab\$</i> , <i>tabstop&amp;</i> )                                                                                                                                                                                                                                                                      |
| <b>Remarks</b>      | All TAB ( <a href="#">CHR\$(9)</a> ) or \$TAB) characters in <i>strtotab\$</i> are replaced with spaces to pad the resulting string to the tab stop position specified in <i>tabstop&amp;</i> . <i>strtotab\$</i> and <i>tabstop&amp;</i> may be <a href="#">variables</a> , <a href="#">literals</a> , or <a href="#">expressions</a> . |
| <b>Restrictions</b> | If the tab stop specified in <i>tabstop&amp;</i> is less than 1 or greater than 256, the original string is returned unchanged.                                                                                                                                                                                                          |
| <b>See also</b>     | <a href="#">PARSE\$</a> , <a href="#">REPLACE</a>                                                                                                                                                                                                                                                                                        |
| <b>Example</b>      | <pre>a\$ = "Hello" &amp; \$TAB &amp; "World" &amp; \$TAB &amp; _     "From PB, Inc." b\$ = TAB\$(a\$,8)</pre>                                                                                                                                                                                                                            |
| <b>Result</b>       | b\$ contains "Hello      World      From PB, Inc."                                                                                                                                                                                                                                                                                       |

## TAB DELETE statement

# Keyword Template

|                 |
|-----------------|
| <b>Purpose</b>  |
| <b>Syntax</b>   |
| <b>Remarks</b>  |
| <b>See also</b> |
| <b>Example</b>  |

# TAB statement IMPROVED

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | A <a href="#">Tab Control</a> is analogous to the dividers in a notebook. It displays one particular page, selecting it from multiple pages, when the user chooses the corresponding tab. The TAB statement is used to manipulate a TAB control.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Syntax</b>  | <pre>TAB DELETE <i>hDlg</i>, <i>ID&amp;</i>, <i>PageNum&amp;</i> TAB GET COUNT <i>hDlg</i>, <i>ID&amp;</i> TO <i>CountVar&amp;</i> TAB GET DIALOG <i>hDlg</i>, <i>ID&amp;</i>, <i>PageNum&amp;</i> TO <i>PageDlgVar&amp;</i> TAB GET IMAGE <i>hDlg</i>, <i>ID&amp;</i>, <i>PageNum&amp;</i> TO <i>ImageVar&amp;</i> TAB GET PAGE <i>PageDlg</i> TO <i>PageNumVar&amp;</i> TAB GET SELECT <i>hDlg</i>, <i>ID&amp;</i> TO <i>PageNumVar&amp;</i> TAB GET TEXT <i>hDlg</i>, <i>ID&amp;</i>, <i>PageNum&amp;</i> TO <i>TextVar\$</i> TAB INSERT PAGE <i>hDlg</i>, <i>ID&amp;</i>, <i>PageNum&amp;</i>, <i>Image&amp;</i>, <i>Text\$</i> [CALL <i>CallBack</i>] TO <i>PageDlgVar&amp;</i> TAB RESET <i>hDlg</i>, <i>ID&amp;</i> TAB SELECT <i>hDlg</i>, <i>ID&amp;</i>, <i>PageNum&amp;</i> TAB SET IMAGE <i>hDlg</i>, <i>ID&amp;</i>, <i>PageNum&amp;</i>, <i>Image&amp;</i> TAB SET IMAGELIST <i>hDlg</i>, <i>ID&amp;</i>, <i>hLst</i> TAB SET TEXT <i>hDlg</i>, <i>ID&amp;</i>, <i>PageNum&amp;</i>, <i>Text\$</i></pre> <p><i>Function Form:</i></p> <pre><i>CountVar&amp;</i> = TAB(COUNT, <i>hDlg</i>, <i>ID&amp;</i>) <i>PageDlgVar&amp;</i> = TAB(DIALOG, <i>hDlg</i>, <i>ID&amp;</i>, <i>PageNum&amp;</i>) <i>ImageVar&amp;</i> = TAB(IMAGE, <i>hDlg</i>, <i>ID&amp;</i>, <i>PageNum&amp;</i>)</pre> |

```

PageNumVar& = TAB(PAGE, PageDlg&)
PageNumVar& = TAB(SELECT, hDlg, ID&)
TextVar$ = TAB$(TEXT, hDlg, ID&, PageNum&)

```

*hDlg* [Handle](#) of the [dialog](#) that owns the Tab Control.

*id&* The [control identifier](#) assigned with [CONTROL ADD TAB](#).

**Remarks** In each of the following descriptions, the Tab Control that is the subject of the statement is identified by the handle of the dialog that owns the Tab Control (*hDlg*), and the unique control ID you gave it upon creation in CONTROL ADD TAB. Whenever a TAB page number or IMAGELIST image number is referenced, it is indexed to one. That is, the first item is 1, the second item is 2, etc. Variations of TAB which return a single value may be written in the optional Function Form, as shown above. These functions may be embedded in an expression of any complexity.

### **TAB DELETE *hDlg, ID&, PageNum&***

The page specified by the *PageNum&* parameter is deleted from the Tab Control.

### **TAB GET COUNT *hDlg, id& TO CountVar&***

The number of pages in the TAB Control is retrieved, and assigned to the [long](#) integer variable specified by *CountVar&*.

### **TAB GET DIALOG *hDlg, ID&, PageNum& TO PageDlgVar&***

The handle of the [child](#) dialog attached to a TAB Control page is retrieved and assigned to the variable designated by *PageDlgVar&*. The dialog handle to be returned is determined by the value of the parameter *PageNum&*. If that page/dialog not exist, the value zero is returned.

### **TAB GET IMAGE *hDlg, ID&, PageNum& TO ImageVar&***

The index of the image displayed on the specified TAB page is retrieved, and assigned to the variable specified by *ImageVar&*. If no image is displayed, the value zero (0) is assigned.

### **TAB GET PAGE *PageDlg TO PageNum Var&***

Given the handle of a TAB Page Dialog, the PageNum is retrieved, and assigned to the variable specified by *PageNumVar&*. This may be particularly useful when you process [CallBack](#) messages for Tab Page Dialogs. If you also need [Parent](#) and [ID](#) information, you can use [WINDOW GET](#).

### **TAB GET SELECT *hDlg, id& TO SelectVar&***

The index of the currently selected page in the Tab Control is retrieved, and assigned to the variable specified by *SelectVar&*. If there is no current selection, the value zero (0) is assigned.

### **TAB GET TEXT *hDlg, ID&, PageNum& TO TextVar\$***

The text displayed on the specified page tab is retrieved, and assigned to the variable specified by *TextVar\$*.

### **TAB INSERT PAGE *hDlg, ID&, PageNum&, Image&, Text\$ [CALL CallBack] TO PageDlgVar&***

A page is added to this TAB Control. The parameter *PageNum&* specifies the position of the page to be inserted. An optional image to be displayed on the tab area is selected from the attached [IMAGELIST](#), based upon the parameter *Image&*. Set *Image&* to 0 if no image is desired. The *Text\$* parameter specifies the text to be displayed on the tab area. *CallBack* is the name of a callback procedure to be used for the page dialog. The handle

of the newly created dialog is assigned to the variable designated by `PageDlgVar&`.

### **TAB RESET *hDlg, id&***

All pages in the specified Tab Control are deleted.

### **TAB SELECT *hDlg, ID&, PageNum&***

The page specified by the `PageNum&` parameter is chosen as the selected page for the TAB control, and the associated dialog is displayed.

### **TAB SET IMAGE *hDlg, ID&, PageNum&, Image&***

The image specified by the parameter `Image&` is displayed on the page tab specified by the parameter `PageNum&`.

### **TAB SET IMAGELIST *hDlg, ID&, hLst***

The IMAGELIST specified by `hLst` is attached to this TAB control. The graphical images contained in the IMAGELIST are displayed on the tabs of this control. The image to be displayed is determined by the specification made in TAB INSERT PAGE or TAB SET IMAGE. When the TAB control is destroyed, any attached IMAGELIST is automatically destroyed.

### **TAB SET TEXT *hDlg, ID&, PageNum&, Text\$***

The text in the parameter `Text$` is displayed on the tab of the page specified by `PageNum&`.

See also [Dynamic Dialog Tools](#), [CONTROL ADD TAB](#), [CONTROL SET FONT](#), [IMAGELIST](#)

## TAB GET COUNT statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## TAB statement IMPROVED

**Purpose** A [Tab Control](#) is analogous to the dividers in a notebook. It displays one particular page, selecting it from multiple pages, when the user chooses the corresponding tab. The TAB statement is used to manipulate a TAB control.

**Syntax**

```
TAB DELETE hDlg, ID&, PageNum&
TAB GET COUNT hDlg, ID& TO CountVar&
TAB GET DIALOG hDlg, ID&, PageNum& TO PageDlgVar&
TAB GET IMAGE hDlg, ID&, PageNum& TO ImageVar&
TAB GET PAGE PageDlg TO PageNumVar&
TAB GET SELECT hDlg, ID& TO PageNumVar&
TAB GET TEXT hDlg, ID&, PageNum& TO TextVar$
TAB INSERT PAGE hDlg, ID&, PageNum&, Image&, Text$ [CALL CallBack] TO
PageDlgVar&
TAB RESET hDlg, ID&
TAB SELECT hDlg, ID&, PageNum&
```

```
TAB SET IMAGE hDlg, ID&, PageNum&, Image&
TAB SET IMAGELIST hDlg, ID&, hLst
TAB SET TEXT hDlg, ID&, PageNum&, Text$
```

**Function Form:**

```
CountVar& = TAB(COUNT, hDlg, ID&)
PageDlgVar& = TAB(DIALOG, hDlg, ID&, PageNum&)
ImageVar& = TAB(IMAGE, hDlg, ID&, PageNum&)
PageNumVar& = TAB(PAGE, PageDlg&)
PageNumVar& = TAB(SELECT, hDlg, ID&)
TextVar$ = TAB$(TEXT, hDlg, ID&, PageNum&)
```

*hDlg*Handle of the [dialog](#) that owns the Tab Control.*id&*The [control identifier](#) assigned with [CONTROL ADD TAB](#).**Remarks**

In each of the following descriptions, the Tab Control that is the subject of the statement is identified by the handle of the dialog that owns the Tab Control (*hDlg*), and the unique control ID you gave it upon creation in [CONTROL ADD TAB](#). Whenever a TAB page number or IMAGELIST image number is referenced, it is indexed to one. That is, the first item is 1, the second item is 2, etc. Variations of TAB which return a single value may be written in the optional Function Form, as shown above. These functions may be embedded in an expression of any complexity.

**TAB DELETE *hDlg, ID&, PageNum&***

The page specified by the *PageNum&* parameter is deleted from the Tab Control.

**TAB GET COUNT *hDlg, id& TO CountVar&***

The number of pages in the TAB Control is retrieved, and assigned to the [long](#) integer variable specified by *CountVar&*.

**TAB GET DIALOG *hDlg, ID&, PageNum& TO PageDlgVar&***

The handle of the [child](#) dialog attached to a TAB Control page is retrieved and assigned to the variable designated by *PageDlgVar&*. The dialog handle to be returned is determined by the value of the parameter *PageNum&*. If that page/dialog not exist, the value zero is returned.

**TAB GET IMAGE *hDlg, ID&, PageNum& TO ImageVar&***

The index of the image displayed on the specified TAB page is retrieved, and assigned to the variable specified by *ImageVar&*. If no image is displayed, the value zero (0) is assigned.

**TAB GET PAGE *PageDlg TO PageNum Var&***

Given the handle of a TAB Page Dialog, the PageNum is retrieved, and assigned to the variable specified by *PageNumVar&*. This may be particularly useful when you process [CallBack](#) messages for Tab Page Dialogs. If you also need [Parent](#) and [ID](#) information, you can use [WINDOW GET](#).

**TAB GET SELECT *hDlg, id& TO SelectVar&***

The index of the currently selected page in the Tab Control is retrieved, and assigned to the variable specified by *SelectVar&*. If there is no current selection, the value zero (0) is assigned.

**TAB GET TEXT *hDlg, ID&, PageNum& TO TextVar\$***

The text displayed on the specified page tab is retrieved, and assigned to the variable specified by *TextVar\$*.

**TAB INSERT PAGE *hDlg, ID&, PageNum&, Image&, Text\$* [CALL *CallBack*] TO *PageDlgVar&***

A page is added to this TAB Control. The parameter *PageNum&* specifies the position of the page to be inserted. An optional image to be displayed on the tab area is selected from the attached [IMAGELIST](#), based upon the parameter *Image&*. Set *Image&* to 0 if no image is desired. The *Text\$* parameter specifies the text to be displayed on the tab area.

*CallBack* is the name of a callback procedure to be used for the page dialog. The handle of the newly created dialog is assigned to the variable designated by *PageDlgVar&*.

**TAB RESET *hDlg, id&***

All pages in the specified Tab Control are deleted.

**TAB SELECT *hDlg, ID&, PageNum&***

The page specified by the *PageNum&* parameter is chosen as the selected page for the TAB control, and the associated dialog is displayed.

**TAB SET IMAGE *hDlg, ID&, PageNum&, Image&***

The image specified by the parameter *Image&* is displayed on the page tab specified by the parameter *PageNum&*.

**TAB SET IMAGELIST *hDlg, ID&, hLst***

The IMAGELIST specified by *hLst* is attached to this TAB control. The graphical images contained in the IMAGELIST are displayed on the tabs of this control. The image to be displayed is determined by the specification made in TAB INSERT PAGE or TAB SET IMAGE. When the TAB control is destroyed, any attached IMAGELIST is automatically destroyed.

**TAB SET TEXT *hDlg, ID&, PageNum&, Text\$***

The text in the parameter *Text\$* is displayed on the tab of the page specified by *PageNum&*.

See also [Dynamic Dialog Tools](#), [CONTROL ADD TAB](#), [CONTROL SET FONT](#), [IMAGELIST](#)

**TAB GET DIALOG statement**

## Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## TAB statement IMPROVED

**Purpose** A [Tab Control](#) is analogous to the dividers in a notebook. It displays one particular page, selecting it from multiple pages, when the user chooses the corresponding tab. The TAB statement is used to manipulate a TAB control.

**Syntax**

```
TAB DELETE hDlg, ID&, PageNum&
TAB GET COUNT hDlg, ID& TO CountVar&
```

```

TAB GET DIALOG hDlg, ID&, PageNum& TO PageDlgVar&
TAB GET IMAGE hDlg, ID&, PageNum& TO ImageVar&
TAB GET PAGE PageDlg TO PageNumVar&
TAB GET SELECT hDlg, ID& TO PageNumVar&
TAB GET TEXT hDlg, ID&, PageNum& TO TextVar$
TAB INSERT PAGE hDlg, ID&, PageNum&, Image&, Text$ [CALL CallBack] TO
PageDlgVar&
TAB RESET hDlg, ID&
TAB SELECT hDlg, ID&, PageNum&
TAB SET IMAGE hDlg, ID&, PageNum&, Image&
TAB SET IMAGELIST hDlg, ID&, hLst
TAB SET TEXT hDlg, ID&, PageNum&, Text$

```

**Function Form:**

```

CountVar& = TAB(COUNT, hDlg, ID&)
PageDlgVar& = TAB(DIALOG, hDlg, ID&, PageNum&)
ImageVar& = TAB(IMAGE, hDlg, ID&, PageNum&)
PageNumVar& = TAB(PAGE, PageDlg&)
PageNumVar& = TAB(SELECT, hDlg, ID&)
TextVar$ = TAB$(TEXT, hDlg, ID&, PageNum&)

```

*hDlg* [Handle](#) of the [dialog](#) that owns the Tab Control.

*id*& The [control identifier](#) assigned with [CONTROL ADD TAB](#).

**Remarks** In each of the following descriptions, the Tab Control that is the subject of the statement is identified by the handle of the dialog that owns the Tab Control (*hDlg*), and the unique control ID you gave it upon creation in CONTROL ADD TAB. Whenever a TAB page number or IMAGELIST image number is referenced, it is indexed to one. That is, the first item is 1, the second item is 2, etc. Variations of TAB which return a single value may be written in the optional Function Form, as shown above. These functions may be embedded in an expression of any complexity.

**TAB DELETE *hDlg*, *ID*&, *PageNum*&**

The page specified by the *PageNum*& parameter is deleted from the Tab Control.

**TAB GET COUNT *hDlg*, *id*& TO *CountVar*&**

The number of pages in the TAB Control is retrieved, and assigned to the [long](#) integer variable specified by *CountVar*&.

**TAB GET DIALOG *hDlg*, *ID*&, *PageNum*& TO *PageDlgVar*&**

The handle of the [child](#) dialog attached to a TAB Control page is retrieved and assigned to the variable designated by *PageDlgVar*&. The dialog handle to be returned is determined by the value of the parameter *PageNum*&. If that page/dialog not exist, the value zero is returned.

**TAB GET IMAGE *hDlg*, *ID*&, *PageNum*& TO *ImageVar*&**

The index of the image displayed on the specified TAB page is retrieved, and assigned to the variable specified by *ImageVar*&. If no image is displayed, the value zero (0) is assigned.

**TAB GET PAGE *PageDlg* TO *PageNumVar*&**

Given the handle of a TAB Page Dialog, the PageNum is retrieved, and assigned to the variable specified by *PageNumVar*&. This may be particularly useful when you process [CallBack](#) messages for Tab Page Dialogs. If you also need [Parent](#) and [ID](#) information, you can use [WINDOW GET](#).

**TAB GET SELECT *hDlg*, *id*& TO *SelectVar*&**

The index of the currently selected page in the Tab Control is retrieved, and assigned to the variable specified by *SelectVar&*. If there is no current selection, the value zero (0) is assigned.

### **TAB GET TEXT *hDlg, ID&, PageNum& TO TextVar\$***

The text displayed on the specified page tab is retrieved, and assigned to the variable specified by *TextVar\$*.

### **TAB INSERT PAGE *hDlg, ID&, PageNum&, Image&, Text\$ [CALL Callback] TO PageDlgVar&***

A page is added to this TAB Control. The parameter *PageNum&* specifies the position of the page to be inserted. An optional image to be displayed on the tab area is selected from the attached [IMAGELIST](#), based upon the parameter *Image&*. Set *Image&* to 0 if no image is desired. The *Text\$* parameter specifies the text to be displayed on the tab area. *Callback* is the name of a callback procedure to be used for the page dialog. The handle of the newly created dialog is assigned to the variable designated by *PageDlgVar&*.

### **TAB RESET *hDlg, id&***

All pages in the specified Tab Control are deleted.

### **TAB SELECT *hDlg, ID&, PageNum&***

The page specified by the *PageNum&* parameter is chosen as the selected page for the TAB control, and the associated dialog is displayed.

### **TAB SET IMAGE *hDlg, ID&, PageNum&, Image&***

The image specified by the parameter *Image&* is displayed on the page tab specified by the parameter *PageNum&*.

### **TAB SET IMAGELIST *hDlg, ID&, hLst***

The IMAGELIST specified by *hLst* is attached to this TAB control. The graphical images contained in the IMAGELIST are displayed on the tabs of this control. The image to be displayed is determined by the specification made in TAB INSERT PAGE or TAB SET IMAGE. When the TAB control is destroyed, any attached IMAGELIST is automatically destroyed.

### **TAB SET TEXT *hDlg, ID&, PageNum&, Text\$***

The text in the parameter *Text\$* is displayed on the tab of the page specified by *PageNum&*.

**See also** [Dynamic Dialog Tools](#), [CONTROL ADD TAB](#), [CONTROL SET FONT](#), [IMAGELIST](#)

## TAB GET IMAGE statement

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

# TAB statement IMPROVED

**Purpose** A [Tab Control](#) is analogous to the dividers in a notebook. It displays one particular page, selecting it from multiple pages, when the user chooses the corresponding tab. The TAB statement is used to manipulate a TAB control.

**Syntax**

```
TAB DELETE hDlg, ID&, PageNum&
TAB GET COUNT hDlg, ID& TO CountVar&
TAB GET DIALOG hDlg, ID&, PageNum& TO PageDlgVar&
TAB GET IMAGE hDlg, ID&, PageNum& TO ImageVar&
TAB GET PAGE PageDlg TO PageNumVar&
TAB GET SELECT hDlg, ID& TO PageNumVar&
TAB GET TEXT hDlg, ID&, PageNum& TO TextVar$
TAB INSERT PAGE hDlg, ID&, PageNum&, Image&, Text$ [CALL Callback] TO
PageDlgVar&
TAB RESET hDlg, ID&
TAB SELECT hDlg, ID&, PageNum&
TAB SET IMAGE hDlg, ID&, PageNum&, Image&
TAB SET IMAGELIST hDlg, ID&, hLst
TAB SET TEXT hDlg, ID&, PageNum&, Text$
```

**Function Form:**

```
CountVar& = TAB(COUNT, hDlg, ID&)
PageDlgVar& = TAB(DIALOG, hDlg, ID&, PageNum&)
ImageVar& = TAB(IMAGE, hDlg, ID&, PageNum&)
PageNumVar& = TAB(PAGE, PageDlg&)
PageNumVar& = TAB(SELECT, hDlg, ID&)
TextVar$ = TAB$(TEXT, hDlg, ID&, PageNum&)
```

*hDlg* [Handle](#) of the [dialog](#) that owns the Tab Control.

*id&* The [control identifier](#) assigned with [CONTROL ADD TAB](#).

**Remarks** In each of the following descriptions, the Tab Control that is the subject of the statement is identified by the handle of the dialog that owns the Tab Control (*hDlg*), and the unique control ID you gave it upon creation in CONTROL ADD TAB. Whenever a TAB page number or IMAGELIST image number is referenced, it is indexed to one. That is, the first item is 1, the second item is 2, etc. Variations of TAB which return a single value may be written in the optional Function Form, as shown above. These functions may be embedded in an expression of any complexity.

## **TAB DELETE *hDlg, ID&, PageNum&***

The page specified by the *PageNum&* parameter is deleted from the Tab Control.

## **TAB GET COUNT *hDlg, id& TO CountVar&***

The number of pages in the TAB Control is retrieved, and assigned to the [long](#) integer variable specified by *CountVar&*.

## **TAB GET DIALOG *hDlg, ID&, PageNum& TO PageDlgVar&***

The handle of the [child](#) dialog attached to a TAB Control page is retrieved and assigned to the variable designated by *PageDlgVar&*. The dialog handle to be returned is determined by the value of the parameter *PageNum&*. If that page/dialog not exist, the value zero is returned.

## **TAB GET IMAGE *hDlg, ID&, PageNum& TO ImageVar&***

The index of the image displayed on the specified TAB page is retrieved, and assigned to the variable specified by *ImageVar&*. If no image is displayed, the value zero (0) is assigned.

**TAB GET PAGE *PageDlg* TO *PageNumVar*&**

Given the handle of a TAB Page Dialog, the *PageNum* is retrieved, and assigned to the variable specified by *PageNumVar*&. This may be particularly useful when you process [CallBack](#) messages for Tab Page Dialogs. If you also need [Parent](#) and [ID](#) information, you can use [WINDOW GET](#).

**TAB GET SELECT *hDlg, id*& TO *SelectVar*&**

The index of the currently selected page in the Tab Control is retrieved, and assigned to the variable specified by *SelectVar*&. If there is no current selection, the value zero (0) is assigned.

**TAB GET TEXT *hDlg, ID*&, *PageNum*& TO *TextVar*\$**

The text displayed on the specified page tab is retrieved, and assigned to the variable specified by *TextVar*\$.

**TAB INSERT PAGE *hDlg, ID*&, *PageNum*&, *Image*&, *Text*\$ [CALL *CallBack*] TO *PageDlgVar*&**

A page is added to this TAB Control. The parameter *PageNum*& specifies the position of the page to be inserted. An optional image to be displayed on the tab area is selected from the attached [IMAGELIST](#), based upon the parameter *Image*&. Set *Image*& to 0 if no image is desired. The *Text*\$ parameter specifies the text to be displayed on the tab area.

*CallBack* is the name of a callback procedure to be used for the page dialog. The handle of the newly created dialog is assigned to the variable designated by *PageDlgVar*&.

**TAB RESET *hDlg, id*&**

All pages in the specified Tab Control are deleted.

**TAB SELECT *hDlg, ID*&, *PageNum*&**

The page specified by the *PageNum*& parameter is chosen as the selected page for the TAB control, and the associated dialog is displayed.

**TAB SET IMAGE *hDlg, ID*&, *PageNum*&, *Image*&**

The image specified by the parameter *Image*& is displayed on the page tab specified by the parameter *PageNum*&.

**TAB SET IMAGELIST *hDlg, ID*&, *hLst***

The IMAGELIST specified by *hLst* is attached to this TAB control. The graphical images contained in the IMAGELIST are displayed on the tabs of this control. The image to be displayed is determined by the specification made in TAB INSERT PAGE or TAB SET IMAGE. When the TAB control is destroyed, any attached IMAGELIST is automatically destroyed.

**TAB SET TEXT *hDlg, ID*&, *PageNum*&, *Text*\$**

The text in the parameter *Text*\$ is displayed on the tab of the page specified by *PageNum*&.

See also [Dynamic Dialog Tools](#), [CONTROL ADD TAB](#), [CONTROL SET FONT](#), [IMAGELIST](#)

**TAB GET PAGE statement****Keyword Template**

Purpose  
 Syntax  
 Remarks  
 See also  
 Example

## TAB statement IMPROVED

**Purpose** A [Tab Control](#) is analogous to the dividers in a notebook. It displays one particular page, selecting it from multiple pages, when the user chooses the corresponding tab. The TAB statement is used to manipulate a TAB control.

**Syntax**

```
TAB DELETE hDlg, ID&, PageNum&
TAB GET COUNT hDlg, ID& TO CountVar&
TAB GET DIALOG hDlg, ID&, PageNum& TO PageDlgVar&
TAB GET IMAGE hDlg, ID&, PageNum& TO ImageVar&
TAB GET PAGE PageDlg TO PageNumVar&
TAB GET SELECT hDlg, ID& TO PageNumVar&
TAB GET TEXT hDlg, ID&, PageNum& TO TextVar$
TAB INSERT PAGE hDlg, ID&, PageNum&, Image&, Text$ [CALL CallBack] TO
PageDlgVar&
TAB RESET hDlg, ID&
TAB SELECT hDlg, ID&, PageNum&
TAB SET IMAGE hDlg, ID&, PageNum&, Image&
TAB SET IMAGELIST hDlg, ID&, hLst
TAB SET TEXT hDlg, ID&, PageNum&, Text$
```

*Function Form:*

```
CountVar& = TAB(COUNT, hDlg, ID&)
PageDlgVar& = TAB(DIALOG, hDlg, ID&, PageNum&)
ImageVar& = TAB(IMAGE, hDlg, ID&, PageNum&)
PageNumVar& = TAB(PAGE, PageDlg&)
PageNumVar& = TAB(SELECT, hDlg, ID&)
TextVar$ = TAB$(TEXT, hDlg, ID&, PageNum&)
```

*hDlg* [Handle](#) of the [dialog](#) that owns the Tab Control.

*id&* The [control identifier](#) assigned with [CONTROL ADD TAB](#).

**Remarks** In each of the following descriptions, the Tab Control that is the subject of the statement is identified by the handle of the dialog that owns the Tab Control (*hDlg*), and the unique control ID you gave it upon creation in CONTROL ADD TAB. Whenever a TAB page number or IMAGELIST image number is referenced, it is indexed to one. That is, the first item is 1, the second item is 2, etc. Variations of TAB which return a single value may be written in the optional Function Form, as shown above. These functions may be embedded in an expression of any complexity.

### **TAB DELETE *hDlg, ID&, PageNum&***

The page specified by the *PageNum&* parameter is deleted from the Tab Control.

### **TAB GET COUNT *hDlg, id&* TO *CountVar&***

The number of pages in the TAB Control is retrieved, and assigned to the [long](#) integer variable specified by *CountVar&*.

### **TAB GET DIALOG *hDlg, ID&, PageNum&* TO *PageDlgVar&***

The handle of the [child](#) dialog attached to a TAB Control page is retrieved and assigned to the variable designated by *PageDlgVar&*. The dialog handle to be returned is determined

by the value of the parameter *PageNum&*. If that page/dialog not exist, the value zero is returned.

### **TAB GET IMAGE *hDlg, ID&, PageNum& TO ImageVar&***

The index of the image displayed on the specified TAB page is retrieved, and assigned to the variable specified by *ImageVar&*. If no image is displayed, the value zero (0) is assigned.

### **TAB GET PAGE *PageDlg TO PageNum Var&***

Given the handle of a TAB Page Dialog, the PageNum is retrieved, and assigned to the variable specified by *PageNumVar&*. This may be particularly useful when you process [CallBack](#) messages for Tab Page Dialogs. If you also need [Parent](#) and [ID](#) information, you can use [WINDOW.GET](#).

### **TAB GET SELECT *hDlg, id& TO SelectVar&***

The index of the currently selected page in the Tab Control is retrieved, and assigned to the variable specified by *SelectVar&*. If there is no current selection, the value zero (0) is assigned.

### **TAB GET TEXT *hDlg, ID&, PageNum& TO TextVar\$***

The text displayed on the specified page tab is retrieved, and assigned to the variable specified by *TextVar\$*.

### **TAB INSERT PAGE *hDlg, ID&, PageNum&, Image&, Text\$ [CALL CallBack] TO PageDlgVar&***

A page is added to this TAB Control. The parameter *PageNum&* specifies the position of the page to be inserted. An optional image to be displayed on the tab area is selected from the attached [IMAGELIST](#), based upon the parameter *Image&*. Set *Image&* to 0 if no image is desired. The *Text\$* parameter specifies the text to be displayed on the tab area. *CallBack* is the name of a callback procedure to be used for the page dialog. The handle of the newly created dialog is assigned to the variable designated by *PageDlgVar&*.

### **TAB RESET *hDlg, id&***

All pages in the specified Tab Control are deleted.

### **TAB SELECT *hDlg, ID&, PageNum&***

The page specified by the *PageNum&* parameter is chosen as the selected page for the TAB control, and the associated dialog is displayed.

### **TAB SET IMAGE *hDlg, ID&, PageNum&, Image&***

The image specified by the parameter *Image&* is displayed on the page tab specified by the parameter *PageNum&*.

### **TAB SET IMAGELIST *hDlg, ID&, hLst***

The IMAGELIST specified by *hLst* is attached to this TAB control. The graphical images contained in the IMAGELIST are displayed on the tabs of this control. The image to be displayed is determined by the specification made in TAB INSERT PAGE or TAB SET IMAGE. When the TAB control is destroyed, any attached IMAGELIST is automatically destroyed.

### **TAB SET TEXT *hDlg, ID&, PageNum&, Text\$***

The text in the parameter *Text\$* is displayed on the tab of the page specified by

*PageNum&*.See also [Dynamic Dialog Tools](#), [CONTROL ADD TAB](#), [CONTROL SET FONT](#), [IMAGELIST](#)

## TAB GET SELECT statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## TAB statement IMPROVED

**Purpose** A [Tab Control](#) is analogous to the dividers in a notebook. It displays one particular page, selecting it from multiple pages, when the user chooses the corresponding tab. The TAB statement is used to manipulate a TAB control.

**Syntax**

```
TAB DELETE hDlg, ID&, PageNum&
TAB GET COUNT hDlg, ID& TO CountVar&
TAB GET DIALOG hDlg, ID&, PageNum& TO PageDlgVar&
TAB GET IMAGE hDlg, ID&, PageNum& TO ImageVar&
TAB GET PAGE PageDlg TO PageNumVar&
TAB GET SELECT hDlg, ID& TO PageNumVar&
TAB GET TEXT hDlg, ID&, PageNum& TO TextVar$
TAB INSERT PAGE hDlg, ID&, PageNum&, Image&, Text$ [CALL CallBack] TO
PageDlgVar&
TAB RESET hDlg, ID&
TAB SELECT hDlg, ID&, PageNum&
TAB SET IMAGE hDlg, ID&, PageNum&, Image&
TAB SET IMAGELIST hDlg, ID&, hLst
TAB SET TEXT hDlg, ID&, PageNum&, Text$
```

*Function Form:*

```
CountVar& = TAB(COUNT, hDlg, ID&)
PageDlgVar& = TAB(DIALOG, hDlg, ID&, PageNum&)
ImageVar& = TAB(IMAGE, hDlg, ID&, PageNum&)
PageNumVar& = TAB(PAGE, PageDlg&)
PageNumVar& = TAB(SELECT, hDlg, ID&)
TextVar$ = TAB$(TEXT, hDlg, ID&, PageNum&)
```

*hDlg* [Handle](#) of the [dialog](#) that owns the Tab Control.*id&* The [control identifier](#) assigned with [CONTROL ADD TAB](#).

**Remarks** In each of the following descriptions, the Tab Control that is the subject of the statement is identified by the handle of the dialog that owns the Tab Control (*hDlg*), and the unique control ID you gave it upon creation in CONTROL ADD TAB. Whenever a TAB page number or IMAGELIST image number is referenced, it is indexed to one. That is, the first item is 1, the second item is 2, etc. Variations of TAB which return a single value may be written in the optional Function Form, as shown above. These functions may be embedded in an expression of any complexity.

### **TAB DELETE *hDlg*, *ID&*, *PageNum&***

The page specified by the *PageNum&* parameter is deleted from the Tab Control.

**TAB GET COUNT *hDlg, id& TO CountVar&***

The number of pages in the TAB Control is retrieved, and assigned to the [long](#) integer variable specified by *CountVar&*.

**TAB GET DIALOG *hDlg, ID&, PageNum& TO PageDlgVar&***

The handle of the [child](#) dialog attached to a TAB Control page is retrieved and assigned to the variable designated by *PageDlgVar&*. The dialog handle to be returned is determined by the value of the parameter *PageNum&*. If that page/dialog not exist, the value zero is returned.

**TAB GET IMAGE *hDlg, ID&, PageNum& TO ImageVar&***

The index of the image displayed on the specified TAB page is retrieved, and assigned to the variable specified by *ImageVar&*. If no image is displayed, the value zero (0) is assigned.

**TAB GET PAGE *PageDlg TO PageNum Var&***

Given the handle of a TAB Page Dialog, the PageNum is retrieved, and assigned to the variable specified by *PageNumVar&*. This may be particularly useful when you process [CallBack](#) messages for Tab Page Dialogs. If you also need [Parent](#) and [ID](#) information, you can use [WINDOW GET](#).

**TAB GET SELECT *hDlg, id& TO SelectVar&***

The index of the currently selected page in the Tab Control is retrieved, and assigned to the variable specified by *SelectVar&*. If there is no current selection, the value zero (0) is assigned.

**TAB GET TEXT *hDlg, ID&, PageNum& TO TextVar\$***

The text displayed on the specified page tab is retrieved, and assigned to the variable specified by *TextVar\$*.

**TAB INSERT PAGE *hDlg, ID&, PageNum&, Image&, Text\$ [CALL CallBack] TO PageDlgVar&***

A page is added to this TAB Control. The parameter *PageNum&* specifies the position of the page to be inserted. An optional image to be displayed on the tab area is selected from the attached [IMAGELIST](#), based upon the parameter *Image&*. Set *Image&* to 0 if no image is desired. The *Text\$* parameter specifies the text to be displayed on the tab area.

*CallBack* is the name of a callback procedure to be used for the page dialog. The handle of the newly created dialog is assigned to the variable designated by *PageDlgVar&*.

**TAB RESET *hDlg, id&***

All pages in the specified Tab Control are deleted.

**TAB SELECT *hDlg, ID&, PageNum&***

The page specified by the *PageNum&* parameter is chosen as the selected page for the TAB control, and the associated dialog is displayed.

**TAB SET IMAGE *hDlg, ID&, PageNum&, Image&***

The image specified by the parameter *Image&* is displayed on the page tab specified by the parameter *PageNum&*.

**TAB SET IMAGELIST *hDlg, ID&, hLst***

The IMAGELIST specified by *hLst* is attached to this TAB control. The graphical images contained in the IMAGELIST are displayed on the tabs of this control. The image to be displayed is determined by the specification made in TAB INSERT PAGE or TAB SET IMAGE. When the TAB control is destroyed, any attached IMAGELIST is automatically destroyed.

### **TAB SET TEXT *hDlg, ID&, PageNum&, Text\$***

The text in the parameter *Text\$* is displayed on the tab of the page specified by *PageNum&*.

See also [Dynamic Dialog Tools](#), [CONTROL ADD TAB](#), [CONTROL SET FONT](#), [IMAGELIST](#)

## TAB GET TEXT statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

# TAB statement IMPROVED

**Purpose** A [Tab Control](#) is analogous to the dividers in a notebook. It displays one particular page, selecting it from multiple pages, when the user chooses the corresponding tab. The TAB statement is used to manipulate a TAB control.

**Syntax**

```
TAB DELETE hDlg, ID&, PageNum&
TAB GET COUNT hDlg, ID& TO CountVar&
TAB GET DIALOG hDlg, ID&, PageNum& TO PageDlgVar&
TAB GET IMAGE hDlg, ID&, PageNum& TO ImageVar&
TAB GET PAGE PageDlg TO PageNumVar&
TAB GET SELECT hDlg, ID& TO PageNumVar&
TAB GET TEXT hDlg, ID&, PageNum& TO TextVar$
TAB INSERT PAGE hDlg, ID&, PageNum&, Image&, Text$ [CALL CallBack] TO
PageDlgVar&
TAB RESET hDlg, ID&
TAB SELECT hDlg, ID&, PageNum&
TAB SET IMAGE hDlg, ID&, PageNum&, Image&
TAB SET IMAGELIST hDlg, ID&, hLst
TAB SET TEXT hDlg, ID&, PageNum&, Text$
```

*Function Form:*

```
CountVar& = TAB(COUNT, hDlg, ID&)
PageDlgVar& = TAB(DIALOG, hDlg, ID&, PageNum&)
ImageVar& = TAB(IMAGE, hDlg, ID&, PageNum&)
PageNumVar& = TAB(PAGE, PageDlg&)
PageNumVar& = TAB(SELECT, hDlg, ID&)
TextVar$ = TAB$(TEXT, hDlg, ID&, PageNum&)
```

*hDlg* [Handle](#) of the [dialog](#) that owns the Tab Control.

*id&* The [control identifier](#) assigned with [CONTROL ADD TAB](#).

**Remarks** In each of the following descriptions, the Tab Control that is the subject of the statement is identified by the handle of the dialog that owns the Tab Control (*hDlg*), and the unique control ID you gave it upon creation in CONTROL ADD TAB. Whenever a TAB page

number or IMAGELIST image number is referenced, it is indexed to one. That is, the first item is 1, the second item is 2, etc. Variations of TAB which return a single value may be written in the optional Function Form, as shown above. These functions may be embedded in an expression of any complexity.

### **TAB DELETE *hDlg, ID&, PageNum&***

The page specified by the *PageNum&* parameter is deleted from the Tab Control.

### **TAB GET COUNT *hDlg, id& TO CountVar&***

The number of pages in the TAB Control is retrieved, and assigned to the [long](#) integer variable specified by *CountVar&*.

### **TAB GET DIALOG *hDlg, ID&, PageNum& TO PageDlgVar&***

The handle of the [child](#) dialog attached to a TAB Control page is retrieved and assigned to the variable designated by *PageDlgVar&*. The dialog handle to be returned is determined by the value of the parameter *PageNum&*. If that page/dialog not exist, the value zero is returned.

### **TAB GET IMAGE *hDlg, ID&, PageNum& TO ImageVar&***

The index of the image displayed on the specified TAB page is retrieved, and assigned to the variable specified by *ImageVar&*. If no image is displayed, the value zero (0) is assigned.

### **TAB GET PAGE *PageDlg TO PageNum Var&***

Given the handle of a TAB Page Dialog, the PageNum is retrieved, and assigned to the variable specified by *PageNumVar&*. This may be particularly useful when you process [CallBack](#) messages for Tab Page Dialogs. If you also need [Parent](#) and [ID](#) information, you can use [WINDOW.GET](#).

### **TAB GET SELECT *hDlg, id& TO SelectVar&***

The index of the currently selected page in the Tab Control is retrieved, and assigned to the variable specified by *SelectVar&*. If there is no current selection, the value zero (0) is assigned.

### **TAB GET TEXT *hDlg, ID&, PageNum& TO TextVar\$***

The text displayed on the specified page tab is retrieved, and assigned to the variable specified by *TextVar\$*.

### **TAB INSERT PAGE *hDlg, ID&, PageNum&, Image&, Text\$ [CALL CallBack] TO PageDlgVar&***

A page is added to this TAB Control. The parameter *PageNum&* specifies the position of the page to be inserted. An optional image to be displayed on the tab area is selected from the attached [IMAGELIST](#), based upon the parameter *Image&*. Set *Image&* to 0 if no image is desired. The *Text\$* parameter specifies the text to be displayed on the tab area. *CallBack* is the name of a callback procedure to be used for the page dialog. The handle of the newly created dialog is assigned to the variable designated by *PageDlgVar&*.

### **TAB RESET *hDlg, id&***

All pages in the specified Tab Control are deleted.

### **TAB SELECT *hDlg, ID&, PageNum&***

The page specified by the *PageNum&* parameter is chosen as the selected page for the

TAB control, and the associated dialog is displayed.

### **TAB SET IMAGE *hDlg, ID&, PageNum&, Image&***

The image specified by the parameter *Image&* is displayed on the page tab specified by the parameter *PageNum&*.

### **TAB SET IMAGELIST *hDlg, ID&, hLst***

The IMAGELIST specified by *hLst* is attached to this TAB control. The graphical images contained in the IMAGELIST are displayed on the tabs of this control. The image to be displayed is determined by the specification made in TAB INSERT PAGE or TAB SET IMAGE. When the TAB control is destroyed, any attached IMAGELIST is automatically destroyed.

### **TAB SET TEXT *hDlg, ID&, PageNum&, Text\$***

The text in the parameter *Text\$* is displayed on the tab of the page specified by *PageNum&*.

See also [Dynamic Dialog Tools](#), [CONTROL ADD TAB](#), [CONTROL SET FONT](#), [IMAGELIST](#)

## TAB INSERT PAGE statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## TAB statement IMPROVED

**Purpose** A [Tab Control](#) is analogous to the dividers in a notebook. It displays one particular page, selecting it from multiple pages, when the user chooses the corresponding tab. The TAB statement is used to manipulate a TAB control.

**Syntax**

```
TAB DELETE hDlg, ID&, PageNum&
TAB GET COUNT hDlg, ID& TO CountVar&
TAB GET DIALOG hDlg, ID&, PageNum& TO PageDlgVar&
TAB GET IMAGE hDlg, ID&, PageNum& TO ImageVar&
TAB GET PAGE PageDlg TO PageNumVar&
TAB GET SELECT hDlg, ID& TO PageNumVar&
TAB GET TEXT hDlg, ID&, PageNum& TO TextVar$
TAB INSERT PAGE hDlg, ID&, PageNum&, Image&, Text$ [CALL CallBack] TO
PageDlgVar&
TAB RESET hDlg, ID&
TAB SELECT hDlg, ID&, PageNum&
TAB SET IMAGE hDlg, ID&, PageNum&, Image&
TAB SET IMAGELIST hDlg, ID&, hLst
TAB SET TEXT hDlg, ID&, PageNum&, Text$
```

*Function Form:*

```
CountVar& = TAB(COUNT, hDlg, ID&)
PageDlgVar& = TAB(DIALOG, hDlg, ID&, PageNum&)
ImageVar& = TAB(IMAGE, hDlg, ID&, PageNum&)
PageNumVar& = TAB(PAGE, PageDlg&)
```

```
PageNumVar& = TAB(SELECT, hDlg, ID&)
TextVar$ = TAB$(TEXT, hDlg, ID&, PageNum&)
```

*hDlg*      [Handle](#) of the [dialog](#) that owns the Tab Control.

*id&*        The [control identifier](#) assigned with [CONTROL ADD TAB](#).

**Remarks**      In each of the following descriptions, the Tab Control that is the subject of the statement is identified by the handle of the dialog that owns the Tab Control (*hDlg*), and the unique control ID you gave it upon creation in CONTROL ADD TAB. Whenever a TAB page number or IMAGELIST image number is referenced, it is indexed to one. That is, the first item is 1, the second item is 2, etc. Variations of TAB which return a single value may be written in the optional Function Form, as shown above. These functions may be embedded in an expression of any complexity.

### **TAB DELETE *hDlg, ID&, PageNum&***

The page specified by the *PageNum&* parameter is deleted from the Tab Control.

### **TAB GET COUNT *hDlg, id& TO CountVar&***

The number of pages in the TAB Control is retrieved, and assigned to the [long](#) integer variable specified by *CountVar&*.

### **TAB GET DIALOG *hDlg, ID&, PageNum& TO PageDlgVar&***

The handle of the [child](#) dialog attached to a TAB Control page is retrieved and assigned to the variable designated by *PageDlgVar&*. The dialog handle to be returned is determined by the value of the parameter *PageNum&*. If that page/dialog not exist, the value zero is returned.

### **TAB GET IMAGE *hDlg, ID&, PageNum& TO ImageVar&***

The index of the image displayed on the specified TAB page is retrieved, and assigned to the variable specified by *ImageVar&*. If no image is displayed, the value zero (0) is assigned.

### **TAB GET PAGE *PageDlg TO PageNum Var&***

Given the handle of a TAB Page Dialog, the PageNum is retrieved, and assigned to the variable specified by *PageNumVar&*. This may be particularly useful when you process [CallBack](#) messages for Tab Page Dialogs. If you also need [Parent](#) and [ID](#) information, you can use [WINDOW GET](#).

### **TAB GET SELECT *hDlg, id& TO SelectVar&***

The index of the currently selected page in the Tab Control is retrieved, and assigned to the variable specified by *SelectVar&*. If there is no current selection, the value zero (0) is assigned.

### **TAB GET TEXT *hDlg, ID&, PageNum& TO TextVar\$***

The text displayed on the specified page tab is retrieved, and assigned to the variable specified by *TextVar\$*.

### **TAB INSERT PAGE *hDlg, ID&, PageNum&, Image&, Text\$ [CALL CallBack] TO PageDlgVar&***

A page is added to this TAB Control. The parameter *PageNum&* specifies the position of the page to be inserted. An optional image to be displayed on the tab area is selected from the attached [IMAGELIST](#), based upon the parameter *Image&*. Set *Image&* to 0 if no image is desired. The *Text\$* parameter specifies the text to be displayed on the tab area. *CallBack* is the name of a callback procedure to be used for the page dialog. The handle of the newly created dialog is assigned to the variable designated by *PageDlgVar&*.

**TAB RESET *hDlg, id&***

All pages in the specified Tab Control are deleted.

**TAB SELECT *hDlg, ID&, PageNum&***

The page specified by the *PageNum&* parameter is chosen as the selected page for the TAB control, and the associated dialog is displayed.

**TAB SET IMAGE *hDlg, ID&, PageNum&, Image&***

The image specified by the parameter *Image&* is displayed on the page tab specified by the parameter *PageNum&*.

**TAB SET IMAGELIST *hDlg, ID&, hLst***

The IMAGELIST specified by *hLst* is attached to this TAB control. The graphical images contained in the IMAGELIST are displayed on the tabs of this control. The image to be displayed is determined by the specification made in TAB INSERT PAGE or TAB SET IMAGE. When the TAB control is destroyed, any attached IMAGELIST is automatically destroyed.

**TAB SET TEXT *hDlg, ID&, PageNum&, Text\$***

The text in the parameter *Text\$* is displayed on the tab of the page specified by *PageNum&*.

See also [Dynamic Dialog Tools](#), [CONTROL ADD TAB](#), [CONTROL SET FONT](#), [IMAGELIST](#)

**TAB RESET statement**

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

# TAB statement IMPROVED

**Purpose** A [Tab Control](#) is analogous to the dividers in a notebook. It displays one particular page, selecting it from multiple pages, when the user chooses the corresponding tab. The TAB statement is used to manipulate a TAB control.

**Syntax**

```
TAB DELETE hDlg, ID&, PageNum&
TAB GET COUNT hDlg, ID& TO CountVar&
TAB GET DIALOG hDlg, ID&, PageNum& TO PageDlgVar&
TAB GET IMAGE hDlg, ID&, PageNum& TO ImageVar&
TAB GET PAGE PageDlg TO PageNumVar&
TAB GET SELECT hDlg, ID& TO PageNumVar&
TAB GET TEXT hDlg, ID&, PageNum& TO TextVar$
TAB INSERT PAGE hDlg, ID&, PageNum&, Image&, Text$ [CALL CallBack] TO
PageDlgVar&
TAB RESET hDlg, ID&
TAB SELECT hDlg, ID&, PageNum&
TAB SET IMAGE hDlg, ID&, PageNum&, Image&
```

```
TAB SET IMAGELIST hDlg, ID&, hLst
TAB SET TEXT hDlg, ID&, PageNum&, Text$
```

**Function Form:**

```
CountVar& = TAB(COUNT, hDlg, ID&)
PageDlgVar& = TAB(DIALOG, hDlg, ID&, PageNum&)
ImageVar& = TAB(IMAGE, hDlg, ID&, PageNum&)
PageNumVar& = TAB(PAGE, PageDlg&)
PageNumVar& = TAB(SELECT, hDlg, ID&)
TextVar$ = TAB$(TEXT, hDlg, ID&, PageNum&)
```

*hDlg* [Handle](#) of the [dialog](#) that owns the Tab Control.

*id&* The [control identifier](#) assigned with [CONTROL ADD TAB](#).

**Remarks** In each of the following descriptions, the Tab Control that is the subject of the statement is identified by the handle of the dialog that owns the Tab Control (*hDlg*), and the unique control ID you gave it upon creation in CONTROL ADD TAB. Whenever a TAB page number or IMAGELIST image number is referenced, it is indexed to one. That is, the first item is 1, the second item is 2, etc. Variations of TAB which return a single value may be written in the optional Function Form, as shown above. These functions may be embedded in an expression of any complexity.

**TAB DELETE *hDlg, ID&, PageNum&***

The page specified by the *PageNum&* parameter is deleted from the Tab Control.

**TAB GET COUNT *hDlg, id& TO CountVar&***

The number of pages in the TAB Control is retrieved, and assigned to the [long](#) integer variable specified by *CountVar&*.

**TAB GET DIALOG *hDlg, ID&, PageNum& TO PageDlgVar&***

The handle of the [child](#) dialog attached to a TAB Control page is retrieved and assigned to the variable designated by *PageDlgVar&*. The dialog handle to be returned is determined by the value of the parameter *PageNum&*. If that page/dialog not exist, the value zero is returned.

**TAB GET IMAGE *hDlg, ID&, PageNum& TO ImageVar&***

The index of the image displayed on the specified TAB page is retrieved, and assigned to the variable specified by *ImageVar&*. If no image is displayed, the value zero (0) is assigned.

**TAB GET PAGE *PageDlg TO PageNum Var&***

Given the handle of a TAB Page Dialog, the PageNum is retrieved, and assigned to the variable specified by *PageNumVar&*. This may be particularly useful when you process [CallBack](#) messages for Tab Page Dialogs. If you also need [Parent](#) and [ID](#) information, you can use [WINDOW GET](#).

**TAB GET SELECT *hDlg, id& TO SelectVar&***

The index of the currently selected page in the Tab Control is retrieved, and assigned to the variable specified by *SelectVar&*. If there is no current selection, the value zero (0) is assigned.

**TAB GET TEXT *hDlg, ID&, PageNum& TO TextVar\$***

The text displayed on the specified page tab is retrieved, and assigned to the variable specified by *TextVar\$*.

**TAB INSERT PAGE *hDlg, ID&, PageNum&, Image&, Text\$ [CALL CallBack]***

**TO PageDlgVar&**

A page is added to this TAB Control. The parameter *PageNum&* specifies the position of the page to be inserted. An optional image to be displayed on the tab area is selected from the attached [IMAGELIST](#), based upon the parameter *Image&*. Set *Image&* to 0 if no image is desired. The *Text\$* parameter specifies the text to be displayed on the tab area.

*CallBack* is the name of a callback procedure to be used for the page dialog. The handle of the newly created dialog is assigned to the variable designated by *PageDlgVar&*.

**TAB RESET hDlg, id&**

All pages in the specified Tab Control are deleted.

**TAB SELECT hDlg, ID&, PageNum&**

The page specified by the *PageNum&* parameter is chosen as the selected page for the TAB control, and the associated dialog is displayed.

**TAB SET IMAGE hDlg, ID&, PageNum&, Image&**

The image specified by the parameter *Image&* is displayed on the page tab specified by the parameter *PageNum&*.

**TAB SET IMAGELIST hDlg, ID&, hLst**

The IMAGELIST specified by *hLst* is attached to this TAB control. The graphical images contained in the IMAGELIST are displayed on the tabs of this control. The image to be displayed is determined by the specification made in TAB INSERT PAGE or TAB SET IMAGE. When the TAB control is destroyed, any attached IMAGELIST is automatically destroyed.

**TAB SET TEXT hDlg, ID&, PageNum&, Text\$**

The text in the parameter *Text\$* is displayed on the tab of the page specified by *PageNum&*.

See also [Dynamic Dialog Tools](#), [CONTROL ADD TAB](#), [CONTROL SET FONT](#), [IMAGELIST](#)

**TAB SELECT statement**

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

# TAB statement IMPROVED

**Purpose** A [Tab Control](#) is analogous to the dividers in a notebook. It displays one particular page, selecting it from multiple pages, when the user chooses the corresponding tab. The TAB statement is used to manipulate a TAB control.

**Syntax**

```
TAB DELETE hDlg, ID&, PageNum&
TAB GET COUNT hDlg, ID& TO CountVar&
TAB GET DIALOG hDlg, ID&, PageNum& TO PageDlgVar&
TAB GET IMAGE hDlg, ID&, PageNum& TO ImageVar&
```

```
TAB GET PAGE PageDlg TO PageNumVar&
TAB GET SELECT hDlg, ID& TO PageNumVar&
TAB GET TEXT hDlg, ID&, PageNum& TO TextVar$
TAB INSERT PAGE hDlg, ID&, PageNum&, Image&, Text$ [CALL Callback] TO
PageDlgVar&
TAB RESET hDlg, ID&
TAB SELECT hDlg, ID&, PageNum&
TAB SET IMAGE hDlg, ID&, PageNum&, Image&
TAB SET IMAGELIST hDlg, ID&, hLst
TAB SET TEXT hDlg, ID&, PageNum&, Text$
```

**Function Form:**

```
CountVar& = TAB(COUNT, hDlg, ID&)
PageDlgVar& = TAB(DIALOG, hDlg, ID&, PageNum&)
ImageVar& = TAB(IMAGE, hDlg, ID&, PageNum&)
PageNumVar& = TAB(PAGE, PageDlg&)
PageNumVar& = TAB(SELECT, hDlg, ID&)
TextVar$ = TAB$(TEXT, hDlg, ID&, PageNum&)
```

*hDlg*Handle of the [dialog](#) that owns the Tab Control.*id&*The [control identifier](#) assigned with [CONTROL ADD TAB](#).**Remarks**

In each of the following descriptions, the Tab Control that is the subject of the statement is identified by the handle of the dialog that owns the Tab Control (*hDlg*), and the unique control ID you gave it upon creation in [CONTROL ADD TAB](#). Whenever a [TAB](#) page number or [IMAGELIST](#) image number is referenced, it is indexed to one. That is, the first item is 1, the second item is 2, etc. Variations of [TAB](#) which return a single value may be written in the optional Function Form, as shown above. These functions may be embedded in an expression of any complexity.

**TAB DELETE *hDlg, ID&, PageNum&***

The page specified by the *PageNum&* parameter is deleted from the Tab Control.

**TAB GET COUNT *hDlg, id& TO CountVar&***

The number of pages in the [TAB](#) Control is retrieved, and assigned to the [long](#) integer variable specified by *CountVar&*.

**TAB GET DIALOG *hDlg, ID&, PageNum& TO PageDlgVar&***

The handle of the [child](#) dialog attached to a [TAB](#) Control page is retrieved and assigned to the variable designated by *PageDlgVar&*. The dialog handle to be returned is determined by the value of the parameter *PageNum&*. If that page/dialog not exist, the value zero is returned.

**TAB GET IMAGE *hDlg, ID&, PageNum& TO ImageVar&***

The index of the image displayed on the specified [TAB](#) page is retrieved, and assigned to the variable specified by *ImageVar&*. If no image is displayed, the value zero (0) is assigned.

**TAB GET PAGE *PageDlg TO PageNumVar&***

Given the handle of a [TAB](#) Page Dialog, the [PageNum](#) is retrieved, and assigned to the variable specified by *PageNumVar&*. This may be particularly useful when you process [CallBack](#) messages for [Tab](#) Page Dialogs. If you also need [Parent](#) and [ID](#) information, you can use [WINDOW GET](#).

**TAB GET SELECT *hDlg, id& TO SelectVar&***

The index of the currently selected page in the [Tab](#) Control is retrieved, and assigned to the variable specified by *SelectVar&*. If there is no current selection, the value zero (0) is

assigned.

### **TAB GET TEXT *hDlg, ID&, PageNum& TO TextVar\$***

The text displayed on the specified page tab is retrieved, and assigned to the variable specified by *TextVar\$*.

### **TAB INSERT PAGE *hDlg, ID&, PageNum&, Image&, Text\$ [CALL Callback] TO PageDlgVar&***

A page is added to this TAB Control. The parameter *PageNum&* specifies the position of the page to be inserted. An optional image to be displayed on the tab area is selected from the attached [IMAGELIST](#), based upon the parameter *Image&*. Set *Image&* to 0 if no image is desired. The *Text\$* parameter specifies the text to be displayed on the tab area.

*Callback* is the name of a callback procedure to be used for the page dialog. The handle of the newly created dialog is assigned to the variable designated by *PageDlgVar&*.

### **TAB RESET *hDlg, id&***

All pages in the specified Tab Control are deleted.

### **TAB SELECT *hDlg, ID&, PageNum&***

The page specified by the *PageNum&* parameter is chosen as the selected page for the TAB control, and the associated dialog is displayed.

### **TAB SET IMAGE *hDlg, ID&, PageNum&, Image&***

The image specified by the parameter *Image&* is displayed on the page tab specified by the parameter *PageNum&*.

### **TAB SET IMAGELIST *hDlg, ID&, hLst***

The IMAGELIST specified by *hLst* is attached to this TAB control. The graphical images contained in the IMAGELIST are displayed on the tabs of this control. The image to be displayed is determined by the specification made in TAB INSERT PAGE or TAB SET IMAGE. When the TAB control is destroyed, any attached IMAGELIST is automatically destroyed.

### **TAB SET TEXT *hDlg, ID&, PageNum&, Text\$***

The text in the parameter *Text\$* is displayed on the tab of the page specified by *PageNum&*.

See also [Dynamic Dialog Tools](#), [CONTROL ADD TAB](#), [CONTROL SET FONT](#), [IMAGELIST](#)

## TAB SET IMAGE statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## TAB statement IMPROVED

**Purpose** A [Tab Control](#) is analogous to the dividers in a notebook. It displays one particular page, selecting it from multiple pages, when the user chooses the corresponding tab. The TAB statement is used to manipulate a TAB control.

**Syntax**

```
TAB DELETE hDlg, ID&, PageNum&
TAB GET COUNT hDlg, ID& TO CountVar&
TAB GET DIALOG hDlg, ID&, PageNum& TO PageDlgVar&
TAB GET IMAGE hDlg, ID&, PageNum& TO ImageVar&
TAB GET PAGE PageDlg TO PageNumVar&
TAB GET SELECT hDlg, ID& TO PageNumVar&
TAB GET TEXT hDlg, ID&, PageNum& TO TextVar$
TAB INSERT PAGE hDlg, ID&, PageNum&, Image&, Text$ [CALL Callback] TO
PageDlgVar&
TAB RESET hDlg, ID&
TAB SELECT hDlg, ID&, PageNum&
TAB SET IMAGE hDlg, ID&, PageNum&, Image&
TAB SET IMAGELIST hDlg, ID&, hLst
TAB SET TEXT hDlg, ID&, PageNum&, Text$
```

*Function Form:*

```
CountVar& = TAB(COUNT, hDlg, ID&)
PageDlgVar& = TAB(DIALOG, hDlg, ID&, PageNum&)
ImageVar& = TAB(IMAGE, hDlg, ID&, PageNum&)
PageNumVar& = TAB(PAGE, PageDlg&)
PageNumVar& = TAB(SELECT, hDlg, ID&)
TextVar$ = TAB$(TEXT, hDlg, ID&, PageNum&)
```

*hDlg* [Handle](#) of the [dialog](#) that owns the Tab Control.

*id&* The [control identifier](#) assigned with [CONTROL ADD TAB](#).

**Remarks** In each of the following descriptions, the Tab Control that is the subject of the statement is identified by the handle of the dialog that owns the Tab Control (hDlg), and the unique control ID you gave it upon creation in CONTROL ADD TAB. Whenever a TAB page number or IMAGELIST image number is referenced, it is indexed to one. That is, the first item is 1, the second item is 2, etc. Variations of TAB which return a single value may be written in the optional Function Form, as shown above. These functions may be embedded in an expression of any complexity.

**TAB DELETE hDlg, ID&, PageNum&**

The page specified by the *PageNum&* parameter is deleted from the Tab Control.

**TAB GET COUNT hDlg, id& TO CountVar&**

The number of pages in the TAB Control is retrieved, and assigned to the [long](#) integer variable specified by *CountVar&*.

**TAB GET DIALOG hDlg, ID&, PageNum& TO PageDlgVar&**

The handle of the [child](#) dialog attached to a TAB Control page is retrieved and assigned to the variable designated by *PageDlgVar&*. The dialog handle to be returned is determined by the value of the parameter *PageNum&*. If that page/dialog not exist, the value zero is returned.

**TAB GET IMAGE hDlg, ID&, PageNum& TO ImageVar&**

The index of the image displayed on the specified TAB page is retrieved, and assigned to the variable specified by *ImageVar&*. If no image is displayed, the value zero (0) is assigned.

**TAB GET PAGE PageDlg TO PageNum Var&**

Given the handle of a TAB Page Dialog, the PageNum is retrieved, and assigned to the

variable specified by *PageNumVar&*. This may be particularly useful when you process [CallBack](#) messages for Tab Page Dialogs. If you also need [Parent](#) and [ID](#) information, you can use [WINDOW GET](#).

### **TAB GET SELECT *hDlg, id& TO SelectVar&***

The index of the currently selected page in the Tab Control is retrieved, and assigned to the variable specified by *SelectVar&*. If there is no current selection, the value zero (0) is assigned.

### **TAB GET TEXT *hDlg, ID&, PageNum& TO TextVar\$***

The text displayed on the specified page tab is retrieved, and assigned to the variable specified by *TextVar\$*.

### **TAB INSERT PAGE *hDlg, ID&, PageNum&, Image&, Text\$ [CALL CallBack] TO PageDlgVar&***

A page is added to this TAB Control. The parameter *PageNum&* specifies the position of the page to be inserted. An optional image to be displayed on the tab area is selected from the attached [IMAGELIST](#), based upon the parameter *Image&*. Set *Image&* to 0 if no image is desired. The *Text\$* parameter specifies the text to be displayed on the tab area.

*CallBack* is the name of a callback procedure to be used for the page dialog. The handle of the newly created dialog is assigned to the variable designated by *PageDlgVar&*.

### **TAB RESET *hDlg, id&***

All pages in the specified Tab Control are deleted.

### **TAB SELECT *hDlg, ID&, PageNum&***

The page specified by the *PageNum&* parameter is chosen as the selected page for the TAB control, and the associated dialog is displayed.

### **TAB SET IMAGE *hDlg, ID&, PageNum&, Image&***

The image specified by the parameter *Image&* is displayed on the page tab specified by the parameter *PageNum&*.

### **TAB SET IMAGELIST *hDlg, ID&, hLst***

The IMAGELIST specified by *hLst* is attached to this TAB control. The graphical images contained in the IMAGELIST are displayed on the tabs of this control. The image to be displayed is determined by the specification made in TAB INSERT PAGE or TAB SET IMAGE. When the TAB control is destroyed, any attached IMAGELIST is automatically destroyed.

### **TAB SET TEXT *hDlg, ID&, PageNum&, Text\$***

The text in the parameter *Text\$* is displayed on the tab of the page specified by *PageNum&*.

See also [Dynamic Dialog Tools](#), [CONTROL ADD TAB](#), [CONTROL SET FONT](#), [IMAGELIST](#)

## TAB SET IMAGELIST statement

# Keyword Template

Purpose

Syntax

Remarks  
See also  
Example

## TAB statement IMPROVED

**Purpose** A [Tab Control](#) is analogous to the dividers in a notebook. It displays one particular page, selecting it from multiple pages, when the user chooses the corresponding tab. The TAB statement is used to manipulate a TAB control.

**Syntax**

```
TAB DELETE hDlg, ID&, PageNum&
TAB GET COUNT hDlg, ID& TO CountVar&
TAB GET DIALOG hDlg, ID&, PageNum& TO PageDlgVar&
TAB GET IMAGE hDlg, ID&, PageNum& TO ImageVar&
TAB GET PAGE PageDlg TO PageNumVar&
TAB GET SELECT hDlg, ID& TO PageNumVar&
TAB GET TEXT hDlg, ID&, PageNum& TO TextVar$
TAB INSERT PAGE hDlg, ID&, PageNum&, Image&, Text$ [CALL Callback] TO
PageDlgVar&
TAB RESET hDlg, ID&
TAB SELECT hDlg, ID&, PageNum&
TAB SET IMAGE hDlg, ID&, PageNum&, Image&
TAB SET IMAGELIST hDlg, ID&, hLst
TAB SET TEXT hDlg, ID&, PageNum&, Text$
```

*Function Form:*

```
CountVar& = TAB(COUNT, hDlg, ID&)
PageDlgVar& = TAB(DIALOG, hDlg, ID&, PageNum&)
ImageVar& = TAB(IMAGE, hDlg, ID&, PageNum&)
PageNumVar& = TAB(PAGE, PageDlg&)
PageNumVar& = TAB(SELECT, hDlg, ID&)
TextVar$ = TAB$(TEXT, hDlg, ID&, PageNum&)
```

*hDlg* [Handle](#) of the [dialog](#) that owns the Tab Control.

*id&* The [control identifier](#) assigned with [CONTROL ADD TAB](#).

**Remarks** In each of the following descriptions, the Tab Control that is the subject of the statement is identified by the handle of the dialog that owns the Tab Control (*hDlg*), and the unique control ID you gave it upon creation in [CONTROL ADD TAB](#). Whenever a TAB page number or [IMAGELIST](#) image number is referenced, it is indexed to one. That is, the first item is 1, the second item is 2, etc. Variations of TAB which return a single value may be written in the optional Function Form, as shown above. These functions may be embedded in an expression of any complexity.

### **TAB DELETE *hDlg, ID&, PageNum&***

The page specified by the *PageNum&* parameter is deleted from the Tab Control.

### **TAB GET COUNT *hDlg, id& TO CountVar&***

The number of pages in the TAB Control is retrieved, and assigned to the [long](#) integer variable specified by *CountVar&*.

### **TAB GET DIALOG *hDlg, ID&, PageNum& TO PageDlgVar&***

The handle of the [child](#) dialog attached to a TAB Control page is retrieved and assigned to the variable designated by *PageDlgVar&*. The dialog handle to be returned is determined by the value of the parameter *PageNum&*. If that page/dialog not exist, the value zero is returned.

**TAB GET IMAGE *hDlg, ID&, PageNum& TO ImageVar&***

The index of the image displayed on the specified TAB page is retrieved, and assigned to the variable specified by *ImageVar&*. If no image is displayed, the value zero (0) is assigned.

**TAB GET PAGE *PageDlg TO PageNum Var&***

Given the handle of a TAB Page Dialog, the *PageNum* is retrieved, and assigned to the variable specified by *PageNumVar&*. This may be particularly useful when you process [CallBack](#) messages for Tab Page Dialogs. If you also need [Parent](#) and [ID](#) information, you can use [WINDOW GET](#).

**TAB GET SELECT *hDlg, id& TO SelectVar&***

The index of the currently selected page in the Tab Control is retrieved, and assigned to the variable specified by *SelectVar&*. If there is no current selection, the value zero (0) is assigned.

**TAB GET TEXT *hDlg, ID&, PageNum& TO TextVar\$***

The text displayed on the specified page tab is retrieved, and assigned to the variable specified by *TextVar\$*.

**TAB INSERT PAGE *hDlg, ID&, PageNum&, Image&, Text\$ [CALL CallBack] TO PageDlgVar&***

A page is added to this TAB Control. The parameter *PageNum&* specifies the position of the page to be inserted. An optional image to be displayed on the tab area is selected from the attached [IMAGELIST](#), based upon the parameter *Image&*. Set *Image&* to 0 if no image is desired. The *Text\$* parameter specifies the text to be displayed on the tab area. *CallBack* is the name of a callback procedure to be used for the page dialog. The handle of the newly created dialog is assigned to the variable designated by *PageDlgVar&*.

**TAB RESET *hDlg, id&***

All pages in the specified Tab Control are deleted.

**TAB SELECT *hDlg, ID&, PageNum&***

The page specified by the *PageNum&* parameter is chosen as the selected page for the TAB control, and the associated dialog is displayed.

**TAB SET IMAGE *hDlg, ID&, PageNum&, Image&***

The image specified by the parameter *Image&* is displayed on the page tab specified by the parameter *PageNum&*.

**TAB SET IMAGELIST *hDlg, ID&, hLst***

The IMAGELIST specified by *hLst* is attached to this TAB control. The graphical images contained in the IMAGELIST are displayed on the tabs of this control. The image to be displayed is determined by the specification made in TAB INSERT PAGE or TAB SET IMAGE. When the TAB control is destroyed, any attached IMAGELIST is automatically destroyed.

**TAB SET TEXT *hDlg, ID&, PageNum&, Text\$***

The text in the parameter *Text\$* is displayed on the tab of the page specified by *PageNum&*.

See also

[Dynamic Dialog Tools](#), [CONTROL ADD TAB](#), [CONTROL SET FONT](#), [IMAGELIST](#)

## TAB SET TEXT statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## TAB statement IMPROVED

**Purpose** A [Tab Control](#) is analogous to the dividers in a notebook. It displays one particular page, selecting it from multiple pages, when the user chooses the corresponding tab. The TAB statement is used to manipulate a TAB control.

**Syntax**

```
TAB DELETE hDlg, ID&, PageNum&
TAB GET COUNT hDlg, ID& TO CountVar&
TAB GET DIALOG hDlg, ID&, PageNum& TO PageDlgVar&
TAB GET IMAGE hDlg, ID&, PageNum& TO ImageVar&
TAB GET PAGE PageDlg TO PageNumVar&
TAB GET SELECT hDlg, ID& TO PageNumVar&
TAB GET TEXT hDlg, ID&, PageNum& TO TextVar$
TAB INSERT PAGE hDlg, ID&, PageNum&, Image&, Text$ [CALL Callback] TO
PageDlgVar&
TAB RESET hDlg, ID&
TAB SELECT hDlg, ID&, PageNum&
TAB SET IMAGE hDlg, ID&, PageNum&, Image&
TAB SET IMAGELIST hDlg, ID&, hLst
TAB SET TEXT hDlg, ID&, PageNum&, Text$
```

*Function Form:*

```
CountVar& = TAB(COUNT, hDlg, ID&)
PageDlgVar& = TAB(DIALOG, hDlg, ID&, PageNum&)
ImageVar& = TAB(IMAGE, hDlg, ID&, PageNum&)
PageNumVar& = TAB(PAGE, PageDlg&)
PageNumVar& = TAB(SELECT, hDlg, ID&)
TextVar$ = TAB$(TEXT, hDlg, ID&, PageNum&)
```

*hDlg* [Handle](#) of the [dialog](#) that owns the Tab Control.

*id&* The [control identifier](#) assigned with [CONTROL ADD TAB](#).

**Remarks** In each of the following descriptions, the Tab Control that is the subject of the statement is identified by the handle of the dialog that owns the Tab Control (hDlg), and the unique control ID you gave it upon creation in CONTROL ADD TAB. Whenever a TAB page number or IMAGELIST image number is referenced, it is indexed to one. That is, the first item is 1, the second item is 2, etc. Variations of TAB which return a single value may be written in the optional Function Form, as shown above. These functions may be embedded in an expression of any complexity.

### **TAB DELETE hDlg, ID&, PageNum&**

The page specified by the *PageNum&* parameter is deleted from the Tab Control.

### **TAB GET COUNT hDlg, id& TO CountVar&**

The number of pages in the TAB Control is retrieved, and assigned to the [long](#) integer

variable specified by *CountVar&*.

### **TAB GET DIALOG *hDlg, ID&, PageNum& TO PageDlgVar&***

The handle of the [child](#) dialog attached to a TAB Control page is retrieved and assigned to the variable designated by *PageDlgVar&*. The dialog handle to be returned is determined by the value of the parameter *PageNum&*. If that page/dialog not exist, the value zero is returned.

### **TAB GET IMAGE *hDlg, ID&, PageNum& TO ImageVar&***

The index of the image displayed on the specified TAB page is retrieved, and assigned to the variable specified by *ImageVar&*. If no image is displayed, the value zero (0) is assigned.

### **TAB GET PAGE *PageDlg TO PageNum Var&***

Given the handle of a TAB Page Dialog, the *PageNum* is retrieved, and assigned to the variable specified by *PageNumVar&*. This may be particularly useful when you process [CallBack](#) messages for Tab Page Dialogs. If you also need [Parent](#) and [ID](#) information, you can use [WINDOW GET](#).

### **TAB GET SELECT *hDlg, id& TO SelectVar&***

The index of the currently selected page in the Tab Control is retrieved, and assigned to the variable specified by *SelectVar&*. If there is no current selection, the value zero (0) is assigned.

### **TAB GET TEXT *hDlg, ID&, PageNum& TO TextVar\$***

The text displayed on the specified page tab is retrieved, and assigned to the variable specified by *TextVar\$*.

### **TAB INSERT PAGE *hDlg, ID&, PageNum&, Image&, Text\$ [CALL CallBack] TO PageDlgVar&***

A page is added to this TAB Control. The parameter *PageNum&* specifies the position of the page to be inserted. An optional image to be displayed on the tab area is selected from the attached [IMAGELIST](#), based upon the parameter *Image&*. Set *Image&* to 0 if no image is desired. The *Text\$* parameter specifies the text to be displayed on the tab area. *CallBack* is the name of a callback procedure to be used for the page dialog. The handle of the newly created dialog is assigned to the variable designated by *PageDlgVar&*.

### **TAB RESET *hDlg, id&***

All pages in the specified Tab Control are deleted.

### **TAB SELECT *hDlg, ID&, PageNum&***

The page specified by the *PageNum&* parameter is chosen as the selected page for the TAB control, and the associated dialog is displayed.

### **TAB SET IMAGE *hDlg, ID&, PageNum&, Image&***

The image specified by the parameter *Image&* is displayed on the page tab specified by the parameter *PageNum&*.

### **TAB SET IMAGELIST *hDlg, ID&, hLst***

The IMAGELIST specified by *hLst* is attached to this TAB control. The graphical images contained in the IMAGELIST are displayed on the tabs of this control. The image to be displayed is determined by the specification made in TAB INSERT PAGE or TAB SET

IMAGE. When the TAB control is destroyed, any attached IMAGELIST is automatically destroyed.

### **TAB SET TEXT *hDlg, ID&, PageNum&, Text\$***

The text in the parameter *Text\$* is displayed on the tab of the page specified by *PageNum&*.

See also [Dynamic Dialog Tools](#), [CONTROL\\_ADD TAB](#), [CONTROL\\_SET FONT](#), [IMAGELIST](#)

## TALLY function

# TALLY function

|                     |                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>      | Count the number of occurrences of specified characters or strings within a .                                                                                                                                                                                                                                                                                                                   |
| <b>Syntax</b>       | <code>x&amp; = TALLY(MainString, [ANY] MatchString)</code>                                                                                                                                                                                                                                                                                                                                      |
| <b>Remarks</b>      | <i>MainString</i> is the <a href="#">string expression</a> in which to count characters. <i>MatchString</i> is the string expression to count all occurrences of. If <i>MatchString</i> is not present in <i>MainString</i> , zero is returned. When a match is found, the scan for the next match begins at the position immediately following the prior match.                                |
| ANY                 | If the ANY keyword is included, <i>MatchString</i> specifies a list of single characters to be searched for individually: a match on any one of which will cause the count to be incremented for each occurrence of that character. Note that repeated characters in <i>MatchString</i> will not increase the tally. For example:<br><pre>x = TALLY("ABCD", ANY "BDB") ' returns 2, not 3</pre> |
| <b>Restrictions</b> | TALLY is case-sensitive, so be wary of capitalization.                                                                                                                                                                                                                                                                                                                                          |
| <b>See also</b>     | <a href="#">INSTR</a> , <a href="#">JOIN\$</a> , <a href="#">LCASE\$</a> , <a href="#">LTRIM\$</a> , <a href="#">MID\$</a> , <a href="#">PARSE</a> , <a href="#">PARSE\$</a> , <a href="#">PARSECOUNT</a> , <a href="#">REMOVE\$</a> , <a href="#">REPLACE</a> , <a href="#">RIGHT\$</a> , <a href="#">RTRIM\$</a> , <a href="#">TRIM\$</a> , <a href="#">UCASE\$</a> , <a href="#">VERIFY</a>  |
| <b>Example</b>      | ' Returns 1, counting the string "bac"<br><pre>x&amp; = TALLY("abacadabra", "bac")</pre><br><pre>'returns 8, counting all "b", "a", and "c" characters x&amp; = TALLY("abacadabra", ANY "bac")</pre>                                                                                                                                                                                            |

## TAN function

# TAN function

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Return the tangent of its argument.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Syntax</b>  | <code>y = TAN(numeric_expression)</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Remarks</b> | <i>numeric_expression</i> is an angle specified in radians. To convert radians to degrees, multiply by 57.29577951308232##. To convert degrees to radians, multiply by 0.0174532925199433##. For more information on radians, see <a href="#">ATN</a> .<br><br>TAN returns an <a href="#">Extended-precision</a> result.<br><br>TAN is approximated with the expression:<br>$\text{TAN} = \text{SIN}(\text{Value}) / \text{COS}(\text{Value})$ The Inverse Tangent (ARCTAN) of a value can be easily calculated with the ATN function.<br><br>The Hyperbolic Tangent (TANH) of a value can be calculated:<br>$\text{TanH} = (\text{EXP}(2 * \text{Value}) - 1) / (\text{EXP}(2 * \text{Value}) + 1)$ The Inverse Hyperbolic Tangent (ARCTANH) of a value can be calculated: |

```
ArcTanH = LOG((1 + Value) / (1 - Value)) / 2
```

```
' Useful Macro functions
MACRO Pi = 3.141592653589793##
MACRO DegreesToRadians(dpDegrees) = (dpDegrees * 0.0174532925199433##)
MACRO RadiansToDegrees(dpRadians) = (dpRadians * 57.29577951308232##)
```

**See also** [ATN](#), [COS](#), [SIN](#)

**Example**

```
pi# = 3.141592653589793##
FOR I& = 5 TO 45 STEP 5
 x$ = "The Tangent of " + FORMAT$(I&,"* ") + _
 " degrees = " + FORMAT$(TAN(pi## / 180 * _
 I&),"0.00")
NEXT I&
```

**Result**

```
The Tangent of 5 degrees = 0.09
The Tangent of 10 degrees = 0.18
The Tangent of 15 degrees = 0.27
The Tangent of 20 degrees = 0.36
The Tangent of 25 degrees = 0.47
The Tangent of 30 degrees = 0.58
The Tangent of 35 degrees = 0.70
The Tangent of 40 degrees = 0.84
The Tangent of 45 degrees = 1.00
```

## TCP ACCEPT statement

# TCP ACCEPT statement

**Purpose** Accept an incoming request for communication from a specified [TCP/IP](#) port.

**Syntax** `TCP ACCEPT [#] fNum& AS newfNum&`

**Remarks** Accept an incoming connection request to the *fNum&* socket, and create a *newfNum&* socket handle to communicate with the new connection.

TCP ACCEPT is only valid with sockets opened using [TCP OPEN SERVER](#).

**See also** [TCP and UDP communications](#), [TCP CLOSE](#), [TCP LINE INPUT](#), [TCP NOTIFY](#), [TCP OPEN](#), [TCP PRINT](#), [TCP RECV](#), [TCP SEND](#), [UDP OPEN](#)

## TCP CLOSE statement

# TCP CLOSE statement

**Purpose** Close a previously opened [TCP/IP](#) port.

**Syntax** `TCP CLOSE [#] fNum&`

**Remarks** Close the previously opened TCP/IP port specified by *fNum&*.

**See also** [TCP and UDP communications](#), [TCP ACCEPT](#), [TCP LINE INPUT](#), [TCP NOTIFY](#), [TCP OPEN](#), [TCP PRINT](#), [TCP RECV](#), [TCP SEND](#), [UDP CLOSE](#)

## TCP LINE INPUT statement

# TCP LINE INPUT statement

**Purpose** Receive a line of text from a specified [TCP/IP](#) port.

**Syntax** TCP LINE [INPUT] [#] *fNum&*, *Buffer\$*

**Remarks** Receive a line of text from the *fNum&* TCP/IP port, and place the data in *Buffer\$*. If no bytes are available, *Buffer\$* will be empty (a null string). If TCP LINE did not receive a complete line of text (terminated by a [\\$CRLF](#) character pair), [EOF\(\*fNum&\*\)](#) will return TRUE (non-zero).

If a time-out occurs, [ERR](#) will be set to indicate a run-time [Error\\_24](#) ("Device timeout"). See [TCP\\_OPEN](#) to specify the TCP socket timeout value.

The EOF function may also be used with TCP LINE (and [COMM\\_LINE](#)) to detect that an incomplete line was received. Normally, the TCP LINE statement reads data until a [\\$CRLF](#) character pair is found, and in that case, EOF will return false (zero). However, even if no [\\$CRLF](#) has been found, TCP LINE will return if no additional data is available. In that case, TCP LINE will return whatever data has been accumulated, and set EOF to logical TRUE (non-zero).

In many cases, it would be prudent to test EOF after every TCP LINE statement to verify that a full line has been received. In some cases, you may wish to execute the statement one or more additional times, combining the data, in order to obtain a full line of text.

**See also** [TCP and UDP communications](#), [EOF](#), [TCP\\_ACCEPT](#), [TCP\\_CLOSE](#), [TCP\\_NOTIFY](#), [TCP\\_OPEN](#), [TCP\\_PRINT](#), [TCP\\_RECV](#), [TCP\\_SEND](#), [UDP\\_RECV](#)

## TCP NOTIFY statement

# TCP NOTIFY statement

**Purpose** Designate which [TCP/IP](#) events will generate a notification message.

**Syntax** TCP NOTIFY [#] *fNum&*, {SEND | RECV | ACCEPT | CONNECT | CLOSE} TO *hWnd&* AS *wMsg&*

**Remarks** Designates which events (SEND, RECV, ACCEPT, CONNECT and CLOSE) will generate a *wMsg&* notification message to the window procedure (callback) of the GUI window or dialog whose window handle is contained in *hWnd&*.

Your program defines the *wMsg&* value, and this value should be equal or larger than %WM\_USER + 500 to avoid conflict with other (common) callback message values.

When the nominated callback function receives the *wMsg&* notification, the *wParam&* parameter identifies the operating system's handle of the socket (see [FILEATTR](#)), the low-order Word of *lParam&* specifies the code of the event (see table below), and the high-order Word of *lParam&* contains the error code (if any).

### LO(WORD, *lParam&*) Definition

|             |                                                |
|-------------|------------------------------------------------|
| %FD_READ    | Data is available to be read from the socket.  |
| %FD_WRITE   | The socket is ready for data to be written.    |
| %FD_ACCEPT  | The socket is able to accept a new connection. |
| %FD_CONNECT | The connection has been established.           |
| %FD_CLOSE   | The socket has been closed.                    |

Notification messages do not arrive in unabated or continuous streams. That is, once a particular notification message arrives, it will not be sent again until the initial message is acted upon. For example, if a %FD\_READ notification is received, it will not be resent until after a [TCP\\_RECV](#) statement is executed.

The [Winsock](#) error codes are listed in WINSOCK2.INC, prefixed with %WSAE.

**See also** [TCP and UDP communications](#), [TCP\\_ACCEPT](#), [TCP\\_CLOSE](#), [TCP\\_LINE\\_INPUT](#), [TCP\\_OPEN](#), [TCP\\_PRINT](#), [TCP\\_RECV](#), [TCP\\_SEND](#), [UDP\\_NOTIFY](#)

## TCP OPEN statement

# TCP OPEN statement

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>             | Enable an application to communicate with a <a href="#">TCP/IP</a> server or client using the TCP protocol over <a href="#">Winsock</a> .                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Syntax</b>              | <p><i>As a client:</i></p> <pre>TCP OPEN {PORT <i>p&amp;</i>   <i>svrc\$</i>} AT <i>address\$</i> AS [#] <i>fNum&amp;</i> [TIMEOUT <i>timeoutval&amp;</i>]</pre> <p><i>As a server:</i></p> <pre>TCP OPEN SERVER [ADDR <i>ip&amp;</i>] {PORT <i>p&amp;</i>   <i>svrc\$</i>} AS [#] <i>fNum&amp;</i> [TIMEOUT <i>timeoutval&amp;</i>]</pre>                                                                                                                                                                               |
| <b>Remarks</b>             | Open a TCP/IP port or service for communication, either as a client or as a server.                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>SERVER</b>              | If the keyword server is included, the TCP port is opened as a TCP/IP server; otherwise, it is opened as a TCP/IP client.                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>ADDR <i>ip&amp;</i></b> | As a server, if you specify the optional ADDR <i>ip&amp;</i> , the TCP server monitors connections at the specified <i>ip&amp;</i> address. Otherwise, the primary <a href="#">IP</a> address for the computer is used by default.                                                                                                                                                                                                                                                                                       |
| <b>PORT <i>p&amp;</i></b>  | As a client, PORT identifies the server port that the client attempts to connect to. As a server, PORT identifies the port the server will monitor for connection requests. You may specify either a port number or a service name, but not both.                                                                                                                                                                                                                                                                        |
| <b><i>svrc\$</i></b>       | If the port number is not specified, a service name must be specified instead. A service name takes the form of "http", "smtp", or "ftp", etc. You may specify either a port number or a service name, but not both.                                                                                                                                                                                                                                                                                                     |
| <b>AT <i>address\$</i></b> | As a client, <i>address\$</i> identifies the address to connect with. <i>address\$</i> can be a domain such as "powerbasic.com", or a dotted IP address in string form, such as "127.0.0.1".                                                                                                                                                                                                                                                                                                                             |
| <b><i>fNum&amp;</i></b>    | A file number such as #1, or a variable with a value obtained using the <a href="#">FREEFILE</a> function.                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>TIMEOUT</b>             | The optional TIMEOUT value allows you to specify how long a <a href="#">TCP SEND</a> , <a href="#">RCV</a> , <a href="#">PRINT</a> , or <a href="#">LINE</a> operation should wait for completion, in milliseconds ( <i>mSec</i> ). If the specified number of milliseconds elapses without a response, the TCP operation will fail, and the <a href="#">ERR</a> system variable will be set to indicate a run-time <a href="#">Error 24</a> ("Device timeout"). The default timeout is 60000 milliseconds (60 seconds). |
| <b>See also</b>            | <a href="#">TCP and UDP communications</a> , <a href="#">FREEFILE</a> , <a href="#">TCP ACCEPT</a> , <a href="#">TCP CLOSE</a> , <a href="#">TCP LINE INPUT</a> , <a href="#">TCP NOTIFY</a> , <a href="#">TCP PRINT</a> , <a href="#">TCP RCV</a> , <a href="#">TCP SEND</a> , <a href="#">UDP OPEN</a>                                                                                                                                                                                                                 |

**Example**

```
' Client TCP/IP example - retrieve a web page
#COMPILE EXE

FUNCTION PBMAIN() AS LONG
 LOCAL Buffer$, Site$, File$, Entire_page$
 LOCAL Length&

 Site$ = "www.powerbasic.com"
 File$ =
"http://www.powerbasic.com/support/forums/Forum2/HTML/000031.html"

 ' Connecting...
 TCP OPEN "http" AT Site$ AS #1 TIMEOUT 60000

 ' Could we connect to site?
 IF ERR THEN
 BEEP
 EXIT FUNCTION
 END IF
```

```

' Send the GET request...
TCP PRINT #1, "GET " & File$ & " HTTP/1.0"
TCP PRINT #1, "Referer: http://www.powerbasic.com/"
TCP PRINT #1, "User-Agent: TCP OPEN Example (www.powerbasic.com)"
TCP PRINT #1, ""

' Retrieve the page...
DO
 TCP RECV #1, 4096, Buffer$
 Entire_page = Entire_page + Buffer$
LOOP WHILE ISTRUE LEN(Buffer$) AND ISFALSE ERR

' Close the TCP/IP port...
TCP CLOSE #1
END FUNCTION

```

## TCP PRINT statement

# TCP PRINT statement

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Write a string to a nominated <a href="#">TCP/IP</a> port.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Syntax</b>   | TCP PRINT [#] <i>fNum&amp;</i> , <i>string_expression</i> [:]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Remarks</b>  | Write the data in <i>string_expression</i> to the <i>fNum&amp;</i> TCP/IP port. If the optional semi-colon is not specified, a carriage-return and linefeed pair ( <a href="#">\$CRLF</a> or <a href="#">CHR\$(13,10)</a> ) is also sent.<br><br>The TCP PRINT statement does not return until <i>string_expression</i> has been sent, or an error occurs. That is, TCP PRINT is a synchronous or "blocking" statement. If a time-out occurs, <a href="#">ERR</a> will be set to indicate a run-time <a href="#">Error 24</a> ("Device timeout"). See <a href="#">TCP OPEN</a> to specify the TCP socket timeout value. |
| <b>See also</b> | <a href="#">TCP and UDP communications</a> , <a href="#">TCP ACCEPT</a> , <a href="#">TCP CLOSE</a> , <a href="#">TCP LINE INPUT</a> , <a href="#">TCP NOTIFY</a> , <a href="#">TCP OPEN</a> , <a href="#">TCP RECV</a> , <a href="#">TCP SEND</a> , <a href="#">UDP OPEN</a>                                                                                                                                                                                                                                                                                                                                           |

## TCP RECV statement

# TCP RECV statement

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Receive data from a specified <a href="#">TCP/IP</a> port.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Syntax</b>   | TCP RECV [#] <i>fNum&amp;</i> , <i>count&amp;</i> , <i>Buffer\$</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Remarks</b>  | Receive <i>count&amp;</i> bytes from the <i>fNum&amp;</i> TCP/IP port and place them in <i>Buffer\$</i> . If <i>count&amp;</i> bytes are not available, <i>Buffer\$</i> will receive whatever bytes are available and <a href="#">EOF(fNum&amp;)</a> will return <a href="#">TRUE</a> (non-zero).<br><br>Typically used in a<br><br>to retrieve a stream of data, a TCP RECV loop should be terminated if <i>Buffer\$</i> returns an empty , or if <a href="#">EOF(fNum&amp;)</a> returns TRUE, or if <a href="#">ERR</a> becomes set. If a time-out occurs, <a href="#">ERR</a> will be set to indicate a run-time <a href="#">Error 24</a> ("Device timeout"). See <a href="#">TCP OPEN</a> to specify the TCP socket timeout value. |
| <b>See also</b> | <a href="#">TCP and UDP communications</a> , <a href="#">EOF</a> , <a href="#">TCP ACCEPT</a> , <a href="#">TCP CLOSE</a> , <a href="#">TCP LINE INPUT</a> , <a href="#">TCP NOTIFY</a> , <a href="#">TCP OPEN</a> , <a href="#">TCP PRINT</a> , <a href="#">TCP SEND</a> , <a href="#">UDP RECV</a>                                                                                                                                                                                                                                                                                                                                                                                                                                   |

## TCP SEND statement

## TCP SEND statement

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Write a string to a nominated <a href="#">TCP/IP</a> port.                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Syntax</b>   | <code>TCP SEND [#] <i>fNum</i>&amp;, <i>string_expression</i></code>                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Remarks</b>  | Write the specified <i>string_expression</i> to the TCP/IP port specified by <i>fNum</i> &.<br><br>The TCP SEND statement does not return until <i>string_expression</i> has been sent, or an error occurs. That is, TCP SEND is a synchronous or "blocking" statement. If a time-out occurs, <a href="#">ERR</a> will be set to indicate a run-time <a href="#">Error 24</a> ("Device timeout"). See <a href="#">TCP_OPEN</a> to specify the TCP socket timeout value. |
| <b>See also</b> | <a href="#">TCP and UDP communications</a> , <a href="#">TCP_ACCEPT</a> , <a href="#">TCP_CLOSE</a> , <a href="#">TCP_LINE_INPUT</a> , <a href="#">TCP_NOTIFY</a> , <a href="#">TCP_OPEN</a> , <a href="#">TCP_PRINT</a> , <a href="#">TCP_RECV</a> , <a href="#">UDP_SEND</a>                                                                                                                                                                                          |

## THREAD CLOSE statement

## THREAD CLOSE statement

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>      | Release the handle of a running thread.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Syntax</b>       | <code>THREAD CLOSE <i>hThread</i> TO <i>IResult</i>&amp;</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Remarks</b>      | <p>THREAD CLOSE releases the <i>thread handle</i> of the thread identified by the <a href="#">DWORD</a> value <i>hThread</i> (see <a href="#">THREAD_CREATE</a>).</p> <p>If successful, <i>IResult</i>&amp; is TRUE (non-zero); otherwise, it is FALSE (zero). If a thread is not closed once it has completed, it will continue to take up memory and CPU resources. Note that THREAD CLOSE does not stop a thread if it is still running; it simply releases the thread's handle (i.e., the resources used to track the thread), and the thread itself will continue to run.</p> <p>Once a thread handle is released, the value stored in <i>hThread</i> becomes undefined. On this basis, thread handles should not be released until there is no further need to test the thread status or change the suspend count for a thread. If a thread does not need to be monitored, its handle can be released immediately after the THREAD CREATE statement, and the thread's resources will be freed automatically when the thread terminates naturally. Best practice suggests that after releasing a thread handle, the thread handle <a href="#">variable</a> should be set to 0, to set it apart from other valid thread handle variables.</p> <p>Once a thread has exited, it is not possible to restart the same thread (as identified by <i>hThread</i>). However, a fresh thread can be executed, using the same target thread Function, and resulting in a new thread handle which will identify the new thread.</p> |
| <b>Restrictions</b> | <p>THREAD CLOSE will always execute successfully provided <i>hThread</i> contains a valid thread handle value. THREAD CLOSE generates no <a href="#">run-time errors</a>; all exceptions are reported in the return value <i>IResult</i>&amp;.</p> <p>The <i>WaitForSingleObject</i> API function can be used wait until a nominated thread has finished executing. Similarly, the <i>WaitForMultipleObjects</i> API can be used to wait for one, two, or all secondary threads (to a maximum of 64 or %MAXIMUM_WAIT_OBJECTS) to complete before continuing on. Such functions can be very useful when a program creates a set of "worker" threads to process data, and the primary thread can then sit idle until all the worker threads have completed all their work. At that point, the primary thread may gather the results of the worker threads, etc.</p> <p>It is also useful to understand that these kind of <i>wait</i> functions are very efficient and use almost no CPU time or resources while they are waiting; however, care must be exercised to avoid a deadlock or circular suspension. For example, a deadlock condition could occur if thread A is halted while it waits for thread B, which in turn has a suspend count that might only be adjustable by Thread A. Similarly, an infinite loop in one thread may also halt any other thread that is waiting for it to terminate.</p>                                                                                                                 |

[THREADCOUNT](#) continues to report a thread tally that will include threads whose handle has already been released. A thread ID value may not be used interchangeably with a thread handle value.

**See also** [FUNCTION/END FUNCTION](#), [THREAD Code Group](#), [THREAD CREATE](#), [THREAD Object](#), [THREAD RESUME](#), [THREAD STATUS](#), [THREAD SUSPEND](#), [THREADCOUNT](#), [THREADED](#), [THREADID](#)

## THREAD Code Group

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## THREAD Code Group

**Purpose** The

Code Group offers a collection of statements which allow you to create and manipulate additional threads of execution in your programs.

**Syntax** `THREAD DirectorWord [params]`

`THREAD DirectorWord [params] TO ReturnVariable(s)`

**Remarks** A Windows thread is a smaller "program-within-a-program", that runs concurrently with the main thread and other threads in the same application program. Threads provide powerful ways for an application to perform several tasks at the same time.

With the advent of multi-core CPU's and multi-CPU computers, it's clearly desirable to encapsulate all of the information about a particular thread in a single component. For that reason, PowerBASIC has introduced the concept of a [THREAD OBJECT](#). While the THREAD Code Group will be supported for some time, we recommend that all new code use THREAD OBJECTS exclusively. They provide much greater control, and much better thread parameter handling for the programmer.

**Restrictions** Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed referencing the same thread.

**See also** [FUNCTION/END FUNCTION](#), [THREAD CLOSE](#), [THREAD CREATE](#), [THREAD GET PRIORITY](#), [THREAD Object](#), [THREAD RESUME](#), [THREAD STATUS](#), [THREAD SUSPEND](#), [THREADCOUNT](#), [THREADED](#), [THREADID](#), [THREADSAFE option descriptor](#)

## THREAD CREATE statement

# THREAD CREATE statement

**Purpose** Create a Windows thread, which is a smaller "program-within-a-program", that runs concurrently with the main thread and other threads in the same application program. Threads provide powerful ways for an application to perform several tasks at the same time.

**Syntax** `THREAD CREATE FuncName(param) [StackSize,] [SUSPEND] TO hThread`

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Remarks</b>      | <p>THREAD CREATE creates and begins execution of a new thread <a href="#">Function</a> identified by <i>FuncName</i>. <i>FuncName</i> is specified without quotation marks. This function must take exactly one <a href="#">Long-integer</a> or <a href="#">Double-word</a> (DWORD) parameter by value (<a href="#">BYVAL</a>). For example:</p> <pre> THREAD FUNCTION MyThreadFunction(BYVAL x AS LONG) AS LONG   ' Thread code goes here END FUNCTION   ' more code here THREAD CREATE MyThreadFunction(var&amp;) TO hThread???</pre> <p>The 32-bit parameter passed to the thread may be used to pass a value such as a programmer-defined ID or window handle to <i>post</i> "progress" messages back to a GUI window/dialog running in another thread. A more common use for the parameter is to pass the address to a <a href="#">UDT</a> or other data structure. Passing an address this way can enable the thread to use a <a href="#">pointer</a> to access large volumes of data that reside outside of the thread. For example:</p> <pre> THREAD FUNCTION MyThread(BYVAL y AS DWORD) AS DWORD   DIM x AS MyUDT POINTER   x = y ' Set the pointer from the DWORD param   ' From here we can access all of the UDT member elements   ' using the standard @x pointer syntax END FUNCTION   ' more code here DIM x AS MyUDT, hThread???</pre> <p><i>Initialize the members of x here</i></p> <pre> THREAD CREATE MyThread( VARPTR(x) ) TO hThread???</pre> <p><i>more code here</i></p> <p>Note that data passed this way is subject to the notes (below) concerning <a href="#">GLOBAL</a> and <a href="#">STATIC variables</a>, in order to avoid synchronization problems during context-switching.</p> <p>The return value of the thread Function is retrieved with the <a href="#">THREAD STATUS</a> statement (once the thread has completed execution).</p> |
| <b>Stack Size</b>   | A long integer expression to specify the requested size of the stack for this newly created thread. This value should always be specified in increments of 64K (65536). If this parameter is omitted, the size of the stack for the main thread will be used.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>SUSPEND</b>      | Execution of the thread begins immediately unless the SUSPEND option is included. In that case, the <i>suspend count</i> for the thread will be initially set to 1, and the thread will be initially suspended. The <a href="#">THREAD RESUME</a> statement is used to decrease the suspend count of a thread by 1, and when the suspend count reaches 0, the thread will start (resume) execution. Controlling the suspend state of a thread requires the thread handle value be retained until such time as the thread can be closed or left to run unmonitored.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>hThread</b>      | If successful, THREAD CREATE returns a Double-word (or Long-integer) handle in <i>hThread</i> , or zero (0) if the thread was not started. This handle is used with the other to control the suspend count, and to release the thread handle, etc. Also see <a href="#">THREAD CLOSE</a> for more information on monitoring, closing, and waiting for threads to complete.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>FuncName</b>     | The name of the thread function to execute as a thread. A thread Function must comply exactly with the following syntax:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                     | <pre> THREAD FUNCTION <i>ThreadFuncName</i> (BYVAL <i>param</i> AS {LONG   DWORD}) AS {LONG   DWORD}</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Restrictions</b> | <p>The THREAD CREATE statement generates no <a href="#">run-time errors</a>; all exceptions are reported as a zero stored in the return value <i>hThread</i>. However, the target thread Function must be located in the same compiled module as the THREAD CREATE statement. That is, a thread Function may not be an imported Function.</p> <p>Additionally, a thread Function may not be directly called or executed, <i>except</i> by a THREAD CREATE statement. This restriction is imposed to ensure that PowerBASIC run-time library can maintain a thread-safe state at all times, correctly allocate and</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

deallocate internal thread-local storage, and the various (such as `THREADCOUNT`) can return accurate values.

One situation that can arise is where a Function may need to be invoked both directly and used as a thread Function. The easiest solution is to create a small *wrapper* Function for the Function, then use `THREAD CREATE` with the wrapper Function when a thread is required, or continue to call the original Function directly when a separate thread is not required. For example:

```
FUNCTION WorkerFunc(BYVAL x AS LONG) AS LONG
 ' code here
END FUNCTION

THREAD FUNCTION WorkerThread(BYVAL x AS LONG) AS LONG
 FUNCTION = WorkerFunc(x)
END FUNCTION

' more code here

' Execute the worker function directly, thus:
lResult& = WorkerFunc(var&)

' Execute the worker thread as a thread, using
' the wrapper function:
THREAD CREATE WorkerThread(var&) TO hThread???
```

A thread can determine its own ID with the [THREADID](#) function. Note: a thread ID is not interchangeable with a thread handle.

Threads are initialized and started asynchronously, so it is wise to give the operating system a small amount of time to perform thread initialization before using the [THREADCOUNT](#) function to monitor the thread.

Once a thread has exited, it is not possible to restart the same thread as identified by *hThread* - however, a new thread can be initiated using the same Function (which naturally provides a new *hThread* handle value). In addition, the same thread Function can be launched multiple times to create a set of identical threads executing the same code.

As each thread is created, it is assigned its own "private" stack frame. Therefore, [LOCAL](#) and [REGISTER](#) variables are private to each thread, and are automatically "thread-safe".

Exercise care when using `GLOBAL` and `STATIC` variables that may be accessed by more than one thread at the same time. If one thread is part way through storing data at the point where another thread begins to read the same memory block, it can result in the second thread reading only partially updated (i.e., invalid) data. The point where one thread is suspended so that another can run is called a "context-switch". In these situations, the use of Windows' synchronization functions (such as *Critical Sections* and *Mutexes*) may be employed to create thread-safe code.

Thread-safe code is deemed to be unaffected by context-switching, regardless of when context-switching occurs. Local variables, being stored in a "private" stack frame, are not affected by context-switching.

Local variable storage created by each thread is automatically freed when the thread Function terminates, in the same manner as a normal [Sub](#), Function, [Method](#), or [Property](#). However, the thread handle must be explicitly freed with a `THREAD CLOSE` statement. The `THREAD CLOSE` can occur at any time, since it only frees the thread handle and has no other impact on the running thread. If the thread result value is not required (or the thread state does not need to be altered), `THREAD CLOSE` can be used immediately after the `THREAD CREATE` statement, leaving the thread to run its course.

For more information on threading and synchronization techniques, please refer to MSDN <http://msdn.microsoft.com>.

**The PowerBASIC run-time library is thread-safe and reentrant.**

**See also**

[FUNCTION/END FUNCTION](#), [THREAD CLOSE](#), [THREAD Code Group](#), [THREAD GET PRIORITY](#), [THREAD Object](#), [THREAD RESUME](#), [THREAD STATUS](#), [THREAD SUSPEND](#), [THREADCOUNT](#), [THREADED](#), [THREADID](#)

**Example**

```

SUB SpawnThreads()
 LOCAL x AS LONG
 LOCAL s AS LONG
 DIM hThread(10) AS LOCAL DWORD

 FOR x = 1 TO 10
 THREAD CREATE MyThread(x) TO hThread(x)
 SLEEP 50
 NEXT

 DisplayText "10 Threads Started! " + _
 "Wait for them to finish!"

 DO
 FOR x = 1 TO 10
 SLEEP 0
 THREAD STATUS hThread(x) TO s
 IF s <> &H103 AND s <> 0 THEN ITERATE DO
 NEXT
 LOOP WHILE s

 FOR x = 1 TO 10
 THREAD CLOSE hThread(x) TO s
 NEXT x

 DisplayText "Finished!"
END SUB

' The following is executed as a thread Function!
THREAD FUNCTION MyThread (BYVAL x AS LONG) AS LONG
 LOCAL n AS LONG
 LOCAL t AS SINGLE

 DisplayText "Begin Thread" + STR$(x)
 t = TIMER

 FOR n = 1 TO 10
 SLEEP 100 + 100 * x
 NEXT n

 t = TIMER - t
 DisplayText "End Thread" + STR$(x) + _
 " Elapsed time = " + STR$(t,5)

END FUNCTION

```

## THREAD GET PRIORITY statement

# Keyword Template

**Purpose**

**Syntax**

Remarks  
See also  
Example

## THREAD GET PRIORITY statement

**Purpose** Retrieve the Priority Value for a

**Syntax** `THREAD GET PRIORITY hThread TO lResult&`

**Remarks** THREAD GET PRIORITY retrieves the priority value for the thread specified by the thread [handle](#) (*hThread*). The thread handle is returned by the [THREAD CREATE](#) statement at the time the thread is created. If *hThread* is zero (0), the thread which is currently executing is presumed. The retrieved priority value is assigned to the [long](#) or [dword](#) variable designated by *lResult&*. A thread ID cannot be used in place of a thread handle.

The thread priority value is one of the following:

```
%THREAD_PRIORITY_IDLE = -15
%THREAD_PRIORITY_LOWEST = -2
%THREAD_PRIORITY_BELOW_NORMAL = -1
%THREAD_PRIORITY_NORMAL = 0
%THREAD_PRIORITY_ABOVE_NORMAL = +1
%THREAD_PRIORITY_HIGHEST = +2
%THREAD_PRIORITY_TIME_CRITICAL = +15
```

**See also** [PROCESS GET PRIORITY](#), [PROCESS SET PRIORITY](#), [THREAD Code Group](#), [THREAD CREATE](#), [THREAD Object](#), [THREAD SET PRIORITY](#)

### THREAD Object

## Keyword Template

Purpose  
Syntax  
Remarks  
See also  
Example

## THREAD Object **New!**

**Purpose** A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level.

THREAD [objects](#) offer a collection of [methods](#) which allow you to easily create and maintain additional threads of execution in your programs.

A thread can be completely encapsulated (contained) within a thread object.

Encapsulation makes an object the perfect vehicle to host a thread. With thread objects, you'll have easy access to multiple thread parameters, private methods, and thread local storage of data. In short, a complete program-within-a-program which can be executed with ease.

We liken this to the concept that "Threads are Alive". When a thread object is created and launched, it takes on a life of its own. It lives (and executes) until its lifetime is over and the thread ends. The life of the thread parallels the life of the object which makes it quite easy to manage.

PowerBASIC provides a pre-defined [interface](#) named "IPowerThread", which is a DUAL interface ([Dispatch](#) and [direct](#) access). When you create a thread object, you first [inherit](#) IPowerThread, giving you immediate access to all of its member methods. Next, you add a THREAD METHOD, a special form of private [CLASS METHOD](#), which is automatically executed when the thread is launched.

It's important to remember that the THREAD METHOD you create contains the code which will be executed in the thread. When you start the thread (by calling the [LAUNCH](#) method), it executes your THREAD METHOD. When you reach the end of the THREAD METHOD, the thread ends, and its lifetime is over. The THREAD METHOD acts just like the [MAIN](#) (or [PBMAIN](#)) function in your executable.

You may give the THREAD METHOD any name you wish. However, it is recommended you name it MAIN or PBMAIN. This bit of self-documentation will be a simple reminder of the functionality when you review the code a year from now! Generally speaking, most thread objects consist primarily of CLASS METHODS which are called from the THREAD METHOD. If there are any Member Methods (visible from outside the class), they are not usually called from within the thread. Instead, they are typically called from other threads to monitor the status and progress.

There must be exactly one THREAD METHOD per Class. No more. No less. The THREAD METHOD is executed automatically; it may never be called from within your program.

[Instance](#) variables are declared just as in any other class. Unique parameters are passed to each object when it is launched. Finally, public methods and properties may be added to monitor and manipulate the life of your thread.

Here's a synopsis of THREAD OBJECT usage:

1. Create a class with an interface which inherits IPowerThread.
2. Create a THREAD METHOD, best named MAIN or PBMAIN.
3. Create an INSTANCE variable named THREADPARAM which will hold the parameter(s) you choose to pass to the thread when it begins execution. This is usually another [object variable](#).
4. Create CLASS METHODS as needed, which will be called from the THREAD METHOD for support of that code.
5. From the main thread, create an object variable of the thread class and interface.
6. Call the LAUNCH method, passing the appropriate parameter to be used as THREADPARAM. Your thread is now running and alive.

#### Syntax

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

#### Remarks

With the advent of multi-core CPU's and multi-CPU computers, it's clearly desirable to encapsulate all of the information about a particular thread in a single component. We recommend that all new code use THREAD OBJECTS exclusively, rather than the [Thread Code Group](#). Thread objects provide much greater control, and much better thread parameter handling for the programmer.

### IPowerThread Methods

The [Dispatch ID](#) (DispID) for each member method is displayed within angle brackets.

**METHOD CLOSE ( ) <2>**

Releases the thread handle of this thread. Note that it does not stop a thread if it is still running; it simply releases the thread handle (i.e., the resources used to track the thread).

Thread handles should not be released until there is no further need to use other thread methods or properties. If a thread does not need to be monitored, its handle can be released immediately. The thread resources will be freed automatically when the thread terminates naturally.

THREADCOUNT continues to report a thread tally that will include threads whose handle has already been released. A thread ID value may not be used interchangeably with a thread handle value.

**METHOD EQUALS(*ObjectVar AS InterfaceName*) AS Long <3>**

Compares the parameter *ObjectVar* to determine if it references the same object as this object. If they both reference the same object, [true](#) (-1) is returned; if not, [false](#) (0) is returned.

**METHOD HANDLE() AS Long <4>**

Retrieves the handle of the thread for use with Windows API functions.

**METHOD ID() AS Long <5>**

Retrieves the ID of the thread for use with Windows API functions.

**METHOD ISALIVE() AS Long <6>**

Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value true (-1) is returned; if not, the value false (0) is returned.

**METHOD JOIN(*ThreadObjectVar AS InterfaceName, TimeoutVal AS Long*) <7>**

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeoutVal* specifies the maximum length of time to wait, in MilliSeconds. If *TimeoutVal* is zero (0), the time to wait is infinite.

**METHOD LAUNCH(*ByRef Param as UDT*) <8>**

LAUNCH begins execution of the thread, passing parameter data to it. Since the thread is hosted by an object, it is only fitting that the parameter data be contained in the most robust form, another object.

THREADPARAM is a mandatory Instance variable which you must define in each thread class. It is normally declared as the interface name of your choice:

```
INSTANCE ThreadParam as MyInterface
```

When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is normally the best choice, as it allows virtually any number of data items to be contained.

In simpler cases, you may choose to declare THREADPARAM as a , [Long Integer](#), or [Dword](#). In that case, you must pass the launch parameter using a option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
```

```
...
```

```
MyThread.Launch(ByVal MyNumber&)
```

Of course, the Pointer parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a user-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER
```

```
THREAD METHOD MyMethod() AS LONG
```

```
xyz# = ThreadParam.member1
```

```
... other code
```

```
END METHOD
```

```
...
```

```
MyThread.Launch(ByVal VARPTR(MyType))
```

**PROPERTY GET PRIORITY() AS Long <9>**

Retrieves the priority value for this thread. The thread priority value is one of the following:

```
%THREAD_PRIORITY_IDLE = -15
%THREAD_PRIORITY_LOWEST = -2
%THREAD_PRIORITY_BELOW_NORMAL = -1
%THREAD_PRIORITY_NORMAL = 0
%THREAD_PRIORITY_ABOVE_NORMAL = +1
%THREAD_PRIORITY_HIGHEST = +2
%THREAD_PRIORITY_TIME_CRITICAL = +15
```

#### **PROPERTY SET PRIORITY (LEVEL AS Long) <9>**

Sets the Priority Value for this thread. The thread priority value must be one of the following:

```
%THREAD_PRIORITY_IDLE = -15
%THREAD_PRIORITY_LOWEST = -2
%THREAD_PRIORITY_BELOW_NORMAL = -1
%THREAD_PRIORITY_NORMAL = 0
%THREAD_PRIORITY_ABOVE_NORMAL = +1
%THREAD_PRIORITY_HIGHEST = +2
%THREAD_PRIORITY_TIME_CRITICAL = +15
```

#### **METHOD RESULT() AS Long <10>**

If the thread has ended, the result value returned by the THREAD METHOD is retrieved and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the [OBJRESULT](#) is set to %S\_OK (0). If the thread has not ended, the value zero (0) is returned, and the OBJRESULT is set to %S\_FALSE (1).

#### **METHOD RESUME() AS Long <11>**

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running at that time.

#### **PROPERTY GET STACKSIZE() AS Long <13>**

Retrieves the size of the [stack](#) for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

#### **PROPERTY SET STACKSIZE(Long) <13>**

Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

#### **METHOD SUSPEND() AS Long <14>**

Suspends execution of the thread. The suspend count of the thread is incremented. If the suspend was successful, the suspend count is returned; otherwise, -1 is returned.

If SUSPEND is executed prior to LAUNCH of the thread, the suspend count is incremented, and the subsequent LAUNCH is treated as a suspended launch. That is, all the necessary setup tasks are performed, but the thread is suspended just before execution of your THREAD METHOD begins. You can continue execution with RESUME.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running while suspended.

#### **METHOD TIMECREATE() AS Quad <16>**

Retrieves the date and time-of-day of the thread creation, and returns it as a [Quad](#) Integer value. The internal format of the value is that of a FILETIME structure, so you can use the

[PowerTime](#) object to convert it to a human readable format of Month/Day/Year/Time.

**METHOD TIMEEXIT() AS Quad <17>**

Retrieves the date and time-of-day of the thread exit, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time. If the thread has not yet exited, the return value is undefined.

**METHOD TIMEKERNEL() AS Quad <18>**

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

**METHOD TIMEUSER() AS Quad <19>**

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the [PowerTime object](#) to convert it to a human readable format.

**Restrictions**

Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed when you reference one particular thread.

**See also**

[PowerTime](#), [THREAD Code Group](#)

**Example**

```

CLASS MyClass
 INSTANCE ThreadParam as DataFace

 THREAD METHOD MAIN() AS LONG
 x& = ThreadParam.GetANumber()
 MsgBox DEC$(x&)
 END METHOD

 INTERFACE MyFace
 INHERIT IPOWERTHREAD

 METHOD abc
 END METHOD
 END INTERFACE
END CLASS

CLASS DataClass
 INTERFACE DataFace
 INHERIT DUAL

 METHOD GetANumber() AS LONG
 METHOD = 77
 END METHOD
 END INTERFACE
END CLASS

FUNCTION PBMain()
 LOCAL xx AS MyFace
 LET xx = CLASS "MyClass"

 LOCAL oo AS DataFace
 LET oo = CLASS "DataClass"

 xx.launch(oo)
 xx.join(xx, 0)
END FUNCTION

```

## THREAD RESUME statement

# THREAD RESUME statement

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>      | Resume execution of a Windows thread.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Syntax</b>       | <code>THREAD RESUME <i>hThread</i> TO <i>lResult</i>&amp;</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Remarks</b>      | <p>THREAD RESUME decreases the <i>suspend count</i> of the thread identified by the 32-bit <a href="#">DWORD</a> value stored in <i>hThread</i> (see <a href="#">THREAD CREATE</a>). If it succeeds, the <i>lResult</i>&amp; value is the thread's previous suspend count; otherwise, it is -1.</p> <p>Execution of a suspended thread resumes when the suspend count of a thread is decremented to zero. If the SUSPEND option is included in the associated THREAD CREATE statement, the thread will have an initial suspend count of 1. In that case, execution of the thread will only begin when a THREAD RESUME statement is executed, using the thread handle stored in <i>hThread</i> to identify the thread.</p> |
| <b>Restrictions</b> | The THREAD RESUME statement generates no <a href="#">run-time errors</a> ; all exceptions are reported in the return value <i>lResult</i> &. A thread ID cannot be used interchangeably with a thread handle. A thread can suspend itself by incrementing its own suspend count, but logically, cannot decrement its own suspend count.                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>See also</b>     | <a href="#">FUNCTION/END FUNCTION</a> , <a href="#">THREAD CLOSE</a> , <a href="#">THREAD Code Group</a> , <a href="#">THREAD CREATE</a> , <a href="#">THREAD Object</a> , <a href="#">THREAD STATUS</a> , <a href="#">THREAD SUSPEND</a> , <a href="#">THREADCOUNT</a> , <a href="#">THREADED</a> , <a href="#">THREADID</a>                                                                                                                                                                                                                                                                                                                                                                                             |

## THREAD SET PRIORITY statement

# Keyword Template

|                 |
|-----------------|
| <b>Purpose</b>  |
| <b>Syntax</b>   |
| <b>Remarks</b>  |
| <b>See also</b> |
| <b>Example</b>  |

# THREAD SET PRIORITY statement

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Sets the Priority Value for a                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Syntax</b>   | <code>THREAD SET PRIORITY <i>hThread</i>, <i>Priority</i>&amp;</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Remarks</b>  | <p>THREAD SET PRIORITY assigns a new priority value to the thread specified by the thread <a href="#">handle</a> (<i>hThread</i>). The thread handle is returned by the <a href="#">THREAD CREATE</a> statement at the time the thread is created. If <i>hThread</i> is zero (0), the thread which is currently executing is presumed. A thread ID cannot be used in place of a thread handle.</p> <p>The thread priority value must be one of the following:</p> <pre> %THREAD_PRIORITY_IDLE           = -15 %THREAD_PRIORITY_LOWEST        = -2 %THREAD_PRIORITY_BELOW_NORMAL  = -1 %THREAD_PRIORITY_NORMAL        = 0 %THREAD_PRIORITY_ABOVE_NORMAL  = +1 %THREAD_PRIORITY_HIGHEST       = +2 %THREAD_PRIORITY_TIME_CRITICAL = +15 </pre> |
| <b>See also</b> | <a href="#">PROCESS GET PRIORITY</a> , <a href="#">PROCESS SET PRIORITY</a> , <a href="#">THREAD Code Group</a> , <a href="#">THREAD</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

[CREATE](#), [THREAD GET PRIORITY](#), [THREAD Object](#)

## THREAD STATUS statement

# THREAD STATUS statement

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>      | Retrieve the Status of a Windows thread.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Syntax</b>       | <code>THREAD STATUS <i>hThread</i> TO <i>lResult&amp;</i></code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Remarks</b>      | <p>THREAD STATUS assigns the status of the thread identified by the <a href="#">DWORD</a> value in <i>hThread</i> (see <a href="#">THREAD CREATE</a>) to <i>lResult&amp;</i>.</p> <p>If the function fails, <i>lResult&amp;</i> is set to zero. If the thread is still running, the system value &amp;H103 is assigned. If the thread has terminated and the thread handle has not yet been closed, the return value from the thread Function is assigned to <i>lResult&amp;</i>. To wait for one or more threads to complete execution, use the WaitForSingleObject or WaitForMultipleObjects API functions - see <a href="#">THREAD CLOSE</a> for more information.</p> <p>The number of currently running threads in a module can be determined with the <a href="#">THREADCOUNT</a> function.</p> |
| <b>Restrictions</b> | The THREAD STATUS statement generates no <a href="#">run-time errors</a> ; all exceptions are reported in the return value <i>lResult&amp;</i> . A thread ID cannot be used in place of a thread handle.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>See also</b>     | <a href="#">FUNCTION/END FUNCTION</a> , <a href="#">THREAD CLOSE</a> , <a href="#">THREAD Code Group</a> , <a href="#">THREAD CREATE</a> , <a href="#">THREAD Object</a> , <a href="#">THREAD RESUME</a> , <a href="#">THREAD SUSPEND</a> , <a href="#">THREADCOUNT</a> , <a href="#">THREADED</a> , <a href="#">THREADID</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

## THREAD SUSPEND statement

# THREAD SUSPEND statement

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>      | Suspend execution of a Windows thread.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Syntax</b>       | <code>THREAD SUSPEND <i>hThread</i> TO <i>lResult&amp;</i></code>                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Remarks</b>      | <p>THREAD SUSPEND adds 1 to the <i>suspend count</i> of the thread specified by <i>hThread</i> (see <a href="#">THREAD CREATE</a>). If it succeeds, the <i>lResult&amp;</i> value is the thread's previous suspend count; otherwise, it is -1. A thread is always suspended if it has a suspend count of 1 or higher.</p> <p>To decrement the suspend count of a thread, use the <a href="#">THREAD RESUME</a> statement. A suspended thread will only resume execution when its suspend count is decremented to 0.</p> |
| <b>Restrictions</b> | The THREAD SUSPEND statement generates no <a href="#">run-time errors</a> ; all exceptions are reported in the return value <i>lResult&amp;</i> . A thread ID cannot be used interchangeably with a thread handle. A thread can suspend itself by incrementing its own suspend count.                                                                                                                                                                                                                                   |
| <b>See also</b>     | <a href="#">FUNCTION/END FUNCTION</a> , <a href="#">THREAD CLOSE</a> , <a href="#">THREAD Code Group</a> , <a href="#">THREAD CREATE</a> , <a href="#">THREAD Object</a> , <a href="#">THREAD RESUME</a> , <a href="#">THREAD STATUS</a> , <a href="#">THREADCOUNT</a> , <a href="#">THREADED</a> , <a href="#">THREADID</a>                                                                                                                                                                                            |

## THREADCOUNT function

# THREADCOUNT function

|                |                                                                                |
|----------------|--------------------------------------------------------------------------------|
| <b>Purpose</b> | Return the number of PowerBASIC-created active threads that exist in a module. |
| <b>Syntax</b>  | <code><i>lCount&amp;</i> = THREADCOUNT</code>                                  |

**Remarks** Applications will return a THREADCOUNT of at least 1, which is attributed to the "primary" application thread. Additional threads created by the application or module with the [THREAD CREATE](#) function will also be included in the tally returned by [THREADCOUNT](#).

THREADCOUNT can be useful for when a "controlling thread" needs to poll the state of a collection of "worker threads" as they complete a set of tasks. However, care should be exercised if other (unrelated) threads may also be running in the same module - in such cases, using [THREAD STATUS](#) is the preferred solution. If polling is not desired, the WaitForMultipleObjects API function can also be useful - see [THREAD CLOSE](#) for more information.

**Restrictions** THREADCOUNT includes threads that have had their thread handle released with THREAD CLOSE, yet are still running.

Threads are initialized and started asynchronously, so it is wise to give the operating system a small amount of time to perform thread initialization before using the THREADCOUNT function to monitor the thread.

A thread Function may not be directly called or executed, except by a THREAD CREATE statement. This restriction is imposed to ensure that PowerBASIC run-time library can maintain a thread-safe state at all times, correctly allocate and deallocate internal thread-local storage), and functions such as THREADCOUNT can return accurate values. See THREAD CREATE for more information and solutions.

**See also** [FUNCTION/END FUNCTION](#), [THREAD CLOSE](#), [THREAD Code Group](#), [THREAD CREATE](#), [THREAD Object](#), [THREAD RESUME](#), [THREAD STATUS](#), [THREAD SUSPEND](#), [THREADED](#), [THREADID](#)

**Example**

```

THREAD FUNCTION tZ(BYVAL x&) AS LONG
 ' Wait for a random time
 SLEEP x& * RND(1,1000)
 FUNCTION = 1
END FUNCTION

FUNCTION PBMAIN
 ' Create 10 threads
 FOR x& = 1 TO 10
 THREAD CREATE tZ(x&) TO hThread???
 THREAD CLOSE hThread??? TO lResult&
 NEXT x&

 'Wait until the threads are all done
 DO
 SLEEP 100
 LOOP WHILE THREADCOUNT > 1
END FUNCTION

```

## THREADED statement

# THREADED statement

**Purpose** Declare thread-local variables.

**Syntax** `THREADED variable[()] [AS type] [, variable[()]]`  
`THREADED variable[()] [, variable[()]] [, ...] AS type`

**Remarks** Threaded variables are global to every [Sub](#), [Function](#), [Method](#), and [Property](#) but are not shared across threads. Each thread has its own independent set of thread-local [variables](#).

To declare an [array](#) as a threaded variable, use an empty set of parentheses in the variable list: You can then use the [DIM](#) statement to dimension the array.

```

THREADED MyArray%()
THREADED StringArray() AS STRING

```

The **THREADED** statement may, optionally, accept a list of variables, all of which are defined by the type descriptor keyword that follows them. For example:

```

THREADED aaa, bbb, ccc AS INTEGER
THREADED vptr, aptr() AS LONG PTR

```

**Restrictions** [DEFtype](#) has no effect on variables defined by a **THREADED** statement.

**See also** [DIM](#), [GLOBAL](#), [INSTANCE](#), [LOCAL](#), [STATIC](#)

**Example**

```

THREADED xxx, yyy, zzz AS INTEGER
THREADED vptr, aptr() AS LONG PTR

```

## THREADID function

# THREADID function

**Purpose** Return a [Long-integer](#) thread identifier of the current thread.

**Syntax** `thrdID& = THREADID`

**Remarks** The thread ID value is returned for the thread that is currently executing. The Thread ID is intended for use with the various (advanced) thread-related API functions provided by Windows.

**Restrictions** The thread ID value cannot be used interchangeably with the thread handle returned by [THREAD CREATE](#).

**See also** [FUNCTION/END FUNCTION](#), [THREAD CLOSE](#), [THREAD CREATE](#), [THREAD RESUME](#), [THREAD STATUS](#), [THREAD SUSPEND](#), [THREADED](#)

## TIME\$ system variable

# TIME\$ system variable

**Purpose** Read and/or set the system time.

**Syntax** To read the time:

```
s$ = TIME$
```

To set the time:

```
TIME$ = string_expression
```

**Remarks** The system variable `TIME$` contains an eight-character

that represents the time of the system clock in the form "*hh:mm:ss*", where *hh* is hours (in 24-hour military form), *mm* is minutes, and *ss* is seconds.

Assigning *string\_expression* to `TIME$` resets the system clock. *string\_expression* must contain time information in military (24-hour) format. Minutes and seconds information can be omitted. For example:

```

TIME$ = "12" 'set clock to 12 noon
TIME$ = "13:01" 'set clock to 1:01 PM
TIME$ = "13:01:30" 'set clock to 30 sec after 1:01 PM
TIME$ = "0:01" 'set clock to 1 min after midnight

```

Use the [TIMER](#) function to return the number of seconds that have elapsed since midnight.

**See also** [DATE\\$](#), [MONTHNAME\\$](#), [POWERTIME](#), [TIMER](#), [TIX](#)

## TIMER function

# TIMER function

|                 |                                                                                                                                                                                                                             |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Return the number of seconds that have elapsed since midnight.                                                                                                                                                              |
| <b>Syntax</b>   | <code>y = TIMER</code>                                                                                                                                                                                                      |
| <b>Remarks</b>  | TIMER returns the number of seconds since midnight as a <a href="#">Double-precision floating-point</a> value. The resolution is about 1/100 of a second on NT-based platforms, or 1/18th of a second on earlier platforms. |
| <b>See also</b> | <a href="#">DATE\$</a> , <a href="#">TIME\$</a> , <a href="#">TIX</a>                                                                                                                                                       |
| <b>Example</b>  | <pre>OldTime\$ = TIME\$ ' Current time TIME\$ = "12"      ' Noon NoonSec\$ = FORMAT\$(TIMER, "#,") x\$ = "Noon is " + NoonSec\$ + " seconds past midnight" TIME\$ = OldTime\$ ' Restore time</pre>                          |
| <b>Result</b>   | Noon is 43,200 seconds past midnight                                                                                                                                                                                        |

## TIX statement

# Keyword Template

|                 |
|-----------------|
| <b>Purpose</b>  |
| <b>Syntax</b>   |
| <b>Remarks</b>  |
| <b>See also</b> |
| <b>Example</b>  |

# TIX statement

|                |                                                                                                                                                                                                                                                                                        |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Measures elapsed CPU cycles.                                                                                                                                                                                                                                                           |
| <b>Syntax</b>  | <pre>TIX QuadVar TIX END QuadVar</pre>                                                                                                                                                                                                                                                 |
| <b>Remarks</b> | The TIX statement offers you the ability to measure elapsed CPU cycles, the smallest timing increment possible. Modern processors typically execute billions of cycles per second. This can be beneficial for comparing the execution speed of various styles of coding in PowerBASIC. |

### TIX QuadVar

The first form of the TIX statement retrieves the current value of the cycle counter and assigns it to the Quad Integer variable.

### TIX END QuadVar

The second form of the TIX statement retrieves the current value of the cycle counter. The value in the QuadVar is subtracted from it, and the result is assigned to QuadVar.

To measure the total cycle count for a particular set of statements, you would write:

```
TIX CycleCount&&
 ' statements to measure go here
TIX END CycleCount&&
```

At this point, CycleCount&& contains the elapsed number of CPU cycles.

See also [#ALIGN](#), [TIMER](#)

## TOOLBAR ADD BUTTON statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## TOOLBAR statement IMPROVED

**Purpose** A [ToolBar control](#) contains one or more buttons which act as shortcuts to menu items. The TOOLBAR statement is used to manipulate a TOOLBAR control.

**Syntax**

```
TOOLBAR ADD BUTTON hDlg, ID, image&, cmd&, style&, text$ [AT item&] [CALL callback]
TOOLBAR ADD SEPARATOR hDlg, ID, size& [,cmd&] [AT item&]
TOOLBAR DELETE BUTTON hDlg, id&, [BYCMD] item&
TOOLBAR GET STATE hDlg, ID, [BYCMD] item& TO datav&
TOOLBAR GET COUNT hDlg, ID TO datav&
TOOLBAR SET IMAGELIST hDlg, ID, hLst, ListType&
TOOLBAR SET STATE hDlg, ID, [BYCMD] item&, state&
```

*hDlg* [Handle](#) of the [dialog](#) that owns the ToolBar.

*hLst* Handle of the [ImageList](#) to be used for graphical items.

*id&* The [control identifier](#) assigned with [CONTROL ADD TOOLBAR](#).

*cmd&* Command id number associated with this button.

*image&* Image number selected (1=first, 2=second, etc.)

*item&* A data item number. First=1, second=2...

*size&* Size of the item expressed in [pixels](#).

*state&* A state descriptor to define specific attributes.

*style&* Style descriptor bits for this button.

*text\$* A text

to be displayed on this button.

*type&* A type descriptor to define specific attributes.

*callback* A [callback](#) function which receives [messages](#) for the control.

*datav&* A [long integer](#) variable to which result data is assigned.

*txtv\$* A string [variable](#) to which result text is assigned.

**Remarks** A TOOLBAR control contains one or more buttons, each of which normally corresponds to a menu item. It is generally placed at the top of the [client area](#) of a dialog. When the user "presses" a tool bar button, the program reacts in the same way as if the command had been selected from a menu. It simply acts as a shortcut to common menu commands.

In each of the following descriptions, the TOOLBAR is referenced by the dialog handle (*hDlg*) and *id&*. In some cases a specific button is chosen with the *item&* parameter. If the BYCMD option is included, *item&* specifies the command id number of the button to

be used. If not, *item&* describes the button by its position on the TOOLBAR. Since separators are considered to be a special class of button by the operating system, they must be counted when you calculate a position item number. Positions are always indexed to one (1=first, 2=second, and so on).

### **TOOLBAR ADD BUTTON *hDlg, ID, image&, cmd&, style&, text\$ [AT item&] [CALL callback]***

A button is added to this TOOLBAR. The image to be displayed is selected from the attached IMAGELIST based upon the parameter *image&* (1=first, 2=second, etc.). The *cmd&* parameter specifies the command id number to be executed (with %WM\_COMMAND) when the button is pressed. The *style&* parameter describes the style of the button from the following most often used attributes:

|                  |                                                                                                                                                                                                           |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| %BTNS_AUTOSIZE   | The width of the button is calculated by the system, based upon the text and the image.                                                                                                                   |
| %BTNS_BUTTON     | The button behaves like a standard push button.                                                                                                                                                           |
| %BTNS_CHECK      | The button is dual-state which toggles between the pressed and nonpressed state each time it's clicked.                                                                                                   |
| %BTNS_GROUP      | Defines a group of buttons. When combined with the check style, it creates a button that stays pressed until another button in the group is pressed. This is similar to an option button or radio button. |
| %BTNS_CHECKGROUP | A combination of check and group styles.                                                                                                                                                                  |
| %BTNS_DROPDOWN   | Creates a drop-down style button that can display a list when clicked. Drop-down buttons send a %TBN_DROPDOWN notification instead of %WM_COMMAND.                                                        |
| %BTNS_NOPREFIX   | The button text will not have an accelerator prefix associated with it.                                                                                                                                   |

The *text\$* parameter specifies the text to be displayed on the button.

If the optional "AT *item&*" clause is included, the button is inserted at the designated position (1=first, 2=second, etc.). Otherwise, it is added to the end of the list.

If the optional "CALL *callback*" clause is included, it specifies the name of a Callback Function that receives %WM\_COMMAND messages when the button is clicked. If not specified, these command messages are sent to the dialog callback specified in

. Message routing by button allows you to easily determine which button generated the event.

If the Callback Function processes a message, it should return [TRUE](#) (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists).

The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the [DDI](#) engine processes unhandled messages.

### **TOOLBAR ADD SEPARATOR *hDlg, ID, size& [,cmd&] [AT item&]***

A separator is added to this TOOLBAR. It separates two buttons by the number of pixels specified in *size&*. It may be used to separate and distinguish two adjacent button groups (%tbstyle\_group), or to just enhance the visual appearance. If the optional *cmd&* parameter is included, it's a unique numeric identifier for this separator. Of course, a separator can't be pressed like a button, so it doesn't literally allow a command to be sent. However, it may be used later with a BYCMD option in TOOLBAR DELETE, TOOLBAR SET STATE, etc. If the "AT *item&*" clause is included, the separator is inserted at the designated position (1=first, 2=second, etc.). Otherwise, it is added to the end of the list.

**TOOLBAR DELETE BUTTON *hDlg, ID, [BYCMD] item&***

A BUTTON or SEPARATOR, specified by *item&*, is deleted from the TOOLBAR. The parameter *item&* may be positional, or it may represent a command id number with BYCMD.

**TOOLBAR GET COUNT *hDlg, ID to datav&***

The number of buttons (and separators) on the TOOLBAR is retrieved and assigned to the long integer variable specified by *datav&*.

**TOOLBAR GET STATE *hDlg, ID, [BYCMD] item& TO datav&***

The state descriptor bits for a specific button are retrieved and assigned to the variable designated by *datav&*. The parameter *item&* tells which button to check -- it may be positional, or it may be the command id number when used with BYCMD. The descriptor bits may consist of one or more of:

|                        |                                              |
|------------------------|----------------------------------------------|
| %TBSTATE_DISABLED      | The button is disabled and grayed. (value=0) |
| %TBSTATE_CHECKED       | The button is checked.                       |
| %TBSTATE_PRESSED       | The button is pressed.                       |
| %TBSTATE_ENABLED       | The button is enabled.                       |
| %TBSTATE_HIDDEN        | The button is hidden.                        |
| %TBSTATE_INDETERMINATE | The button is indeterminate and grayed.      |
| %TBSTATE_MARKED        | The button is highlighted.                   |

**TOOLBAR SET IMAGELIST *hDlg, ID, hLst, type&***

The IMAGELIST specified by *hLst* is attached to this TOOLBAR control. The value of *ListType&* specifies the type of IMAGELIST:

|   |                 |
|---|-----------------|
| 0 | Default images  |
| 1 | Disabled images |
| 2 | Hot images      |

The graphical images contained in the IMAGELIST are displayed on the TOOLBAR buttons. Up to three IMAGELIST structures may be attached to each TOOLBAR control.

The image to be displayed is determined by the specification made in TOOLBAR ADD BUTTON, and the current state of the button. When the TOOLBAR control is destroyed, any attached IMAGELIST is automatically destroyed.

**TOOLBAR SET STATE *hDlg, ID, [BYCMD] item&, state&***

The state descriptor bits for the specified button are applied from the expression *state&*.

The parameter *item&* tells which button to set -- it may be positional, or it may be the command id number when used with BYCMD. The descriptor bits *state&* may consist of:

|                        |                                              |
|------------------------|----------------------------------------------|
| %TBSTATE_DISABLED      | The button is disabled and grayed. (value=0) |
| %TBSTATE_CHECKED       | The button is checked.                       |
| %TBSTATE_PRESSED       | The button is pressed.                       |
| %TBSTATE_ENABLED       | The button is enabled.                       |
| %TBSTATE_HIDDEN        | The button is hidden.                        |
| %TBSTATE_INDETERMINATE | The button is indeterminate and grayed.      |
| %TBSTATE_MARKED        | The button is highlighted.                   |

See also

[DIALOG SHOW MODAL](#), [DIALOG SHOW MODELESS](#), [Dynamic Dialog Tools](#), [CONTROL ADD TOOLBAR](#), [CONTROL SET FONT](#), [IMAGELIST](#)

**TOOLBAR ADD SEPARATOR statement**

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## TOOLBAR statement IMPROVED

**Purpose** A [ToolBar control](#) contains one or more buttons which act as shortcuts to menu items. The TOOLBAR statement is used to manipulate a TOOLBAR control.

**Syntax**

```
TOOLBAR ADD BUTTON hDlg, ID, image&, cmd&, style&, text$ [AT item&] [CALL callback]
TOOLBAR ADD SEPARATOR hDlg, ID, size& [,cmd&] [AT item&]
TOOLBAR DELETE BUTTON hDlg, id&, [BYCMD] item&
TOOLBAR GET STATE hDlg, ID, [BYCMD] item& TO datav&
TOOLBAR GET COUNT hDlg, ID TO datav&
TOOLBAR SET IMAGELIST hDlg, ID, hLst, ListType&
TOOLBAR SET STATE hDlg, ID, [BYCMD] item&, state&
```

*hDlg* [Handle](#) of the [dialog](#) that owns the ToolBar.

*hLst* Handle of the [ImageList](#) to be used for graphical items.

*id&* The [control identifier](#) assigned with [CONTROL ADD TOOLBAR](#).

*cmd&* Command id number associated with this button.

*image&* Image number selected (1=first, 2=second, etc.)

*item&* A data item number. First=1, second=2...

*size&* Size of the item expressed in [pixels](#).

*state&* A state descriptor to define specific attributes.

*style&* Style descriptor bits for this button.

*text\$* A text  
to be displayed on this button.

*type&* A type descriptor to define specific attributes.

*callback* A [callback](#) function which receives [messages](#) for the control.

*datav&* A [long integer](#) variable to which result data is assigned.

*txtv\$* A string [variable](#) to which result text is assigned.

**Remarks** A TOOLBAR control contains one or more buttons, each of which normally corresponds to a menu item. It is generally placed at the top of the [client area](#) of a dialog. When the user "presses" a tool bar button, the program reacts in the same way as if the command had been selected from a menu. It simply acts as a shortcut to common menu commands.

In each of the following descriptions, the TOOLBAR is referenced by the dialog handle (*hDlg*) and *id&*. In some cases a specific button is chosen with the *item&* parameter. If the BYCMD option is included, *item&* specifies the command id number of the button to be used. If not, *item&* describes the button by its position on the TOOLBAR. Since separators are considered to be a special class of button by the operating system, they must be counted when you calculate a position item number. Positions are always indexed to one (1=first, 2=second, and so on).

**TOOLBAR ADD BUTTON *hDlg, ID, image&, cmd&, style&, text\$ [AT item&] [CALL callback]***

A button is added to this TOOLBAR. The image to be displayed is selected from the attached IMAGELIST based upon the parameter *image&* (1=first, 2=second, etc.). The *cmd&* parameter specifies the command id number to be executed (with %WM\_COMMAND) when the button is pressed. The *style&* parameter describes the style of the button from the following most often used attributes:

|                  |                                                                                                                                                                                                           |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| %BTNS_AUTOSIZE   | The width of the button is calculated by the system, based upon the text and the image.                                                                                                                   |
| %BTNS_BUTTON     | The button behaves like a standard push button.                                                                                                                                                           |
| %BTNS_CHECK      | The button is dual-state which toggles between the pressed and nonpressed state each time it's clicked.                                                                                                   |
| %BTNS_GROUP      | Defines a group of buttons. When combined with the check style, it creates a button that stays pressed until another button in the group is pressed. This is similar to an option button or radio button. |
| %BTNS_CHECKGROUP | A combination of check and group styles.                                                                                                                                                                  |
| %BTNS_DROPDOWN   | Creates a drop-down style button that can display a list when clicked. Drop-down buttons send a %TBN_DROPDOWN notification instead of %WM_COMMAND.                                                        |
| %BTNS_NOPREFIX   | The button text will not have an accelerator prefix associated with it.                                                                                                                                   |

The *text\$* parameter specifies the text to be displayed on the button.

If the optional "AT *item&*" clause is included, the button is inserted at the designated position (1=first, 2=second, etc.). Otherwise, it is added to the end of the list.

If the optional "CALL *callback*" clause is included, it specifies the name of a Callback Function that receives %WM\_COMMAND messages when the button is clicked. If not specified, these command messages are sent to the dialog callback specified in

. Message routing by button allows you to easily determine which button generated the event.

If the Callback Function processes a message, it should return [TRUE](#) (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists).

The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the [DDI](#) engine processes unhandled messages.

**TOOLBAR ADD SEPARATOR *hDlg, ID, size& [,cmd&] [AT item&]***

A separator is added to this TOOLBAR. It separates two buttons by the number of pixels specified in *size&*. It may be used to separate and distinguish two adjacent button groups (%tbstyle\_group), or to just enhance the visual appearance. If the optional *cmd&* parameter is included, it's a unique numeric identifier for this separator. Of course, a separator can't be pressed like a button, so it doesn't literally allow a command to be sent. However, it may be used later with a BYCMD option in TOOLBAR DELETE, TOOLBAR SET STATE, etc. If the "AT *item&*" clause is included, the separator is inserted at the designated position (1=first, 2=second, etc.). Otherwise, it is added to the end of the list.

**TOOLBAR DELETE BUTTON *hDlg, ID, [BYCMD] item&***

A BUTTON or SEPARATOR, specified by *item&*, is deleted from the TOOLBAR. The parameter *item&* may be positional, or it may represent a command id number with BYCMD.

**TOOLBAR GET COUNT *hDlg, ID to datav&***

The number of buttons (and separators) on the TOOLBAR is retrieved and assigned to the long integer variable specified by *datav&*.

**TOOLBAR GET STATE *hDlg, ID, [BYCMD] item& TO datav&***

The state descriptor bits for a specific button are retrieved and assigned to the variable designated by *datav&*. The parameter *item&* tells which button to check -- it may be positional, or it may be the command id number when used with BYCMD. The descriptor bits may consist of one or more of:

|                        |                                              |
|------------------------|----------------------------------------------|
| %TBSTATE_DISABLED      | The button is disabled and grayed. (value=0) |
| %TBSTATE_CHECKED       | The button is checked.                       |
| %TBSTATE_PRESSED       | The button is pressed.                       |
| %TBSTATE_ENABLED       | The button is enabled.                       |
| %TBSTATE_HIDDEN        | The button is hidden.                        |
| %TBSTATE_INDETERMINATE | The button is indeterminate and grayed.      |
| %TBSTATE_MARKED        | The button is highlighted.                   |

**TOOLBAR SET IMAGELIST *hDlg, ID, hLst, type&***

The IMAGELIST specified by *hLst* is attached to this TOOLBAR control. The value of *ListType&* specifies the type of IMAGELIST:

|   |                 |
|---|-----------------|
| 0 | Default images  |
| 1 | Disabled images |
| 2 | Hot images      |

The graphical images contained in the IMAGELIST are displayed on the TOOLBAR buttons. Up to three IMAGELIST structures may be attached to each TOOLBAR control. The image to be displayed is determined by the specification made in TOOLBAR ADD BUTTON, and the current state of the button. When the TOOLBAR control is destroyed, any attached IMAGELIST is automatically destroyed.

**TOOLBAR SET STATE *hDlg, ID, [BYCMD] item&, state&***

The state descriptor bits for the specified button are applied from the expression *state&*.

The parameter *item&* tells which button to set -- it may be positional, or it may be the command id number when used with BYCMD. The descriptor bits *state&* may consist of:

|                        |                                              |
|------------------------|----------------------------------------------|
| %TBSTATE_DISABLED      | The button is disabled and grayed. (value=0) |
| %TBSTATE_CHECKED       | The button is checked.                       |
| %TBSTATE_PRESSED       | The button is pressed.                       |
| %TBSTATE_ENABLED       | The button is enabled.                       |
| %TBSTATE_HIDDEN        | The button is hidden.                        |
| %TBSTATE_INDETERMINATE | The button is indeterminate and grayed.      |
| %TBSTATE_MARKED        | The button is highlighted.                   |

See also

[DIALOG SHOW MODAL](#), [DIALOG SHOW MODELESS](#), [Dynamic Dialog Tools](#), [CONTROL ADD TOOLBAR](#), [CONTROL SET FONT](#), [IMAGELIST](#)

**TOOLBAR DELETE BUTTON statement****Keyword Template**

Purpose

Syntax

Remarks  
See also  
Example

## TOOLBAR statement IMPROVED

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>    | A <a href="#">ToolBar control</a> contains one or more buttons which act as shortcuts to menu items. The TOOLBAR statement is used to manipulate a TOOLBAR control.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Syntax</b>     | <pre>TOOLBAR ADD BUTTON <i>hDlg</i>, <i>ID</i>, <i>image&amp;</i>, <i>cmd&amp;</i>, <i>style&amp;</i>, <i>text\$</i> [AT <i>item&amp;</i>] [CALL <i>callback</i>]</pre> <pre>TOOLBAR ADD SEPARATOR <i>hDlg</i>, <i>ID</i>, <i>size&amp;</i> [,<i>cmd&amp;</i>] [AT <i>item&amp;</i>]</pre> <pre>TOOLBAR DELETE BUTTON <i>hDlg</i>, <i>id&amp;</i>, [BYCMD] <i>item&amp;</i></pre> <pre>TOOLBAR GET STATE <i>hDlg</i>, <i>ID</i>, [BYCMD] <i>item&amp;</i> TO <i>datav&amp;</i></pre> <pre>TOOLBAR GET COUNT <i>hDlg</i>, <i>ID</i> TO <i>datav&amp;</i></pre> <pre>TOOLBAR SET IMAGELIST <i>hDlg</i>, <i>ID</i>, <i>hLst</i>, <i>ListType&amp;</i></pre> <pre>TOOLBAR SET STATE <i>hDlg</i>, <i>ID</i>, [BYCMD] <i>item&amp;</i>, <i>state&amp;</i></pre> |
| <i>hDlg</i>       | <a href="#">Handle</a> of the <a href="#">dialog</a> that owns the ToolBar.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <i>hLst</i>       | Handle of the <a href="#">ImageList</a> to be used for graphical items.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <i>id&amp;</i>    | The <a href="#">control identifier</a> assigned with <a href="#">CONTROL ADD TOOLBAR</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <i>cmd&amp;</i>   | Command id number associated with this button.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <i>image&amp;</i> | Image number selected (1=first, 2=second, etc.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <i>item&amp;</i>  | A data item number. First=1, second=2...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <i>size&amp;</i>  | Size of the item expressed in <a href="#">pixels</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <i>state&amp;</i> | A state descriptor to define specific attributes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <i>style&amp;</i> | Style descriptor bits for this button.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <i>text\$</i>     | A text<br>to be displayed on this button.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <i>type&amp;</i>  | A type descriptor to define specific attributes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <i>callback</i>   | A <a href="#">callback</a> function which receives <a href="#">messages</a> for the control.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <i>datav&amp;</i> | A <a href="#">long integer</a> variable to which result data is assigned.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <i>txtv\$</i>     | A string <a href="#">variable</a> to which result text is assigned.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

**Remarks** A TOOLBAR control contains one or more buttons, each of which normally corresponds to a menu item. It is generally placed at the top of the [client area](#) of a dialog. When the user "presses" a tool bar button, the program reacts in the same way as if the command had been selected from a menu. It simply acts as a shortcut to common menu commands.

In each of the following descriptions, the TOOLBAR is referenced by the dialog handle (*hDlg*) and *id&*. In some cases a specific button is chosen with the *item&* parameter. If the BYCMD option is included, *item&* specifies the command id number of the button to be used. If not, *item&* describes the button by its position on the TOOLBAR. Since separators are considered to be a special class of button by the operating system, they must be counted when you calculate a position item number. Positions are always indexed to one (1=first, 2=second, and so on).

### **TOOLBAR ADD BUTTON *hDlg*, *ID*, *image&*, *cmd&*, *style&*, *text\$* [AT *item&*] [CALL *callback*]**

A button is added to this TOOLBAR. The image to be displayed is selected from the attached IMAGELIST based upon the parameter *image&* (1=first, 2=second, etc.). The *cmd&* parameter specifies the command id number to be executed (with %

WM\_COMMAND) when the button is pressed. The *style&* parameter describes the style of the button from the following most often used attributes:

|                  |                                                                                                                                                                                                           |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| %BTNS_AUTOSIZE   | The width of the button is calculated by the system, based upon the text and the image.                                                                                                                   |
| %BTNS_BUTTON     | The button behaves like a standard push button.                                                                                                                                                           |
| %BTNS_CHECK      | The button is dual-state which toggles between the pressed and nonpressed state each time it's clicked.                                                                                                   |
| %BTNS_GROUP      | Defines a group of buttons. When combined with the check style, it creates a button that stays pressed until another button in the group is pressed. This is similar to an option button or radio button. |
| %BTNS_CHECKGROUP | A combination of check and group styles.                                                                                                                                                                  |
| %BTNS_DROPDOWN   | Creates a drop-down style button that can display a list when clicked. Drop-down buttons send a %TBN_DROPDOWN notification instead of %WM_COMMAND.                                                        |
| %BTNS_NOPREFIX   | The button text will not have an accelerator prefix associated with it.                                                                                                                                   |

The *text\$* parameter specifies the text to be displayed on the button.

If the optional "AT *item&*" clause is included, the button is inserted at the designated position (1=first, 2=second, etc.). Otherwise, it is added to the end of the list.

If the optional "CALL *callback*" clause is included, it specifies the name of a Callback Function that receives %WM\_COMMAND messages when the button is clicked. If not specified, these command messages are sent to the dialog callback specified in *.* Message routing by button allows you to easily determine which button generated the event.

If the Callback Function processes a message, it should return [TRUE](#) (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists).

The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the [DDT](#) engine processes unhandled messages.

### **TOOLBAR ADD SEPARATOR *hDlg, ID, size& [,cmd&] [AT item&]***

A separator is added to this TOOLBAR. It separates two buttons by the number of pixels specified in *size&*. It may be used to separate and distinguish two adjacent button groups (%tbstyle\_group), or to just enhance the visual appearance. If the optional *cmd&* parameter is included, it's a unique numeric identifier for this separator. Of course, a separator can't be pressed like a button, so it doesn't literally allow a command to be sent. However, it may be used later with a BYCMD option in TOOLBAR DELETE, TOOLBAR SET STATE, etc. If the "AT *item&*" clause is included, the separator is inserted at the designated position (1=first, 2=second, etc.). Otherwise, it is added to the end of the list.

### **TOOLBAR DELETE BUTTON *hDlg, ID, [BYCMD] item&***

A BUTTON or SEPARATOR, specified by *item&*, is deleted from the TOOLBAR. The parameter *item&* may be positional, or it may represent a command id number with BYCMD.

### **TOOLBAR GET COUNT *hDlg, ID to datav&***

The number of buttons (and separators) on the TOOLBAR is retrieved and assigned to the long integer variable specified by *datav&*.

**TOOLBAR GET STATE *hDlg, ID, [BYCMD] item& TO datav&***

The state descriptor bits for a specific button are retrieved and assigned to the variable designated by *datav&*. The parameter *item&* tells which button to check -- it may be positional, or it may be the command id number when used with BYCMD. The descriptor bits may consist of one or more of:

|                        |                                              |
|------------------------|----------------------------------------------|
| %TBSTATE_DISABLED      | The button is disabled and grayed. (value=0) |
| %TBSTATE_CHECKED       | The button is checked.                       |
| %TBSTATE_PRESSED       | The button is pressed.                       |
| %TBSTATE_ENABLED       | The button is enabled.                       |
| %TBSTATE_HIDDEN        | The button is hidden.                        |
| %TBSTATE_INDETERMINATE | The button is indeterminate and grayed.      |
| %TBSTATE_MARKED        | The button is highlighted.                   |

**TOOLBAR SET IMAGELIST *hDlg, ID, hLst, type&***

The IMAGELIST specified by *hLst* is attached to this TOOLBAR control. The value of *ListType&* specifies the type of IMAGELIST:

|   |                 |
|---|-----------------|
| 0 | Default images  |
| 1 | Disabled images |
| 2 | Hot images      |

The graphical images contained in the IMAGELIST are displayed on the TOOLBAR buttons. Up to three IMAGELIST structures may be attached to each TOOLBAR control.

The image to be displayed is determined by the specification made in TOOLBAR ADD BUTTON, and the current state of the button. When the TOOLBAR control is destroyed, any attached IMAGELIST is automatically destroyed.

**TOOLBAR SET STATE *hDlg, ID, [BYCMD] item&, state&***

The state descriptor bits for the specified button are applied from the expression *state&*.

The parameter *item&* tells which button to set -- it may be positional, or it may be the command id number when used with BYCMD. The descriptor bits *state&* may consist of:

|                        |                                              |
|------------------------|----------------------------------------------|
| %TBSTATE_DISABLED      | The button is disabled and grayed. (value=0) |
| %TBSTATE_CHECKED       | The button is checked.                       |
| %TBSTATE_PRESSED       | The button is pressed.                       |
| %TBSTATE_ENABLED       | The button is enabled.                       |
| %TBSTATE_HIDDEN        | The button is hidden.                        |
| %TBSTATE_INDETERMINATE | The button is indeterminate and grayed.      |
| %TBSTATE_MARKED        | The button is highlighted.                   |

See also

[DIALOG SHOW MODAL](#), [DIALOG SHOW MODELESS](#), [Dynamic Dialog Tools](#), [CONTROL ADD TOOLBAR](#), [CONTROL SET FONT](#), [IMAGELIST](#)

**TOOLBAR GET COUNT statement****Keyword Template**

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

# TOOLBAR statement IMPROVED

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>    | A <a href="#">ToolBar control</a> contains one or more buttons which act as shortcuts to menu items. The TOOLBAR statement is used to manipulate a TOOLBAR control.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Syntax</b>     | <pre> TOOLBAR ADD BUTTON <i>hDlg</i>, <i>ID</i>, <i>image&amp;</i>, <i>cmd&amp;</i>, <i>style&amp;</i>, <i>text\$</i> [AT <i>item&amp;</i>] [CALL <i>callback</i>] TOOLBAR ADD SEPARATOR <i>hDlg</i>, <i>ID</i>, <i>size&amp;</i> [,<i>cmd&amp;</i>] [AT <i>item&amp;</i>] TOOLBAR DELETE BUTTON <i>hDlg</i>, <i>id&amp;</i>, [BYCMD] <i>item&amp;</i> TOOLBAR GET STATE <i>hDlg</i>, <i>ID</i>, [BYCMD] <i>item&amp;</i> TO <i>datav&amp;</i> TOOLBAR GET COUNT <i>hDlg</i>, <i>ID</i> TO <i>datav&amp;</i> TOOLBAR SET IMAGELIST <i>hDlg</i>, <i>ID</i>, <i>hLst</i>, <i>ListType&amp;</i> TOOLBAR SET STATE <i>hDlg</i>, <i>ID</i>, [BYCMD] <i>item&amp;</i>, <i>state&amp;</i> </pre>                                                                                                                                                                                                                                                                                                                             |
| <i>hDlg</i>       | <a href="#">Handle</a> of the <a href="#">dialog</a> that owns the ToolBar.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <i>hLst</i>       | Handle of the <a href="#">ImageList</a> to be used for graphical items.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <i>id&amp;</i>    | The <a href="#">control identifier</a> assigned with <a href="#">CONTROL ADD TOOLBAR</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <i>cmd&amp;</i>   | Command id number associated with this button.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <i>image&amp;</i> | Image number selected (1=first, 2=second, etc.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <i>item&amp;</i>  | A data item number. First=1, second=2...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <i>size&amp;</i>  | Size of the item expressed in <a href="#">pixels</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <i>state&amp;</i> | A state descriptor to define specific attributes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <i>style&amp;</i> | Style descriptor bits for this button.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <i>text\$</i>     | A text<br>to be displayed on this button.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <i>type&amp;</i>  | A type descriptor to define specific attributes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <i>callback</i>   | A <a href="#">callback</a> function which receives <a href="#">messages</a> for the control.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <i>datav&amp;</i> | A <a href="#">long integer</a> variable to which result data is assigned.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <i>txtv\$</i>     | A string <a href="#">variable</a> to which result text is assigned.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Remarks</b>    | <p>A TOOLBAR control contains one or more buttons, each of which normally corresponds to a menu item. It is generally placed at the top of the <a href="#">client area</a> of a dialog. When the user "presses" a tool bar button, the program reacts in the same way as if the command had been selected from a menu. It simply acts as a shortcut to common menu commands.</p> <p>In each of the following descriptions, the TOOLBAR is referenced by the dialog handle (<i>hDlg</i>) and <i>id&amp;</i>. In some cases a specific button is chosen with the <i>item&amp;</i> parameter. If the BYCMD option is included, <i>item&amp;</i> specifies the command id number of the button to be used. If not, <i>item&amp;</i> describes the button by its position on the TOOLBAR. Since separators are considered to be a special class of button by the operating system, they must be counted when you calculate a position item number. Positions are always indexed to one (1=first, 2=second, and so on).</p> |

## **TOOLBAR ADD BUTTON *hDlg*, *ID*, *image&*, *cmd&*, *style&*, *text\$* [AT *item&*] [CALL *callback*]**

A button is added to this TOOLBAR. The image to be displayed is selected from the attached IMAGELIST based upon the parameter *image&* (1=first, 2=second, etc.). The *cmd&* parameter specifies the command id number to be executed (with % WM\_COMMAND) when the button is pressed. The *style&* parameter describes the style of the button from the following most often used attributes:

|                |                                                                                         |
|----------------|-----------------------------------------------------------------------------------------|
| %BTNS_AUTOSIZE | The width of the button is calculated by the system, based upon the text and the image. |
|----------------|-----------------------------------------------------------------------------------------|

|                          |                                                                                                                                                                                                           |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| %BTNS_BUTTON             | The button behaves like a standard push button.                                                                                                                                                           |
| %BTNS_CHECK              | The button is dual-state which toggles between the pressed and nonpressed state each time it's clicked.                                                                                                   |
| %BTNS_GROUP              | Defines a group of buttons. When combined with the check style, it creates a button that stays pressed until another button in the group is pressed. This is similar to an option button or radio button. |
| %<br>BTNS_CHECKGROU<br>P | A combination of check and group styles.                                                                                                                                                                  |
| %<br>BTNS_DROPDOWN       | Creates a drop-down style button that can display a list when clicked. Drop-down buttons send a % TBN_DROPDOWN notification instead of % WM_COMMAND.                                                      |
| %BTNS_NOPREFIX           | The button text will not have an accelerator prefix associated with it.                                                                                                                                   |

The *text\$* parameter specifies the text to be displayed on the button.

If the optional "AT *item&*" clause is included, the button is inserted at the designated position (1=first, 2=second, etc.). Otherwise, it is added to the end of the list.

If the optional "CALL *callback*" clause is included, it specifies the name of a Callback Function that receives %WM\_COMMAND messages when the button is clicked. If not specified, these command messages are sent to the dialog callback specified in

. Message routing by button allows you to easily determine which button generated the event.

If the Callback Function processes a message, it should return [TRUE](#) (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists).

The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the [DDI](#) engine processes unhandled messages.

### **TOOLBAR ADD SEPARATOR *hDlg, ID, size& [,cmd&] [AT item&]***

A separator is added to this TOOLBAR. It separates two buttons by the number of pixels specified in *size&*. It may be used to separate and distinguish two adjacent button groups (%tbstyle\_group), or to just enhance the visual appearance. If the optional *cmd&* parameter is included, it's a unique numeric identifier for this separator. Of course, a separator can't be pressed like a button, so it doesn't literally allow a command to be sent. However, it may be used later with a BYCMD option in TOOLBAR DELETE, TOOLBAR SET STATE, etc. If the "AT *item&*" clause is included, the separator is inserted at the designated position (1=first, 2=second, etc.). Otherwise, it is added to the end of the list.

### **TOOLBAR DELETE BUTTON *hDlg, ID, [BYCMD] item&***

A BUTTON or SEPARATOR, specified by *item&*, is deleted from the TOOLBAR. The parameter *item&* may be positional, or it may represent a command id number with BYCMD.

### **TOOLBAR GET COUNT *hDlg, ID to datav&***

The number of buttons (and separators) on the TOOLBAR is retrieved and assigned to the long integer variable specified by *datav&*.

### **TOOLBAR GET STATE *hDlg, ID, [BYCMD] item& TO datav&***

The state descriptor bits for a specific button are retrieved and assigned to the variable designated by *datav&*. The parameter *item&* tells which button to check -- it may be positional, or it may be the command id number when used with BYCMD. The descriptor

bits may consist of one or more of:

|                        |                                              |
|------------------------|----------------------------------------------|
| %TBSTATE_DISABLED      | The button is disabled and grayed. (value=0) |
| %TBSTATE_CHECKED       | The button is checked.                       |
| %TBSTATE_PRESSED       | The button is pressed.                       |
| %TBSTATE_ENABLED       | The button is enabled.                       |
| %TBSTATE_HIDDEN        | The button is hidden.                        |
| %TBSTATE_INDETERMINATE | The button is indeterminate and grayed.      |
| %TBSTATE_MARKED        | The button is highlighted.                   |

### **TOOLBAR SET IMAGELIST *hDlg, ID, hLst, type&***

The IMAGELIST specified by *hLst* is attached to this TOOLBAR control. The value of *ListType&* specifies the type of IMAGELIST:

|   |                 |
|---|-----------------|
| 0 | Default images  |
| 1 | Disabled images |
| 2 | Hot images      |

The graphical images contained in the IMAGELIST are displayed on the TOOLBAR buttons. Up to three IMAGELIST structures may be attached to each TOOLBAR control.

The image to be displayed is determined by the specification made in TOOLBAR ADD BUTTON, and the current state of the button. When the TOOLBAR control is destroyed, any attached IMAGELIST is automatically destroyed.

### **TOOLBAR SET STATE *hDlg, ID, [BYCMD] item&, state&***

The state descriptor bits for the specified button are applied from the expression *state&*.

The parameter *item&* tells which button to set -- it may be positional, or it may be the command id number when used with BYCMD. The descriptor bits *state&* may consist of:

|                        |                                              |
|------------------------|----------------------------------------------|
| %TBSTATE_DISABLED      | The button is disabled and grayed. (value=0) |
| %TBSTATE_CHECKED       | The button is checked.                       |
| %TBSTATE_PRESSED       | The button is pressed.                       |
| %TBSTATE_ENABLED       | The button is enabled.                       |
| %TBSTATE_HIDDEN        | The button is hidden.                        |
| %TBSTATE_INDETERMINATE | The button is indeterminate and grayed.      |
| %TBSTATE_MARKED        | The button is highlighted.                   |

**See also** [DIALOG SHOW MODAL](#), [DIALOG SHOW MODELESS](#), [Dynamic Dialog Tools](#), [CONTROL ADD TOOLBAR](#), [CONTROL SET FONT](#), [IMAGELIST](#)

## TOOLBAR GET STATE statement

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## TOOLBAR statement IMPROVED

**Purpose** A [ToolBar control](#) contains one or more buttons which act as shortcuts to menu items. The TOOLBAR statement is used to manipulate a TOOLBAR control.

**Syntax**

```

TOOLBAR ADD BUTTON hDlg, ID, image&, cmd&, style&, text$ [AT item&] [CALL
callback]
TOOLBAR ADD SEPARATOR hDlg, ID, size& [,cmd&] [AT item&]
TOOLBAR DELETE BUTTON hDlg, id&, [BYCMD] item&
TOOLBAR GET STATE hDlg, ID, [BYCMD] item& TO datav&
TOOLBAR GET COUNT hDlg, ID TO datav&
TOOLBAR SET IMAGELIST hDlg, ID, hLst, ListType&
TOOLBAR SET STATE hDlg, ID, [BYCMD] item&, state&

```

*hDlg*            [Handle](#) of the [dialog](#) that owns the ToolBar.

*hLst*            Handle of the [ImageList](#) to be used for graphical items.

*id&*             The [control identifier](#) assigned with [CONTROL\\_ADD\\_TOOLBAR](#).

*cmd&*            Command id number associated with this button.

*image&*          Image number selected (1=first, 2=second, etc.)

*item&*           A data item number. First=1, second=2...

*size&*           Size of the item expressed in [pixels](#).

*state&*          A state descriptor to define specific attributes.

*style&*          Style descriptor bits for this button.

*text\$*           A text  
                 to be displayed on this button.

*type&*           A type descriptor to define specific attributes.

*callback*        A [callback](#) function which receives [messages](#) for the control.

*datav&*          A [long integer](#) variable to which result data is assigned.

*txtv\$*           A string [variable](#) to which result text is assigned.

**Remarks**

A TOOLBAR control contains one or more buttons, each of which normally corresponds to a menu item. It is generally placed at the top of the [client area](#) of a dialog. When the user "presses" a tool bar button, the program reacts in the same way as if the command had been selected from a menu. It simply acts as a shortcut to common menu commands.

In each of the following descriptions, the TOOLBAR is referenced by the dialog handle (*hDlg*) and *id&*. In some cases a specific button is chosen with the *item&* parameter. If the BYCMD option is included, *item&* specifies the command id number of the button to be used. If not, *item&* describes the button by its position on the TOOLBAR. Since separators are considered to be a special class of button by the operating system, they must be counted when you calculate a position item number. Positions are always indexed to one (1=first, 2=second, and so on).

### **TOOLBAR ADD BUTTON *hDlg*, *ID*, *image&*, *cmd&*, *style&*, *text\$* [AT *item&*] [CALL *callback*]**

A button is added to this TOOLBAR. The image to be displayed is selected from the attached IMAGELIST based upon the parameter *image&* (1=first, 2=second, etc.). The *cmd&* parameter specifies the command id number to be executed (with % WM\_COMMAND) when the button is pressed. The *style&* parameter describes the style of the button from the following most often used attributes:

|                |                                                                                                                      |
|----------------|----------------------------------------------------------------------------------------------------------------------|
| %BTNS_AUTOSIZE | The width of the button is calculated by the system, based upon the text and the image.                              |
| %BTNS_BUTTON   | The button behaves like a standard push button.                                                                      |
| %BTNS_CHECK    | The button is dual-state which toggles between the pressed and nonpressed state each time it's clicked.              |
| %BTNS_GROUP    | Defines a group of buttons. When combined with the check style, it creates a button that stays pressed until another |

|                          |                                                                                                                                                      |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
|                          | button in the group is pressed. This is similar to an option button or radio button.                                                                 |
| %<br>BTNS_CHECKGROU<br>P | A combination of check and group styles.                                                                                                             |
| %<br>BTNS_DROPDOWN       | Creates a drop-down style button that can display a list when clicked. Drop-down buttons send a % TBN_DROPDOWN notification instead of % WM_COMMAND. |
| %BTNS_NOPREFIX           | The button text will not have an accelerator prefix associated with it.                                                                              |

The *text\$* parameter specifies the text to be displayed on the button.

If the optional "AT *item&*" clause is included, the button is inserted at the designated position (1=first, 2=second, etc.). Otherwise, it is added to the end of the list.

If the optional "CALL *callback*" clause is included, it specifies the name of a Callback Function that receives %WM\_COMMAND messages when the button is clicked. If not specified, these command messages are sent to the dialog callback specified in . Message routing by button allows you to easily determine which button generated the event.

If the Callback Function processes a message, it should return **TRUE** (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists).

The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the **DDI** engine processes unhandled messages.

### **TOOLBAR ADD SEPARATOR *hDlg, ID, size& [,cmd&] [AT item&]***

A separator is added to this TOOLBAR. It separates two buttons by the number of pixels specified in *size&*. It may be used to separate and distinguish two adjacent button groups (%tbstyle\_group), or to just enhance the visual appearance. If the optional *cmd&* parameter is included, it's a unique numeric identifier for this separator. Of course, a separator can't be pressed like a button, so it doesn't literally allow a command to be sent. However, it may be used later with a BYCMD option in TOOLBAR DELETE, TOOLBAR SET STATE, etc. If the "AT *item&*" clause is included, the separator is inserted at the designated position (1=first, 2=second, etc.). Otherwise, it is added to the end of the list.

### **TOOLBAR DELETE BUTTON *hDlg, ID, [BYCMD] item&***

A BUTTON or SEPARATOR, specified by *item&*, is deleted from the TOOLBAR. The parameter *item&* may be positional, or it may represent a command id number with BYCMD.

### **TOOLBAR GET COUNT *hDlg, ID to datav&***

The number of buttons (and separators) on the TOOLBAR is retrieved and assigned to the long integer variable specified by *datav&*.

### **TOOLBAR GET STATE *hDlg, ID, [BYCMD] item& TO datav&***

The state descriptor bits for a specific button are retrieved and assigned to the variable designated by *datav&*. The parameter *item&* tells which button to check -- it may be positional, or it may be the command id number when used with BYCMD. The descriptor bits may consist of one or more of:

|                   |                                              |
|-------------------|----------------------------------------------|
| %TBSTATE_DISABLED | The button is disabled and grayed. (value=0) |
| %TBSTATE_CHECKED  | The button is checked.                       |
| %TBSTATE_PRESSED  | The button is pressed.                       |
| %TBSTATE_ENABLED  | The button is enabled.                       |

|                        |                                         |
|------------------------|-----------------------------------------|
| %TBSTATE_HIDDEN        | The button is hidden.                   |
| %TBSTATE_INDETERMINATE | The button is indeterminate and grayed. |
| %TBSTATE_MARKED        | The button is highlighted.              |

### **TOOLBAR SET IMAGELIST *hDlg, ID, hLst, type&***

The IMAGELIST specified by *hLst* is attached to this TOOLBAR control. The value of *ListType&* specifies the type of IMAGELIST:

|   |                 |
|---|-----------------|
| 0 | Default images  |
| 1 | Disabled images |
| 2 | Hot images      |

The graphical images contained in the IMAGELIST are displayed on the TOOLBAR buttons. Up to three IMAGELIST structures may be attached to each TOOLBAR control.

The image to be displayed is determined by the specification made in TOOLBAR ADD BUTTON, and the current state of the button. When the TOOLBAR control is destroyed, any attached IMAGELIST is automatically destroyed.

### **TOOLBAR SET STATE *hDlg, ID, [BYCMD] item&, state&***

The state descriptor bits for the specified button are applied from the expression *state&*.

The parameter *item&* tells which button to set -- it may be positional, or it may be the command id number when used with BYCMD. The descriptor bits *state&* may consist of:

|                        |                                              |
|------------------------|----------------------------------------------|
| %TBSTATE_DISABLED      | The button is disabled and grayed. (value=0) |
| %TBSTATE_CHECKED       | The button is checked.                       |
| %TBSTATE_PRESSED       | The button is pressed.                       |
| %TBSTATE_ENABLED       | The button is enabled.                       |
| %TBSTATE_HIDDEN        | The button is hidden.                        |
| %TBSTATE_INDETERMINATE | The button is indeterminate and grayed.      |
| %TBSTATE_MARKED        | The button is highlighted.                   |

See also [DIALOG SHOW MODAL](#), [DIALOG SHOW MODELESS](#), [Dynamic Dialog Tools](#), [CONTROL ADD TOOLBAR](#), [CONTROL SET FONT](#), [IMAGELIST](#)

## TOOLBAR SET IMAGELIST statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## TOOLBAR statement IMPROVED

**Purpose** A [ToolBar control](#) contains one or more buttons which act as shortcuts to menu items. The TOOLBAR statement is used to manipulate a TOOLBAR control.

**Syntax**

```
TOOLBAR ADD BUTTON hDlg, ID, image&, cmd&, style&, text$ [AT item&] [CALL callback]
TOOLBAR ADD SEPARATOR hDlg, ID, size& [,cmd&] [AT item&]
TOOLBAR DELETE BUTTON hDlg, id&, [BYCMD] item&
TOOLBAR GET STATE hDlg, ID, [BYCMD] item& TO datav&
TOOLBAR GET COUNT hDlg, ID TO datav&
```

```
TOOLBAR SET IMAGELIST hDlg, ID, hLst, ListType&
TOOLBAR SET STATE hDlg, ID, [BYCMD] item&, state&
```

|                   |                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>hDlg</i>       | <a href="#">Handle</a> of the <a href="#">dialog</a> that owns the ToolBar.                                                                                                                                                                                                                                                                                               |
| <i>hLst</i>       | Handle of the <a href="#">ImageList</a> to be used for graphical items.                                                                                                                                                                                                                                                                                                   |
| <i>id&amp;</i>    | The <a href="#">control identifier</a> assigned with <a href="#">CONTROL_ADD_TOOLBAR</a> .                                                                                                                                                                                                                                                                                |
| <i>cmd&amp;</i>   | Command id number associated with this button.                                                                                                                                                                                                                                                                                                                            |
| <i>image&amp;</i> | Image number selected (1=first, 2=second, etc.)                                                                                                                                                                                                                                                                                                                           |
| <i>item&amp;</i>  | A data item number. First=1, second=2...                                                                                                                                                                                                                                                                                                                                  |
| <i>size&amp;</i>  | Size of the item expressed in <a href="#">pixels</a> .                                                                                                                                                                                                                                                                                                                    |
| <i>state&amp;</i> | A state descriptor to define specific attributes.                                                                                                                                                                                                                                                                                                                         |
| <i>style&amp;</i> | Style descriptor bits for this button.                                                                                                                                                                                                                                                                                                                                    |
| <i>text\$</i>     | A text<br>to be displayed on this button.                                                                                                                                                                                                                                                                                                                                 |
| <i>type&amp;</i>  | A type descriptor to define specific attributes.                                                                                                                                                                                                                                                                                                                          |
| <i>callback</i>   | A <a href="#">callback</a> function which receives <a href="#">messages</a> for the control.                                                                                                                                                                                                                                                                              |
| <i>datav&amp;</i> | A <a href="#">long integer</a> variable to which result data is assigned.                                                                                                                                                                                                                                                                                                 |
| <i>txtv\$</i>     | A string <a href="#">variable</a> to which result text is assigned.                                                                                                                                                                                                                                                                                                       |
| <b>Remarks</b>    | A TOOLBAR control contains one or more buttons, each of which normally corresponds to a menu item. It is generally placed at the top of the <a href="#">client area</a> of a dialog. When the user "presses" a tool bar button, the program reacts in the same way as if the command had been selected from a menu. It simply acts as a shortcut to common menu commands. |

In each of the following descriptions, the TOOLBAR is referenced by the dialog handle (*hDlg*) and *id&*. In some cases a specific button is chosen with the *item&* parameter. If the BYCMD option is included, *item&* specifies the command id number of the button to be used. If not, *item&* describes the button by its position on the TOOLBAR. Since separators are considered to be a special class of button by the operating system, they must be counted when you calculate a position item number. Positions are always indexed to one (1=first, 2=second, and so on).

### **TOOLBAR ADD BUTTON *hDlg, ID, image&, cmd&, style&, text\$ [AT item&] [CALL callback]***

A button is added to this TOOLBAR. The image to be displayed is selected from the attached IMAGELIST based upon the parameter *image&* (1=first, 2=second, etc.). The *cmd&* parameter specifies the command id number to be executed (with % WM\_COMMAND) when the button is pressed. The *style&* parameter describes the style of the button from the following most often used attributes:

|                          |                                                                                                                                                                                                           |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| %BTNS_AUTOSIZE           | The width of the button is calculated by the system, based upon the text and the image.                                                                                                                   |
| %BTNS_BUTTON             | The button behaves like a standard push button.                                                                                                                                                           |
| %BTNS_CHECK              | The button is dual-state which toggles between the pressed and nonpressed state each time it's clicked.                                                                                                   |
| %BTNS_GROUP              | Defines a group of buttons. When combined with the check style, it creates a button that stays pressed until another button in the group is pressed. This is similar to an option button or radio button. |
| %<br>BTNS_CHECKGROU<br>P | A combination of check and group styles.                                                                                                                                                                  |
| %                        | Creates a drop-down style button that can display a list                                                                                                                                                  |

|                |                                                                                             |
|----------------|---------------------------------------------------------------------------------------------|
| BTNS_DROPDOWN  | when clicked. Drop-down buttons send a % TBN_DROPDOWN notification instead of % WM_COMMAND. |
| %BTNS_NOPREFIX | The button text will not have an accelerator prefix associated with it.                     |

The *text\$* parameter specifies the text to be displayed on the button.

If the optional "AT *item&*" clause is included, the button is inserted at the designated position (1=first, 2=second, etc.). Otherwise, it is added to the end of the list.

If the optional "CALL *callback*" clause is included, it specifies the name of a Callback Function that receives %WM\_COMMAND messages when the button is clicked. If not specified, these command messages are sent to the dialog callback specified in

. Message routing by button allows you to easily determine which button generated the event.

If the Callback Function processes a message, it should return [TRUE](#) (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists).

The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the [DDI](#) engine processes unhandled messages.

### **TOOLBAR ADD SEPARATOR *hDlg, ID, size& [,cmd&] [AT item&]***

A separator is added to this TOOLBAR. It separates two buttons by the number of pixels specified in *size&*. It may be used to separate and distinguish two adjacent button groups (%tbstyle\_group), or to just enhance the visual appearance. If the optional *cmd&* parameter is included, it's a unique numeric identifier for this separator. Of course, a separator can't be pressed like a button, so it doesn't literally allow a command to be sent. However, it may be used later with a BYCMD option in TOOLBAR DELETE, TOOLBAR SET STATE, etc. If the "AT *item&*" clause is included, the separator is inserted at the designated position (1=first, 2=second, etc.). Otherwise, it is added to the end of the list.

### **TOOLBAR DELETE BUTTON *hDlg, ID, [BYCMD] item&***

A BUTTON or SEPARATOR, specified by *item&*, is deleted from the TOOLBAR. The parameter *item&* may be positional, or it may represent a command id number with BYCMD.

### **TOOLBAR GET COUNT *hDlg, ID to datav&***

The number of buttons (and separators) on the TOOLBAR is retrieved and assigned to the long integer variable specified by *datav&*.

### **TOOLBAR GET STATE *hDlg, ID, [BYCMD] item& TO datav&***

The state descriptor bits for a specific button are retrieved and assigned to the variable designated by *datav&*. The parameter *item&* tells which button to check -- it may be positional, or it may be the command id number when used with BYCMD. The descriptor bits may consist of one or more of:

|                        |                                              |
|------------------------|----------------------------------------------|
| %TBSTATE_DISABLED      | The button is disabled and grayed. (value=0) |
| %TBSTATE_CHECKED       | The button is checked.                       |
| %TBSTATE_PRESSED       | The button is pressed.                       |
| %TBSTATE_ENABLED       | The button is enabled.                       |
| %TBSTATE_HIDDEN        | The button is hidden.                        |
| %TBSTATE_INDETERMINATE | The button is indeterminate and grayed.      |
| %TBSTATE_MARKED        | The button is highlighted.                   |

### **TOOLBAR SET IMAGELIST *hDlg, ID, hLst, type&***

The IMAGELIST specified by *hLst* is attached to this TOOLBAR control. The value of *ListType&* specifies the type of IMAGELIST:

- 0 Default images
- 1 Disabled images
- 2 Hot images

The graphical images contained in the IMAGELIST are displayed on the TOOLBAR buttons. Up to three IMAGELIST structures may be attached to each TOOLBAR control.

The image to be displayed is determined by the specification made in TOOLBAR ADD BUTTON, and the current state of the button. When the TOOLBAR control is destroyed, any attached IMAGELIST is automatically destroyed.

### **TOOLBAR SET STATE *hDlg, ID, [BYCMD] item&, state&***

The state descriptor bits for the specified button are applied from the expression *state&*.

The parameter *item&* tells which button to set -- it may be positional, or it may be the command id number when used with BYCMD. The descriptor bits *state&* may consist of:

|                        |                                              |
|------------------------|----------------------------------------------|
| %TBSTATE_DISABLED      | The button is disabled and grayed. (value=0) |
| %TBSTATE_CHECKED       | The button is checked.                       |
| %TBSTATE_PRESSED       | The button is pressed.                       |
| %TBSTATE_ENABLED       | The button is enabled.                       |
| %TBSTATE_HIDDEN        | The button is hidden.                        |
| %TBSTATE_INDETERMINATE | The button is indeterminate and grayed.      |
| %TBSTATE_MARKED        | The button is highlighted.                   |

**See also** [DIALOG SHOW MODAL](#), [DIALOG SHOW MODELESS](#), [Dynamic Dialog Tools](#), [CONTROL ADD TOOLBAR](#), [CONTROL SET FONT](#), [IMAGELIST](#)

## TOOLBAR SET STATE statement

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## TOOLBAR statement IMPROVED

**Purpose** A [ToolBar control](#) contains one or more buttons which act as shortcuts to menu items. The TOOLBAR statement is used to manipulate a TOOLBAR control.

**Syntax**

```
TOOLBAR ADD BUTTON hDlg, ID, image&, cmd&, style&, text$ [AT item&] [CALL callback]
```

```
TOOLBAR ADD SEPARATOR hDlg, ID, size& [,cmd&] [AT item&]
```

```
TOOLBAR DELETE BUTTON hDlg, id&, [BYCMD] item&
```

```
TOOLBAR GET STATE hDlg, ID, [BYCMD] item& TO datav&
```

```
TOOLBAR GET COUNT hDlg, ID TO datav&
```

```
TOOLBAR SET IMAGELIST hDlg, ID, hLst, ListType&
```

```
TOOLBAR SET STATE hDlg, ID, [BYCMD] item&, state&
```

*hDlg* [Handle](#) of the [dialog](#) that owns the ToolBar.

*hLst* Handle of the [ImageList](#) to be used for graphical items.

|                   |                                                                                              |
|-------------------|----------------------------------------------------------------------------------------------|
| <i>id&amp;</i>    | The <a href="#">control identifier</a> assigned with <a href="#">CONTROL ADD TOOLBAR</a> .   |
| <i>cmd&amp;</i>   | Command id number associated with this button.                                               |
| <i>image&amp;</i> | Image number selected (1=first, 2=second, etc.)                                              |
| <i>item&amp;</i>  | A data item number. First=1, second=2...                                                     |
| <i>size&amp;</i>  | Size of the item expressed in <a href="#">pixels</a> .                                       |
| <i>state&amp;</i> | A state descriptor to define specific attributes.                                            |
| <i>style&amp;</i> | Style descriptor bits for this button.                                                       |
| <i>text\$</i>     | A text<br>to be displayed on this button.                                                    |
| <i>type&amp;</i>  | A type descriptor to define specific attributes.                                             |
| <i>callback</i>   | A <a href="#">callback</a> function which receives <a href="#">messages</a> for the control. |
| <i>datav&amp;</i> | A <a href="#">long integer</a> variable to which result data is assigned.                    |
| <i>txtv\$</i>     | A string <a href="#">variable</a> to which result text is assigned.                          |

**Remarks** A TOOLBAR control contains one or more buttons, each of which normally corresponds to a menu item. It is generally placed at the top of the [client area](#) of a dialog. When the user "presses" a tool bar button, the program reacts in the same way as if the command had been selected from a menu. It simply acts as a shortcut to common menu commands.

In each of the following descriptions, the TOOLBAR is referenced by the dialog handle (*hDlg*) and *id&*. In some cases a specific button is chosen with the *item&* parameter. If the BYCMD option is included, *item&* specifies the command id number of the button to be used. If not, *item&* describes the button by its position on the TOOLBAR. Since separators are considered to be a special class of button by the operating system, they must be counted when you calculate a position item number. Positions are always indexed to one (1=first, 2=second, and so on).

### **TOOLBAR ADD BUTTON *hDlg, ID, image&, cmd&, style&, text\$ [AT item&] [CALL callback]***

A button is added to this TOOLBAR. The image to be displayed is selected from the attached IMAGELIST based upon the parameter *image&* (1=first, 2=second, etc.). The *cmd&* parameter specifies the command id number to be executed (with % WM\_COMMAND) when the button is pressed. The *style&* parameter describes the style of the button from the following most often used attributes:

|                          |                                                                                                                                                                                                           |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| %BTNS_AUTOSIZE           | The width of the button is calculated by the system, based upon the text and the image.                                                                                                                   |
| %BTNS_BUTTON             | The button behaves like a standard push button.                                                                                                                                                           |
| %BTNS_CHECK              | The button is dual-state which toggles between the pressed and nonpressed state each time it's clicked.                                                                                                   |
| %BTNS_GROUP              | Defines a group of buttons. When combined with the check style, it creates a button that stays pressed until another button in the group is pressed. This is similar to an option button or radio button. |
| %<br>BTNS_CHECKGROU<br>P | A combination of check and group styles.                                                                                                                                                                  |
| %<br>BTNS_DROPDOWN       | Creates a drop-down style button that can display a list when clicked. Drop-down buttons send a % TBN_DROPDOWN notification instead of % WM_COMMAND.                                                      |
| %BTNS_NOPREFIX           | The button text will not have an accelerator prefix associated with it.                                                                                                                                   |

The *text\$* parameter specifies the text to be displayed on the button.

If the optional "AT *item&*" clause is included, the button is inserted at the designated position (1=first, 2=second, etc.). Otherwise, it is added to the end of the list.

If the optional "CALL *callback*" clause is included, it specifies the name of a Callback Function that receives %WM\_COMMAND messages when the button is clicked. If not specified, these command messages are sent to the dialog callback specified in

. Message routing by button allows you to easily determine which button generated the event.

If the Callback Function processes a message, it should return **TRUE** (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists).

The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the **DDI** engine processes unhandled messages.

### **TOOLBAR ADD SEPARATOR *hDlg, ID, size& [,cmd&] [AT item&]***

A separator is added to this TOOLBAR. It separates two buttons by the number of pixels specified in *size&*. It may be used to separate and distinguish two adjacent button groups (%tbstyle\_group), or to just enhance the visual appearance. If the optional *cmd&* parameter is included, it's a unique numeric identifier for this separator. Of course, a separator can't be pressed like a button, so it doesn't literally allow a command to be sent. However, it may be used later with a BYCMD option in TOOLBAR DELETE, TOOLBAR SET STATE, etc. If the "AT *item&*" clause is included, the separator is inserted at the designated position (1=first, 2=second, etc.). Otherwise, it is added to the end of the list.

### **TOOLBAR DELETE BUTTON *hDlg, ID, [BYCMD] item&***

A BUTTON or SEPARATOR, specified by *item&*, is deleted from the TOOLBAR. The parameter *item&* may be positional, or it may represent a command id number with BYCMD.

### **TOOLBAR GET COUNT *hDlg, ID to datav&***

The number of buttons (and separators) on the TOOLBAR is retrieved and assigned to the long integer variable specified by *datav&*.

### **TOOLBAR GET STATE *hDlg, ID, [BYCMD] item& TO datav&***

The state descriptor bits for a specific button are retrieved and assigned to the variable designated by *datav&*. The parameter *item&* tells which button to check -- it may be positional, or it may be the command id number when used with BYCMD. The descriptor bits may consist of one or more of:

|                        |                                              |
|------------------------|----------------------------------------------|
| %TBSTATE_DISABLED      | The button is disabled and grayed. (value=0) |
| %TBSTATE_CHECKED       | The button is checked.                       |
| %TBSTATE_PRESSED       | The button is pressed.                       |
| %TBSTATE_ENABLED       | The button is enabled.                       |
| %TBSTATE_HIDDEN        | The button is hidden.                        |
| %TBSTATE_INDETERMINATE | The button is indeterminate and grayed.      |
| %TBSTATE_MARKED        | The button is highlighted.                   |

### **TOOLBAR SET IMAGELIST *hDlg, ID, hLst, type&***

The IMAGELIST specified by *hLst* is attached to this TOOLBAR control. The value of *ListType&* specifies the type of IMAGELIST:

|   |                 |
|---|-----------------|
| 0 | Default images  |
| 1 | Disabled images |
| 2 | Hot images      |

The graphical images contained in the IMAGELIST are displayed on the TOOLBAR buttons. Up to three IMAGELIST structures may be attached to each TOOLBAR control.

The image to be displayed is determined by the specification made in TOOLBAR ADD BUTTON, and the current state of the button. When the TOOLBAR control is destroyed, any attached IMAGELIST is automatically destroyed.

### **TOOLBAR SET STATE *hDlg, ID, [BYCMD] item&, state&***

The state descriptor bits for the specified button are applied from the expression *state&*.

The parameter *item&* tells which button to set -- it may be positional, or it may be the command id number when used with BYCMD. The descriptor bits *state&* may consist of:

|                        |                                              |
|------------------------|----------------------------------------------|
| %TBSTATE_DISABLED      | The button is disabled and grayed. (value=0) |
| %TBSTATE_CHECKED       | The button is checked.                       |
| %TBSTATE_PRESSED       | The button is pressed.                       |
| %TBSTATE_ENABLED       | The button is enabled.                       |
| %TBSTATE_HIDDEN        | The button is hidden.                        |
| %TBSTATE_INDETERMINATE | The button is indeterminate and grayed.      |
| %TBSTATE_MARKED        | The button is highlighted.                   |

See also

[DIALOG SHOW MODAL](#), [DIALOG SHOW MODELESS](#), [Dynamic Dialog Tools](#), [CONTROL ADD TOOLBAR](#), [CONTROL SET FONT](#), [IMAGELIST](#)

## TRACE statement

# TRACE statement

**Purpose** Capture a representation of the precise flow of execution in a module.

**Syntax**

```
TRACE NEW fname$
TRACE ON
TRACE PRINT string_expr
TRACE OFF
TRACE CLOSE
```

**Remarks** The TRACE statement is used to generate a *trace file* detailing program flow as execution passes through [Labels](#), plus entry and exit of all [Subs](#), [Functions](#), [Methods](#), and [Properties](#), along with details of passed parameters, etc. All trace details are written to a named disk file *fname\$*.

TRACE also logs PowerBASIC [run-time errors](#) as they occur, to assist with locating program errors. TRACE can be dynamically started and stopped with the TRACE ON and TRACE OFF statements to enable the programmer to check specific portions of a program without generating volumes of irrelevant trace data.

The five general forms of the TRACE statement are described as follow:

### **TRACE NEW *fname\$***

TRACE NEW causes a standard sequential *trace file* (of the specified file name *fname\$*) to be created, deleting any previous file of the same name.

### **TRACE ON**

When a subsequent TRACE ON is then executed, PowerBASIC begins to write pertinent trace information to the trace file. It will contain a chronological list of every call to an internal procedure, the associated parameter values, and the point at which it was exited. Further, it will list a label name each time that program execution flows through the label position.

In a test or debugging situation, TRACE, [CALLSTK](#), and [CALLSTK\\$](#) allow you to easily answer that age-old programming question, "How did I get here?". TRACE details the entry and exit of every procedure in your program, while CALLSTK simply lists the stack

frames that exist above the current level. TRACE is particularly valuable in pinpointing the area of a program where a fatal machine crash occurs.

#### TRACE PRINT *string\_expr*

TRACE PRINT writes the value of *string\_expr* to the trace file. It can be used to record the value of important variables or other information of importance.

#### TRACE OFF

TRACE OFF temporarily stops output to the trace file. The trace can be subsequently restarted with another TRACE ON statement. An implied TRACE OFF is performed when you exit the procedure in which the current TRACE ON was executed.

#### TRACE CLOSE

TRACE CLOSE permanently detaches the trace file from the stream of trace data.

The TRACE statement can easily create a huge trace file, so caution must be exercised. Use TRACE ON at the lowest procedure level possible, to keep the output size within reason.

If [PBMAIN](#) contains TRACE NEW and TRACE ON statements, and subsequently calls SUB AAA(x&), which in turn calls SUB BBB(y&,a\$), which then calls SUB CCC(z&), which encounters a run-time [error 5](#), the trace file might look something like this:

```
Trace Begins...
AAA(3)
 BBB(4,string data)
 CCC(5)
 TRACE PRINT printed this user data from CCC()
 ERROR 151 was generated in this thread
 CCC Exit
 BBB Exit
AAA Exit
```

Numeric parameters are displayed in decimal, while pointer and array parameters display a decimal representation of the offset of the target value.

#### Restrictions

TRACE can be invaluable during [debugging](#), but it generates substantial additional code that should be avoided in the final release version of an application. If the source code contains [#TOOLS OFF](#), all TRACE statements which remain in the program are ignored by the compiler, and the parameters and expressions are excluded from the compiled program.

To conserve memory requirements in the code, long labels are truncated to 13 characters; however, procedure names are not truncated.

The TRACE statement is "Thread-Aware", displaying only Sub, Function, Method, Property, or Label details from the thread in which it was executed. You can execute TRACE multiple times, or even in multiple concurrent threads. However, you must use caution to ensure that each thread uses a unique name for its own trace file.

#### See also

[#TOOLS](#), [CALLSTK](#), [CALLSTK\\$](#), [CALLSTKCOUNT](#), [FUNCNAME\\$](#), [PROFILE](#)

#### Example

```
#TOOLS ON
FUNCTION PBMAIN
 TRACE NEW "tracelog.txt"
 TRACE ON
 x& = 3
 CALL AAA(x&)
 TRACE OFF
 TRACE CLOSE
END FUNCTION

SUB AAA(x&)
 INCR x&
 CALL BBB(x&,"string data")
```

```

 ' More code
END SUB

SUB BBB(y&,a$)
 INCR y&
 CALL CCC(y&)
END SUB

SUB CCC(z&)
 TRACE PRINT "TRACE PRINT printed this " + _
 "user data from " + FUNCNAME$ + "("
 ERROR 151 ' Trigger a run-time error
END SUB

```

## TREEVIEW DELETE statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## TREEVIEW statement

**Purpose** A [TreeView](#) control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

**Syntax**

```

TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO
hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&

```

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>hDlg</i>        | Handle of the <a href="#">dialog</a> that owns the Treeview.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <i>id&amp;</i>     | The <a href="#">control identifier</a> assigned with <a href="#">CONTROL_ADD_TREEVIEW</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <i>hItem</i>       | Handle of a Treeview item, used to uniquely identify the item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <i>datav&amp;</i>  | A <a href="#">long integer</a> variable to which result data is assigned.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <i>txtv\$</i>      | A string variable to which result data is assigned.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <i>hPrnt</i>       | Handle of the parent item to insert the new item under.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <i>hIAftr</i>      | Handle of the item to insert the new item after.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <i>image&amp;</i>  | Image index of the new item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <i>simage&amp;</i> | Selected image index of the new item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <i>txt\$</i>       | Text to be displayed for the Treeview item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <i>flag&amp;</i>   | A long integer value to define specific attributes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <i>hLst</i>        | <a href="#">Handle of the ImageList to be used for graphical items.</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Remarks</b>     | <p><b><u>TREEVIEW DELETE <i>hDlg, id&amp;, hItem</i></u></b></p> <p>The data item specified by the handle <i>hItem</i> is deleted from the TREEVIEW control.</p> <p><b><u>TREEVIEW GET BOLD <i>hDlg, id&amp;, hItem TO datav&amp;</i></u></b></p> <p>The bold attribute for the data item <i>hItem</i> is retrieved and assigned to the variable <i>datav&amp;</i>. If the item is bold, the value <a href="#">true</a> (-1) is assigned. If not bold, the value <a href="#">false</a> (0) is assigned.</p> <p><b><u>TREEVIEW GET CHECK <i>hDlg, id&amp;, hItem TO datav&amp;</i></u></b></p> <p>The checkmark attribute for the data item <i>hItem</i> is retrieved and assigned to the variable <i>datav&amp;</i>. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.</p> <p><b><u>TREEVIEW GET CHILD <i>hDlg, id&amp;, hItem TO datav&amp;</i></u></b></p> <p>The parent data item specified by <i>hItem</i> is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by <i>datav&amp;</i>. If none are found, the value zero (0) is assigned to <i>datav&amp;</i>.</p> <p><b><u>TREEVIEW GET COUNT <i>hDlg, id&amp; TO datav&amp;</i></u></b></p> <p>The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by <i>datav&amp;</i>.</p> <p><b><u>TREEVIEW GET EXPANDED <i>hDlg, id&amp;, hItem TO datav&amp;</i></u></b></p> <p>The expanded attribute for the data item <i>hItem</i> is retrieved and assigned to the variable <i>datav&amp;</i>. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.</p> <p><b><u>TREEVIEW GET NEXT <i>hDlg, id&amp;, hItem TO datav&amp;</i></u></b></p> <p>The data item specified by <i>hItem</i> is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by <i>datav&amp;</i>. If no next sibling is found, the value zero (0) is assigned to <i>datav&amp;</i>.</p> <p><b><u>TREEVIEW GET PARENT <i>hDlg, id&amp;, hItem TO datav&amp;</i></u></b></p> <p>The data item specified by <i>hItem</i> is scanned for its parent data item. The handle of the parent is assigned to the variable specified by <i>datav&amp;</i>. If no parent is found, the value zero (0) is assigned to <i>datav&amp;</i>.</p> |

**TREEVIEW GET PREVIOUS *hDlg, id&, hItem* TO *datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET ROOT *hDlg, id&* TO *datav&***

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

**TREEVIEW GET SELECT *hDlg, id&* TO *datav&***

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

**TREEVIEW GET TEXT *hDlg, id&, hItem* TO *txtv\$***

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv\$*.

**TREEVIEW GET USER *hDlg, id&, hItem* TO *datav&***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

**TREEVIEW INSERT ITEM *hDlg, id&, hPrnt, hIAftr, image&, selimage&, txt\$* TO *hItem***

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI\_FIRST (at the beginning), %TVI\_LAST (at the end), %TVI\_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt\$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

**TREEVIEW RESET *hDlg, id&***

All data items are deleted from the specified TREEVIEW control.

**TREEVIEW SELECT *hDlg, id&, hItem***

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

**TREEVIEW SET BOLD *hDlg, id&, hItem, flag&***

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

**TREEVIEW SET CHECK *hDlg, id&, hItem, flag&***

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

**TREEVIEW SET EXPANDED *hDlg, id&, hItem, flag&***

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

**TREEVIEW SET IMAGELIST *hDlg, id&, hLst***

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

**TREEVIEW SET TEXT *hDlg, id&, hItem, txt\$***

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt\$*.

**TREEVIEW SET USER *hDlg, id&, hItem, NumExpr***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

**TREEVIEW UNSELECT *hDlg, id&***

All items in the TREEVIEW control are set to an unselected state.

**See also** [Dynamic Dialog Tools](#), [CONTROL ADD TREEVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [IMAGELIST](#)

**TREEVIEW GET BOLD statement****Keyword Template**

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

**TREEVIEW statement**

**Purpose** A [TreeView](#) control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

- . Each time you add an item, you must specify its relationship to existing data items.

**Syntax**

```

TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO
hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&

```

|                    |                                                                                             |
|--------------------|---------------------------------------------------------------------------------------------|
| <i>hDlg</i>        | <a href="#">Handle</a> of the <a href="#">dialog</a> that owns the Treeview.                |
| <i>id&amp;</i>     | The <a href="#">control identifier</a> assigned with <a href="#">CONTROL ADD TREEVIEW</a> . |
| <i>hItem</i>       | Handle of a Treeview item, used to uniquely identify the item                               |
| <i>datav&amp;</i>  | A <a href="#">long integer</a> variable to which result data is assigned.                   |
| <i>txtv\$</i>      | A string variable to which result data is assigned.                                         |
| <i>hPrnt</i>       | Handle of the parent item to insert the new item under.                                     |
| <i>hIAftr</i>      | Handle of the item to insert the new item after.                                            |
| <i>image&amp;</i>  | Image index of the new item                                                                 |
| <i>simage&amp;</i> | Selected image index of the new item                                                        |
| <i>txt\$</i>       | Text to be displayed for the Treeview item                                                  |
| <i>flag&amp;</i>   | A long integer value to define specific attributes                                          |
| <i>hLst</i>        | <a href="#">Handle of the ImageList to be used for graphical items.</a>                     |

**Remarks****TREEVIEW DELETE *hDlg, id&, hItem***

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

**TREEVIEW GET BOLD *hDlg, id&, hItem* TO *datav&***

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value [true](#) (-1) is assigned. If not bold, the value [false](#) (0) is assigned.

**TREEVIEW GET CHECK *hDlg, id&, hItem* TO *datav&***

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

**TREEVIEW GET CHILD *hDlg, id&, hItem* TO *datav&***

The parent data item specified by *hItem* is scanned for child data items. If any are found,

the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

### **TREEVIEW GET COUNT *hDlg, id& TO datav&***

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

### **TREEVIEW GET EXPANDED *hDlg, id&, hItem TO datav&***

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

### **TREEVIEW GET NEXT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

### **TREEVIEW GET PARENT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

### **TREEVIEW GET PREVIOUS *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

### **TREEVIEW GET ROOT *hDlg, id& TO datav&***

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

### **TREEVIEW GET SELECT *hDlg, id& TO datav&***

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

### **TREEVIEW GET TEXT *hDlg, id&, hItem TO txtv\$***

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv\$*.

### **TREEVIEW GET USER *hDlg, id&, hItem TO datav&***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

### **TREEVIEW INSERT ITEM *hDlg, id&, hPrnt, hAfr, image&, selimage&, txt\$ TO hItem***

A new data item is added to this TREEVIEW control. The parameter *hPmt* specifies the

parent of this item, or zero if item is to be inserted at the root. The parameter *hIAfr* specifies the handle of the item after which this new item is to be inserted, or %TVL\_FIRST (at the beginning), %TVL\_LAST (at the end), %TVL\_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt\$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

### **TREEVIEW RESET *hDlg, id&***

All data items are deleted from the specified TREEVIEW control.

### **TREEVIEW SELECT *hDlg, id&, hItem***

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

### **TREEVIEW SET BOLD *hDlg, id&, hItem, flag&***

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

### **TREEVIEW SET CHECK *hDlg, id&, hItem, flag&***

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

### **TREEVIEW SET EXPANDED *hDlg, id&, hItem, flag&***

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

### **TREEVIEW SET IMAGELIST *hDlg, id&, hLst***

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

### **TREEVIEW SET TEXT *hDlg, id&, hItem, txt\$***

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt\$*.

### **TREEVIEW SET USER *hDlg, id&, hItem, NumExpr***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

### **TREEVIEW UNSELECT *hDlg, id&***

All items in the TREEVIEW control are set to an unselected state.

See also

[Dynamic Dialog Tools](#), [CONTROL ADD TREEVIEW](#), [CONTROL SET COLOR](#), [CONTROL](#)

[SET FONT, IMAGELIST](#)**TREEVIEW GET CHECK statement****Keyword Template**

Purpose

Syntax

Remarks

See also

Example

**TREEVIEW statement**

**Purpose** A [TreeView](#) control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

**Syntax**

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO
hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&
```

*hDlg* [Handle](#) of the [dialog](#) that owns the Treeview.

*id&* The [control identifier](#) assigned with [CONTROL ADD TREEVIEW](#).

*hItem* Handle of a Treeview item, used to uniquely identify the item

*datav&* A [long integer](#) variable to which result data is assigned.

*txtv\$* A string variable to which result data is assigned.

*hPrnt* Handle of the parent item to insert the new item under.

*hIAftr* Handle of the item to insert the new item after.

*image&* Image index of the new item

|                    |                                                                |
|--------------------|----------------------------------------------------------------|
| <i>simage&amp;</i> | Selected image index of the new item                           |
| <i>txt\$</i>       | Text to be displayed for the Treeview item                     |
| <i>flag&amp;</i>   | A long integer value to define specific attributes             |
| <i>hLst</i>        | <u>Handle of the ImageList to be used for graphical items.</u> |

**Remarks**     **TREEVIEW DELETE *hDlg, id&, hItem***

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

**TREEVIEW GET BOLD *hDlg, id&, hItem TO datav&***

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value [true](#) (-1) is assigned. If not bold, the value [false](#) (0) is assigned.

**TREEVIEW GET CHECK *hDlg, id&, hItem TO datav&***

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

**TREEVIEW GET CHILD *hDlg, id&, hItem TO datav&***

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET COUNT *hDlg, id& TO datav&***

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

**TREEVIEW GET EXPANDED *hDlg, id&, hItem TO datav&***

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

**TREEVIEW GET NEXT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET PARENT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET PREVIOUS *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET ROOT *hDlg, id& TO datav&***

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

**TREEVIEW GET SELECT *hDlg, id& TO datav&***

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

### **TREEVIEW GET TEXT *hDlg, id&, hItem TO txtv\$***

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv\$*.

### **TREEVIEW GET USER *hDlg, id&, hItem TO datav&***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every [DDI](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

### **TREEVIEW INSERT ITEM *hDlg, id&, hPrnt, hIAftr, image&, selimage&, txt\$ TO hItem***

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI\_FIRST (at the beginning), %TVI\_LAST (at the end), %TVI\_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt\$* designates the text string which should be displayed. If the operation is successful, the handle of the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

### **TREEVIEW RESET *hDlg, id&***

All data items are deleted from the specified TREEVIEW control.

### **TREEVIEW SELECT *hDlg, id&, hItem***

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

### **TREEVIEW SET BOLD *hDlg, id&, hItem, flag&***

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

### **TREEVIEW SET CHECK *hDlg, id&, hItem, flag&***

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

### **TREEVIEW SET EXPANDED *hDlg, id&, hItem, flag&***

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

### **TREEVIEW SET IMAGELIST *hDlg, id&, hLst***

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

### **TREEVIEW SET TEXT *hDlg, id&, hItem, txt\$***

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt\$*.

### **TREEVIEW SET USER *hDlg, id&, hItem, NumExpr***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

### **TREEVIEW UNSELECT *hDlg, id&***

All items in the TREEVIEW control are set to an unselected state.

See also

[Dynamic Dialog Tools](#), [CONTROL ADD TREEVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [IMAGELIST](#)

## TREEVIEW GET CHILD statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

# TREEVIEW statement

Purpose

A [TreeView](#) control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

Syntax

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO
```

```

hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&

```

*hDlg*      [Handle](#) of the [dialog](#) that owns the Treeview.

*id&*        The [control identifier](#) assigned with [CONTROL.ADD.TREEVIEW.](#)

*hItem*     Handle of a Treeview item, used to uniquely identify the item

*datav&*    A [long integer](#) variable to which result data is assigned.

*txtv\$*     A string variable to which result data is assigned.

*hPmt*     Handle of the parent item to insert the new item under.

*hIAfr*     Handle of the item to insert the new item after.

*image&*    Image index of the new item

*simage&*   Selected image index of the new item

*txt\$*      Text to be displayed for the Treeview item

*flag&*     A long integer value to define specific attributes

*hLst*      [Handle of the ImageList to be used for graphical items.](#)

**Remarks**      **TREEVIEW DELETE *hDlg, id&, hItem***

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

**TREEVIEW GET BOLD *hDlg, id&, hItem TO datav&***

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value [true](#) (-1) is assigned. If not bold, the value [false](#) (0) is assigned.

**TREEVIEW GET CHECK *hDlg, id&, hItem TO datav&***

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

**TREEVIEW GET CHILD *hDlg, id&, hItem TO datav&***

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET COUNT *hDlg, id& TO datav&***

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

**TREEVIEW GET EXPANDED *hDlg, id&, hItem TO datav&***

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

**TREEVIEW GET NEXT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET PARENT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET PREVIOUS *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET ROOT *hDlg, id& TO datav&***

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

**TREEVIEW GET SELECT *hDlg, id& TO datav&***

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

**TREEVIEW GET TEXT *hDlg, id&, hItem TO txtv\$***

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv\$*.

**TREEVIEW GET USER *hDlg, id&, hItem TO datav&***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

**TREEVIEW INSERT ITEM *hDlg, id&, hPrnt, hIAftr, image&, selimage&, txt\$ TO hItem***

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVL\_FIRST (at the beginning), %TVL\_LAST (at the end), %TVL\_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt\$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

**TREEVIEW RESET *hDlg, id&***

All data items are deleted from the specified TREEVIEW control.

**TREEVIEW SELECT *hDlg, id&, hItem***

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

**TREEVIEW SET BOLD *hDlg, id&, hItem, flag&***

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

**TREEVIEW SET CHECK *hDlg, id&, hItem, flag&***

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

**TREEVIEW SET EXPANDED *hDlg, id&, hItem, flag&***

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

**TREEVIEW SET IMAGELIST *hDlg, id&, hLst***

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

**TREEVIEW SET TEXT *hDlg, id&, hItem, txt\$***

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt\$*.

**TREEVIEW SET USER *hDlg, id&, hItem, NumExpr***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

**TREEVIEW UNSELECT *hDlg, id&***

All items in the TREEVIEW control are set to an unselected state.

See also

[Dynamic Dialog Tools](#), [CONTROL ADD TREEVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [IMAGELIST](#)

**TREEVIEW GET COUNT statement****Keyword Template**

Purpose

Syntax

Remarks

See also

## Example

# TREEVIEW statement

**Purpose** A [TreeView](#) control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

**Syntax**

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&
```

*hDlg* [Handle](#) of the [dialog](#) that owns the Treeview.

*id&* The [control identifier](#) assigned with [CONTROL ADD TREEVIEW](#).

*hItem* Handle of a Treeview item, used to uniquely identify the item

*datav&* A [long integer](#) variable to which result data is assigned.

*txtv\$* A string variable to which result data is assigned.

*hPrnt* Handle of the parent item to insert the new item under.

*hIAftr* Handle of the item to insert the new item after.

*image&* Image index of the new item

*simage&* Selected image index of the new item

*txt\$* Text to be displayed for the Treeview item

*flag&* A long integer value to define specific attributes

*hLst* [Handle of the ImageList](#) to be used for graphical items.

**TREEVIEW DELETE *hDlg, id&, hItem***

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

**TREEVIEW GET BOLD *hDlg, id&, hItem* TO *datav&***

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value [true](#) (-1) is assigned. If not bold, the value [false](#) (0) is assigned.

**TREEVIEW GET CHECK *hDlg, id&, hItem TO datav&***

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

**TREEVIEW GET CHILD *hDlg, id&, hItem TO datav&***

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET COUNT *hDlg, id& TO datav&***

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

**TREEVIEW GET EXPANDED *hDlg, id&, hItem TO datav&***

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

**TREEVIEW GET NEXT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET PARENT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET PREVIOUS *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET ROOT *hDlg, id& TO datav&***

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

**TREEVIEW GET SELECT *hDlg, id& TO datav&***

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

**TREEVIEW GET TEXT *hDlg, id&, hItem TO txtv\$***

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv\$*.

**TREEVIEW GET USER *hDlg, id&, hItem TO datav&***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of

the user item to be accessed. The returned user value is assigned to the long integer variable specified by *dataV&*. In addition to these TREEVIEW user values, every [DDI](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

### **TREEVIEW INSERT ITEM *hDlg, id&, hPrnt, hIAftr, image&, selimage&, txt\$ TO hItem***

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI\_FIRST (at the beginning), %TVI\_LAST (at the end), %TVI\_SORT (alphabetical order).

If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items.

If no image is needed, the value(s) 0 should be used. The parameter *txt\$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

### **TREEVIEW RESET *hDlg, id&***

All data items are deleted from the specified TREEVIEW control.

### **TREEVIEW SELECT *hDlg, id&, hItem***

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

### **TREEVIEW SET BOLD *hDlg, id&, hItem, flag&***

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

### **TREEVIEW SET CHECK *hDlg, id&, hItem, flag&***

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

### **TREEVIEW SET EXPANDED *hDlg, id&, hItem, flag&***

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

### **TREEVIEW SET IMAGELIST *hDlg, id&, hLst***

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

### **TREEVIEW SET TEXT *hDlg, id&, hItem, txt\$***

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt\$*.

### **TREEVIEW SET USER *hDlg, id&, hItem, NumExpr***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of

the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

### **TREEVIEW UNSELECT *hDlg, id&***

All items in the TREEVIEW control are set to an unselected state.

See also [Dynamic Dialog Tools](#), [CONTROL ADD TREEVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [IMAGELIST](#)

## TREEVIEW GET EXPANDED statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

# TREEVIEW statement

**Purpose** A [TreeView](#) control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

**Syntax**

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&
```

*hDlg* [Handle](#) of the [dialog](#) that owns the Treeview.

*id&* The [control identifier](#) assigned with [CONTROL ADD TREEVIEW](#).

|                    |                                                                           |
|--------------------|---------------------------------------------------------------------------|
| <i>hItem</i>       | Handle of a Treeview item, used to uniquely identify the item             |
| <i>datav&amp;</i>  | A <a href="#">long integer</a> variable to which result data is assigned. |
| <i>txtv\$</i>      | A string variable to which result data is assigned.                       |
| <i>hPrnt</i>       | Handle of the parent item to insert the new item under.                   |
| <i>hIAftr</i>      | Handle of the item to insert the new item after.                          |
| <i>image&amp;</i>  | Image index of the new item                                               |
| <i>simage&amp;</i> | Selected image index of the new item                                      |
| <i>txt\$</i>       | Text to be displayed for the Treeview item                                |
| <i>flag&amp;</i>   | A long integer value to define specific attributes                        |
| <i>hLst</i>        | <u>Handle of the ImageList to be used for graphical items.</u>            |

**Remarks****TREEVIEW DELETE *hDlg, id&, hItem***

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

**TREEVIEW GET BOLD *hDlg, id&, hItem* TO *datav&***

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value [true](#) (-1) is assigned. If not bold, the value [false](#) (0) is assigned.

**TREEVIEW GET CHECK *hDlg, id&, hItem* TO *datav&***

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

**TREEVIEW GET CHILD *hDlg, id&, hItem* TO *datav&***

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET COUNT *hDlg, id&* TO *datav&***

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

**TREEVIEW GET EXPANDED *hDlg, id&, hItem* TO *datav&***

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

**TREEVIEW GET NEXT *hDlg, id&, hItem* TO *datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET PARENT *hDlg, id&, hItem* TO *datav&***

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET PREVIOUS *hDlg, id&, hItem* TO *datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the

previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

### **TREEVIEW GET ROOT *hDlg, id& TO datav&***

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

### **TREEVIEW GET SELECT *hDlg, id& TO datav&***

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

### **TREEVIEW GET TEXT *hDlg, id&, hItem TO txtv\$***

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv\$*.

### **TREEVIEW GET USER *hDlg, id&, hItem TO datav&***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

### **TREEVIEW INSERT ITEM *hDlg, id&, hPrnt, hIAftr, image&, selimage&, txt\$ TO hItem***

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI\_FIRST (at the beginning), %TVI\_LAST (at the end), %TVI\_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt\$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

### **TREEVIEW RESET *hDlg, id&***

All data items are deleted from the specified TREEVIEW control.

### **TREEVIEW SELECT *hDlg, id&, hItem***

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

### **TREEVIEW SET BOLD *hDlg, id&, hItem, flag&***

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

### **TREEVIEW SET CHECK *hDlg, id&, hItem, flag&***

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is

unchecked.

### **TREEVIEW SET EXPANDED *hDlg, id&, hItem, flag&***

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

### **TREEVIEW SET IMAGELIST *hDlg, id&, hLst***

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

### **TREEVIEW SET TEXT *hDlg, id&, hItem, txt\$***

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt\$*.

### **TREEVIEW SET USER *hDlg, id&, hItem, NumExpr***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

### **TREEVIEW UNSELECT *hDlg, id&***

All items in the TREEVIEW control are set to an unselected state.

**See also** [Dynamic Dialog Tools](#), [CONTROL ADD TREEVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [IMAGELIST](#)

## TREEVIEW GET NEXT statement

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## TREEVIEW statement

**Purpose** A [TreeView](#) control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

**Syntax**

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
```

```

TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO
hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&

```

|                    |                                                                                             |
|--------------------|---------------------------------------------------------------------------------------------|
| <i>hDlg</i>        | <a href="#">Handle</a> of the <a href="#">dialog</a> that owns the Treeview.                |
| <i>id&amp;</i>     | The <a href="#">control identifier</a> assigned with <a href="#">CONTROL ADD TREEVIEW</a> . |
| <i>hItem</i>       | Handle of a Treeview item, used to uniquely identify the item                               |
| <i>datav&amp;</i>  | A <a href="#">long integer</a> variable to which result data is assigned.                   |
| <i>txtv\$</i>      | A string variable to which result data is assigned.                                         |
| <i>hPrnt</i>       | Handle of the parent item to insert the new item under.                                     |
| <i>hIAftr</i>      | Handle of the item to insert the new item after.                                            |
| <i>image&amp;</i>  | Image index of the new item                                                                 |
| <i>simage&amp;</i> | Selected image index of the new item                                                        |
| <i>txt\$</i>       | Text to be displayed for the Treeview item                                                  |
| <i>flag&amp;</i>   | A long integer value to define specific attributes                                          |
| <i>hLst</i>        | <a href="#">Handle of the ImageList to be used for graphical items.</a>                     |

#### Remarks **TREEVIEW DELETE *hDlg, id&, hItem***

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

#### **TREEVIEW GET BOLD *hDlg, id&, hItem* TO *datav&***

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value [true](#) (-1) is assigned. If not bold, the value [false](#) (0) is assigned.

#### **TREEVIEW GET CHECK *hDlg, id&, hItem* TO *datav&***

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

#### **TREEVIEW GET CHILD *hDlg, id&, hItem* TO *datav&***

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

#### **TREEVIEW GET COUNT *hDlg, id&* TO *datav&***

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

### **TREEVIEW GET EXPANDED *hDlg, id&, hItem TO datav&***

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

### **TREEVIEW GET NEXT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

### **TREEVIEW GET PARENT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

### **TREEVIEW GET PREVIOUS *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

### **TREEVIEW GET ROOT *hDlg, id& TO datav&***

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

### **TREEVIEW GET SELECT *hDlg, id& TO datav&***

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

### **TREEVIEW GET TEXT *hDlg, id&, hItem TO txtv\$***

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv\$*.

### **TREEVIEW GET USER *hDlg, id&, hItem TO datav&***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

### **TREEVIEW INSERT ITEM *hDlg, id&, hPrnt, hIAftr, image&, selimage&, txt\$ TO hItem***

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI\_FIRST (at the beginning), %TVI\_LAST (at the end), %TVI\_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items.

If no image is needed, the value(s) 0 should be used. The parameter *txt\$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

### **TREEVIEW RESET *hDlg, id&***

All data items are deleted from the specified TREEVIEW control.

### **TREEVIEW SELECT *hDlg, id&, hItem***

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

### **TREEVIEW SET BOLD *hDlg, id&, hItem, flag&***

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

### **TREEVIEW SET CHECK *hDlg, id&, hItem, flag&***

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

### **TREEVIEW SET EXPANDED *hDlg, id&, hItem, flag&***

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

### **TREEVIEW SET IMAGELIST *hDlg, id&, hLst***

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

### **TREEVIEW SET TEXT *hDlg, id&, hItem, txt\$***

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt\$*.

### **TREEVIEW SET USER *hDlg, id&, hItem, NumExpr***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

### **TREEVIEW UNSELECT *hDlg, id&***

All items in the TREEVIEW control are set to an unselected state.

See also

[Dynamic Dialog Tools](#), [CONTROL ADD TREEVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [IMAGELIST](#)

## TREEVIEW GET PARENT statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## TREEVIEW statement

**Purpose** A [TreeView](#) control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text  
 . Each time you add an item, you must specify its relationship to existing data items.

**Syntax**

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&
```

*hDlg* [Handle](#) of the [dialog](#) that owns the Treeview.

*id&* The [control identifier](#) assigned with [CONTROL ADD TREEVIEW](#).

*hItem* Handle of a Treeview item, used to uniquely identify the item

*datav&* A [long integer](#) variable to which result data is assigned.

*txtv\$* A string variable to which result data is assigned.

*hPrnt* Handle of the parent item to insert the new item under.

*hIAftr* Handle of the item to insert the new item after.

*image&* Image index of the new item

*simage&* Selected image index of the new item

*txt\$* Text to be displayed for the Treeview item

*flag&* A long integer value to define specific attributes

*hLst* [Handle of the ImageList](#) to be used for graphical items.

## Remarks

**TREEVIEW DELETE *hDlg, id&, hItem***

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

**TREEVIEW GET BOLD *hDlg, id&, hItem TO datav&***

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value [true](#) (-1) is assigned. If not bold, the value [false](#) (0) is assigned.

**TREEVIEW GET CHECK *hDlg, id&, hItem TO datav&***

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

**TREEVIEW GET CHILD *hDlg, id&, hItem TO datav&***

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET COUNT *hDlg, id& TO datav&***

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

**TREEVIEW GET EXPANDED *hDlg, id&, hItem TO datav&***

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

**TREEVIEW GET NEXT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET PARENT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET PREVIOUS *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET ROOT *hDlg, id& TO datav&***

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

**TREEVIEW GET SELECT *hDlg, id& TO datav&***

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

**TREEVIEW GET TEXT *hDlg, id&, hItem TO txtv\$***

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txt\$*.

### **TREEVIEW GET USER *hDlg, id&, hItem TO datav&***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

### **TREEVIEW INSERT ITEM *hDlg, id&, hPrnt, hIAftr, image&, selimage&, txt\$ TO hItem***

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI\_FIRST (at the beginning), %TVI\_LAST (at the end), %TVI\_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt\$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

### **TREEVIEW RESET *hDlg, id&***

All data items are deleted from the specified TREEVIEW control.

### **TREEVIEW SELECT *hDlg, id&, hItem***

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

### **TREEVIEW SET BOLD *hDlg, id&, hItem, flag&***

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

### **TREEVIEW SET CHECK *hDlg, id&, hItem, flag&***

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

### **TREEVIEW SET EXPANDED *hDlg, id&, hItem, flag&***

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

### **TREEVIEW SET IMAGELIST *hDlg, id&, hLst***

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

### **TREEVIEW SET TEXT *hDlg, id&, hItem, txt\$***

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt\$*.

### **TREEVIEW SET USER *hDlg, id&, hItem, NumExpr***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

### **TREEVIEW UNSELECT *hDlg, id&***

All items in the TREEVIEW control are set to an unselected state.

**See also** [Dynamic Dialog Tools](#), [CONTROL ADD TREEVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [IMAGELIST](#)

## TREEVIEW GET PREVIOUS statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

# TREEVIEW statement

**Purpose** A [TreeView](#) control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

**Syntax**

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
```

```
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&
```

|                    |                                                                                             |
|--------------------|---------------------------------------------------------------------------------------------|
| <i>hDlg</i>        | <a href="#">Handle</a> of the <a href="#">dialog</a> that owns the Treeview.                |
| <i>id&amp;</i>     | The <a href="#">control identifier</a> assigned with <a href="#">CONTROL.ADD.TREEVIEW</a> . |
| <i>hItem</i>       | Handle of a Treeview item, used to uniquely identify the item                               |
| <i>datav&amp;</i>  | A <a href="#">long integer</a> variable to which result data is assigned.                   |
| <i>txtv\$</i>      | A string variable to which result data is assigned.                                         |
| <i>hPrnt</i>       | Handle of the parent item to insert the new item under.                                     |
| <i>hIAftr</i>      | Handle of the item to insert the new item after.                                            |
| <i>image&amp;</i>  | Image index of the new item                                                                 |
| <i>simage&amp;</i> | Selected image index of the new item                                                        |
| <i>txt\$</i>       | Text to be displayed for the Treeview item                                                  |
| <i>flag&amp;</i>   | A long integer value to define specific attributes                                          |
| <i>hLst</i>        | <a href="#">Handle of the ImageList to be used for graphical items.</a>                     |
| <b>Remarks</b>     | <b><u>TREEVIEW DELETE <i>hDlg, id&amp;, hItem</i></u></b>                                   |

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

#### **TREEVIEW GET BOLD *hDlg, id&, hItem TO datav&***

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value [true](#) (-1) is assigned. If not bold, the value [false](#) (0) is assigned.

#### **TREEVIEW GET CHECK *hDlg, id&, hItem TO datav&***

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

#### **TREEVIEW GET CHILD *hDlg, id&, hItem TO datav&***

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

#### **TREEVIEW GET COUNT *hDlg, id& TO datav&***

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

#### **TREEVIEW GET EXPANDED *hDlg, id&, hItem TO datav&***

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

#### **TREEVIEW GET NEXT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET PARENT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET PREVIOUS *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET ROOT *hDlg, id& TO datav&***

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

**TREEVIEW GET SELECT *hDlg, id& TO datav&***

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

**TREEVIEW GET TEXT *hDlg, id&, hItem TO txtv\$***

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv\$*.

**TREEVIEW GET USER *hDlg, id&, hItem TO datav&***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every [DDI](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

**TREEVIEW INSERT ITEM *hDlg, id&, hPrnt, hIAftr, image&, selimage&, txt\$ TO hItem***

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI\_FIRST (at the beginning), %TVI\_LAST (at the end), %TVI\_SORT (alphabetical order).

If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items.

If no image is needed, the value(s) 0 should be used. The parameter *txt\$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

**TREEVIEW RESET *hDlg, id&***

All data items are deleted from the specified TREEVIEW control.

**TREEVIEW SELECT *hDlg, id&, hItem***

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

**TREEVIEW SET BOLD *hDlg, id&, hItem, flag&***

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

**TREEVIEW SET CHECK *hDlg, id&, hItem, flag&***

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

**TREEVIEW SET EXPANDED *hDlg, id&, hItem, flag&***

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

**TREEVIEW SET IMAGELIST *hDlg, id&, hLst***

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

**TREEVIEW SET TEXT *hDlg, id&, hItem, txt\$***

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt\$*.

**TREEVIEW SET USER *hDlg, id&, hItem, NumExpr***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

**TREEVIEW UNSELECT *hDlg, id&***

All items in the TREEVIEW control are set to an unselected state.

See also

[Dynamic Dialog Tools](#), [CONTROL ADD TREEVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [IMAGELIST](#)

## TREEVIEW GET ROOT statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

# TREEVIEW statement

**Purpose** A [TreeView](#) control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

## Syntax

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO
hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&
```

*hDlg* [Handle](#) of the [dialog](#) that owns the Treeview.

*id&* The [control identifier](#) assigned with [CONTROL ADD TREEVIEW](#).

*hItem* Handle of a Treeview item, used to uniquely identify the item

*datav&* A [long integer](#) variable to which result data is assigned.

*txtv\$* A string variable to which result data is assigned.

*hPrnt* Handle of the parent item to insert the new item under.

*hIAftr* Handle of the item to insert the new item after.

*image&* Image index of the new item

*simage&* Selected image index of the new item

*txt\$* Text to be displayed for the Treeview item

*flag&* A long integer value to define specific attributes

*hLst* [Handle of the ImageList to be used for graphical items.](#)

## Remarks

### **TREEVIEW DELETE *hDlg, id&, hItem***

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

### **TREEVIEW GET BOLD *hDlg, id&, hItem* TO *datav&***

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*.

If the item is bold, the value [true](#) (-1) is assigned. If not bold, the value [false](#) (0) is assigned.

### **TREEVIEW GET CHECK *hDlg, id&, hItem* TO *datav&***

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

### **TREEVIEW GET CHILD *hDlg, id&, hItem TO datav&***

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

### **TREEVIEW GET COUNT *hDlg, id& TO datav&***

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

### **TREEVIEW GET EXPANDED *hDlg, id&, hItem TO datav&***

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

### **TREEVIEW GET NEXT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

### **TREEVIEW GET PARENT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

### **TREEVIEW GET PREVIOUS *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

### **TREEVIEW GET ROOT *hDlg, id& TO datav&***

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

### **TREEVIEW GET SELECT *hDlg, id& TO datav&***

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

### **TREEVIEW GET TEXT *hDlg, id&, hItem TO txtv\$***

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv\$*.

### **TREEVIEW GET USER *hDlg, id&, hItem TO datav&***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every [DDI](#)

control offers an additional eight user values which can be accessed with [CONTROL\\_GET\\_USER](#) and [CONTROL\\_SET\\_USER](#).

### **TREEVIEW INSERT ITEM *hDlg, id&, hPrnt, hIAftr, image&, selimage&, txt\$ TO hItem***

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI\_FIRST (at the beginning), %TVI\_LAST (at the end), %TVI\_SORT (alphabetical order).

If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items.

If no image is needed, the value(s) 0 should be used. The parameter *txt\$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

### **TREEVIEW RESET *hDlg, id&***

All data items are deleted from the specified TREEVIEW control.

### **TREEVIEW SELECT *hDlg, id&, hItem***

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

### **TREEVIEW SET BOLD *hDlg, id&, hItem, flag&***

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

### **TREEVIEW SET CHECK *hDlg, id&, hItem, flag&***

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

### **TREEVIEW SET EXPANDED *hDlg, id&, hItem, flag&***

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

### **TREEVIEW SET IMAGELIST *hDlg, id&, hLst***

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

### **TREEVIEW SET TEXT *hDlg, id&, hItem, txt\$***

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt\$*.

### **TREEVIEW SET USER *hDlg, id&, hItem, NumExpr***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight

user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

### **TREEVIEW UNSELECT *hDlg, id&***

All items in the TREEVIEW control are set to an unselected state.

See also [Dynamic Dialog Tools](#), [CONTROL ADD TREEVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [IMAGELIST](#)

## TREEVIEW GET SELECT statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

# TREEVIEW statement

**Purpose** A [TreeView](#) control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

**Syntax**

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&
```

*hDlg* [Handle](#) of the [dialog](#) that owns the Treeview.

*id&* The [control identifier](#) assigned with [CONTROL ADD TREEVIEW](#).

*hItem* Handle of a Treeview item, used to uniquely identify the item

|                    |                                                                           |
|--------------------|---------------------------------------------------------------------------|
| <i>datav&amp;</i>  | A <a href="#">long integer</a> variable to which result data is assigned. |
| <i>txtv\$</i>      | A string variable to which result data is assigned.                       |
| <i>hPrnt</i>       | Handle of the parent item to insert the new item under.                   |
| <i>hIAftr</i>      | Handle of the item to insert the new item after.                          |
| <i>image&amp;</i>  | Image index of the new item                                               |
| <i>simage&amp;</i> | Selected image index of the new item                                      |
| <i>txt\$</i>       | Text to be displayed for the Treeview item                                |
| <i>flag&amp;</i>   | A long integer value to define specific attributes                        |
| <i>hLst</i>        | <u>Handle of the ImageList to be used for graphical items.</u>            |

**Remarks****TREEVIEW DELETE *hDlg, id&, hItem***

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

**TREEVIEW GET BOLD *hDlg, id&, hItem TO datav&***

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value [true](#) (-1) is assigned. If not bold, the value [false](#) (0) is assigned.

**TREEVIEW GET CHECK *hDlg, id&, hItem TO datav&***

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

**TREEVIEW GET CHILD *hDlg, id&, hItem TO datav&***

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET COUNT *hDlg, id& TO datav&***

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

**TREEVIEW GET EXPANDED *hDlg, id&, hItem TO datav&***

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

**TREEVIEW GET NEXT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET PARENT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET PREVIOUS *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is

found, the value zero (0) is assigned to *datav&*.

### **TREEVIEW GET ROOT *hDlg, id& TO datav&***

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

### **TREEVIEW GET SELECT *hDlg, id& TO datav&***

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

### **TREEVIEW GET TEXT *hDlg, id&, hItem TO txtv\$***

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv\$*.

### **TREEVIEW GET USER *hDlg, id&, hItem TO datav&***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

### **TREEVIEW INSERT ITEM *hDlg, id&, hPnt, hAft, image&, selimage&, txt\$ TO hItem***

A new data item is added to this TREEVIEW control. The parameter *hPnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hAft* specifies the handle of the item after which this new item is to be inserted, or %TVI\_FIRST (at the beginning), %TVI\_LAST (at the end), %TVI\_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt\$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

### **TREEVIEW RESET *hDlg, id&***

All data items are deleted from the specified TREEVIEW control.

### **TREEVIEW SELECT *hDlg, id&, hItem***

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

### **TREEVIEW SET BOLD *hDlg, id&, hItem, flag&***

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

### **TREEVIEW SET CHECK *hDlg, id&, hItem, flag&***

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

**TREEVIEW SET EXPANDED *hDlg, id&, hItem, flag&***

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

**TREEVIEW SET IMAGELIST *hDlg, id&, hLst***

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

**TREEVIEW SET TEXT *hDlg, id&, hItem, txt\$***

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt\$*.

**TREEVIEW SET USER *hDlg, id&, hItem, NumExpr***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

**TREEVIEW UNSELECT *hDlg, id&***

All items in the TREEVIEW control are set to an unselected state.

See also

[Dynamic Dialog Tools](#), [CONTROL ADD TREEVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [IMAGELIST](#)

**TREEVIEW GET TEXT statement**

## Keyword Template

Purpose

Syntax

Remarks

See also

Example

## TREEVIEW statement

**Purpose** A [TreeView](#) control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

**Syntax**

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
```

```

TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO
hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&

```

|                    |                                                                                            |
|--------------------|--------------------------------------------------------------------------------------------|
| <i>hDlg</i>        | <a href="#">Handle</a> of the <a href="#">dialog</a> that owns the Treeview.               |
| <i>id&amp;</i>     | The <a href="#">control identifier</a> assigned with <a href="#">CONTROL.ADD.TREEVIEW.</a> |
| <i>hItem</i>       | Handle of a Treeview item, used to uniquely identify the item                              |
| <i>datav&amp;</i>  | A <a href="#">long integer</a> variable to which result data is assigned.                  |
| <i>txtv\$</i>      | A string variable to which result data is assigned.                                        |
| <i>hPrnt</i>       | Handle of the parent item to insert the new item under.                                    |
| <i>hIAftr</i>      | Handle of the item to insert the new item after.                                           |
| <i>image&amp;</i>  | Image index of the new item                                                                |
| <i>simage&amp;</i> | Selected image index of the new item                                                       |
| <i>txt\$</i>       | Text to be displayed for the Treeview item                                                 |
| <i>flag&amp;</i>   | A long integer value to define specific attributes                                         |
| <i>hLst</i>        | <a href="#">Handle of the ImageList to be used for graphical items.</a>                    |

**Remarks****TREEVIEW DELETE *hDlg, id&, hItem***

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

**TREEVIEW GET BOLD *hDlg, id&, hItem* TO *datav&***

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value [true](#) (-1) is assigned. If not bold, the value [false](#) (0) is assigned.

**TREEVIEW GET CHECK *hDlg, id&, hItem* TO *datav&***

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

**TREEVIEW GET CHILD *hDlg, id&, hItem* TO *datav&***

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET COUNT *hDlg, id&* TO *datav&***

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer

variable specified by *datav&*.

### **TREEVIEW GET EXPANDED *hDlg, id&, hItem TO datav&***

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

### **TREEVIEW GET NEXT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

### **TREEVIEW GET PARENT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

### **TREEVIEW GET PREVIOUS *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

### **TREEVIEW GET ROOT *hDlg, id& TO datav&***

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

### **TREEVIEW GET SELECT *hDlg, id& TO datav&***

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

### **TREEVIEW GET TEXT *hDlg, id&, hItem TO txtv\$***

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv\$*.

### **TREEVIEW GET USER *hDlg, id&, hItem TO datav&***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

### **TREEVIEW INSERT ITEM *hDlg, id&, hPrnt, hIAftr, image&, selimage&, txt\$ TO hItem***

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI\_FIRST (at the beginning), %TVI\_LAST (at the end), %TVI\_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt\$* designates the

text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

### **TREEVIEW RESET *hDlg, id&***

All data items are deleted from the specified TREEVIEW control.

### **TREEVIEW SELECT *hDlg, id&, hItem***

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

### **TREEVIEW SET BOLD *hDlg, id&, hItem, flag&***

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

### **TREEVIEW SET CHECK *hDlg, id&, hItem, flag&***

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

### **TREEVIEW SET EXPANDED *hDlg, id&, hItem, flag&***

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

### **TREEVIEW SET IMAGELIST *hDlg, id&, hLst***

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

### **TREEVIEW SET TEXT *hDlg, id&, hItem, txt\$***

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt\$*.

### **TREEVIEW SET USER *hDlg, id&, hItem, NumExpr***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

### **TREEVIEW UNSELECT *hDlg, id&***

All items in the TREEVIEW control are set to an unselected state.

See also

[Dynamic Dialog Tools](#), [CONTROL ADD TREEVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [IMAGELIST](#)

## TREEVIEW GET USER statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## TREEVIEW statement

**Purpose** A [TreeView](#) control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text  
 . Each time you add an item, you must specify its relationship to existing data items.

**Syntax**

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO
hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&
```

*hDlg* [Handle](#) of the [dialog](#) that owns the Treeview.

*id&* The [control identifier](#) assigned with [CONTROL ADD TREEVIEW](#).

*hItem* Handle of a Treeview item, used to uniquely identify the item

*datav&* A [long integer](#) variable to which result data is assigned.

*txtv\$* A string variable to which result data is assigned.

*hPrnt* Handle of the parent item to insert the new item under.

*hIAftr* Handle of the item to insert the new item after.

*image&* Image index of the new item

*simage&* Selected image index of the new item

*txt\$* Text to be displayed for the Treeview item

*flag&* A long integer value to define specific attributes

*hLst* [Handle of the ImageList to be used for graphical items.](#)

## Remarks

**TREEVIEW DELETE *hDlg, id&, hItem***

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

**TREEVIEW GET BOLD *hDlg, id&, hItem TO datav&***

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value [true](#) (-1) is assigned. If not bold, the value [false](#) (0) is assigned.

**TREEVIEW GET CHECK *hDlg, id&, hItem TO datav&***

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

**TREEVIEW GET CHILD *hDlg, id&, hItem TO datav&***

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET COUNT *hDlg, id& TO datav&***

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

**TREEVIEW GET EXPANDED *hDlg, id&, hItem TO datav&***

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

**TREEVIEW GET NEXT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET PARENT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET PREVIOUS *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET ROOT *hDlg, id& TO datav&***

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

**TREEVIEW GET SELECT *hDlg, id& TO datav&***

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

**TREEVIEW GET TEXT *hDlg, id&, hItem TO txtv\$***

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txt\$*.

### **TREEVIEW GET USER *hDlg, id&, hItem TO datav&***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

### **TREEVIEW INSERT ITEM *hDlg, id&, hPrnt, hIAftr, image&, selimage&, txt\$ TO hItem***

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI\_FIRST (at the beginning), %TVI\_LAST (at the end), %TVI\_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt\$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

### **TREEVIEW RESET *hDlg, id&***

All data items are deleted from the specified TREEVIEW control.

### **TREEVIEW SELECT *hDlg, id&, hItem***

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

### **TREEVIEW SET BOLD *hDlg, id&, hItem, flag&***

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

### **TREEVIEW SET CHECK *hDlg, id&, hItem, flag&***

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

### **TREEVIEW SET EXPANDED *hDlg, id&, hItem, flag&***

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

### **TREEVIEW SET IMAGELIST *hDlg, id&, hLst***

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

### **TREEVIEW SET TEXT *hDlg, id&, hItem, txt\$***

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt\$*.

### **TREEVIEW SET USER *hDlg, id&, hItem, NumExpr***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

### **TREEVIEW UNSELECT *hDlg, id&***

All items in the TREEVIEW control are set to an unselected state.

**See also** [Dynamic Dialog Tools](#), [CONTROL ADD TREEVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [IMAGELIST](#)

## TREEVIEW INSERT ITEM statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## TREEVIEW statement

**Purpose** A [TreeView](#) control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

**Syntax**

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
```

```
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&
```

|                    |                                                                                             |
|--------------------|---------------------------------------------------------------------------------------------|
| <i>hDlg</i>        | <a href="#">Handle</a> of the <a href="#">dialog</a> that owns the Treeview.                |
| <i>id&amp;</i>     | The <a href="#">control identifier</a> assigned with <a href="#">CONTROL.ADD.TREEVIEW</a> . |
| <i>hItem</i>       | Handle of a Treeview item, used to uniquely identify the item                               |
| <i>datav&amp;</i>  | A <a href="#">long integer</a> variable to which result data is assigned.                   |
| <i>txtv\$</i>      | A string variable to which result data is assigned.                                         |
| <i>hPrnt</i>       | Handle of the parent item to insert the new item under.                                     |
| <i>hIAftr</i>      | Handle of the item to insert the new item after.                                            |
| <i>image&amp;</i>  | Image index of the new item                                                                 |
| <i>simage&amp;</i> | Selected image index of the new item                                                        |
| <i>txt\$</i>       | Text to be displayed for the Treeview item                                                  |
| <i>flag&amp;</i>   | A long integer value to define specific attributes                                          |
| <i>hLst</i>        | <a href="#">Handle of the ImageList to be used for graphical items.</a>                     |
| <b>Remarks</b>     | <b><u>TREEVIEW DELETE <i>hDlg, id&amp;, hItem</i></u></b>                                   |

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

#### **TREEVIEW GET BOLD *hDlg, id&, hItem TO datav&***

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value [true](#) (-1) is assigned. If not bold, the value [false](#) (0) is assigned.

#### **TREEVIEW GET CHECK *hDlg, id&, hItem TO datav&***

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

#### **TREEVIEW GET CHILD *hDlg, id&, hItem TO datav&***

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

#### **TREEVIEW GET COUNT *hDlg, id& TO datav&***

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

#### **TREEVIEW GET EXPANDED *hDlg, id&, hItem TO datav&***

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

#### **TREEVIEW GET NEXT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET PARENT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET PREVIOUS *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET ROOT *hDlg, id& TO datav&***

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

**TREEVIEW GET SELECT *hDlg, id& TO datav&***

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

**TREEVIEW GET TEXT *hDlg, id&, hItem TO txtv\$***

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv\$*.

**TREEVIEW GET USER *hDlg, id&, hItem TO datav&***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every [DDI](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

**TREEVIEW INSERT ITEM *hDlg, id&, hPrnt, hIAftr, image&, selimage&, txt\$ TO hItem***

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI\_FIRST (at the beginning), %TVI\_LAST (at the end), %TVI\_SORT (alphabetical order).

If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items.

If no image is needed, the value(s) 0 should be used. The parameter *txt\$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

**TREEVIEW RESET *hDlg, id&***

All data items are deleted from the specified TREEVIEW control.

**TREEVIEW SELECT *hDlg, id&, hItem***

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

**TREEVIEW SET BOLD *hDlg, id&, hItem, flag&***

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

**TREEVIEW SET CHECK *hDlg, id&, hItem, flag&***

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

**TREEVIEW SET EXPANDED *hDlg, id&, hItem, flag&***

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

**TREEVIEW SET IMAGELIST *hDlg, id&, hLst***

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

**TREEVIEW SET TEXT *hDlg, id&, hItem, txt\$***

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt\$*.

**TREEVIEW SET USER *hDlg, id&, hItem, NumExpr***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

**TREEVIEW UNSELECT *hDlg, id&***

All items in the TREEVIEW control are set to an unselected state.

See also

[Dynamic Dialog Tools](#), [CONTROL ADD TREEVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [IMAGELIST](#)

## TREEVIEW RESET statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

# TREEVIEW statement

**Purpose** A [TreeView](#) control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

**Syntax**

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO
hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&
```

*hDlg* [Handle](#) of the [dialog](#) that owns the Treeview.

*id&* The [control identifier](#) assigned with [CONTROL ADD TREEVIEW](#).

*hItem* Handle of a Treeview item, used to uniquely identify the item

*datav&* A [long integer](#) variable to which result data is assigned.

*txtv\$* A string variable to which result data is assigned.

*hPrnt* Handle of the parent item to insert the new item under.

*hIAftr* Handle of the item to insert the new item after.

*image&* Image index of the new item

*simage&* Selected image index of the new item

*txt\$* Text to be displayed for the Treeview item

*flag&* A long integer value to define specific attributes

*hLst* [Handle of the ImageList to be used for graphical items.](#)

**Remarks** **TREEVIEW DELETE *hDlg, id&, hItem***

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

**TREEVIEW GET BOLD *hDlg, id&, hItem* TO *datav&***

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*.

If the item is bold, the value [true](#) (-1) is assigned. If not bold, the value [false](#) (0) is assigned.

**TREEVIEW GET CHECK *hDlg, id&, hItem* TO *datav&***

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

### **TREEVIEW GET CHILD *hDlg, id&, hItem TO datav&***

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

### **TREEVIEW GET COUNT *hDlg, id& TO datav&***

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

### **TREEVIEW GET EXPANDED *hDlg, id&, hItem TO datav&***

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

### **TREEVIEW GET NEXT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

### **TREEVIEW GET PARENT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

### **TREEVIEW GET PREVIOUS *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

### **TREEVIEW GET ROOT *hDlg, id& TO datav&***

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

### **TREEVIEW GET SELECT *hDlg, id& TO datav&***

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

### **TREEVIEW GET TEXT *hDlg, id&, hItem TO txtv\$***

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv\$*.

### **TREEVIEW GET USER *hDlg, id&, hItem TO datav&***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every [DDI](#)

control offers an additional eight user values which can be accessed with [CONTROL\\_GET\\_USER](#) and [CONTROL\\_SET\\_USER](#).

### **TREEVIEW INSERT ITEM *hDlg, id&, hPrnt, hIAftr, image&, selimage&, txt\$ TO hItem***

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI\_FIRST (at the beginning), %TVI\_LAST (at the end), %TVI\_SORT (alphabetical order).

If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items.

If no image is needed, the value(s) 0 should be used. The parameter *txt\$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

### **TREEVIEW RESET *hDlg, id&***

All data items are deleted from the specified TREEVIEW control.

### **TREEVIEW SELECT *hDlg, id&, hItem***

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

### **TREEVIEW SET BOLD *hDlg, id&, hItem, flag&***

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

### **TREEVIEW SET CHECK *hDlg, id&, hItem, flag&***

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

### **TREEVIEW SET EXPANDED *hDlg, id&, hItem, flag&***

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

### **TREEVIEW SET IMAGELIST *hDlg, id&, hLst***

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

### **TREEVIEW SET TEXT *hDlg, id&, hItem, txt\$***

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt\$*.

### **TREEVIEW SET USER *hDlg, id&, hItem, NumExpr***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight

user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

### **TREEVIEW UNSELECT *hDlg, id&***

All items in the TREEVIEW control are set to an unselected state.

See also [Dynamic Dialog Tools](#), [CONTROL ADD TREEVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [IMAGELIST](#)

## TREEVIEW SELECT statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

# TREEVIEW statement

**Purpose** A [TreeView](#) control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

**Syntax**

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&
```

*hDlg* [Handle](#) of the [dialog](#) that owns the Treeview.

*id&* The [control identifier](#) assigned with [CONTROL ADD TREEVIEW](#).

*hItem* Handle of a Treeview item, used to uniquely identify the item

|                    |                                                                           |
|--------------------|---------------------------------------------------------------------------|
| <i>datav&amp;</i>  | A <a href="#">long integer</a> variable to which result data is assigned. |
| <i>txtv\$</i>      | A string variable to which result data is assigned.                       |
| <i>hPrnt</i>       | Handle of the parent item to insert the new item under.                   |
| <i>hIAftr</i>      | Handle of the item to insert the new item after.                          |
| <i>image&amp;</i>  | Image index of the new item                                               |
| <i>simage&amp;</i> | Selected image index of the new item                                      |
| <i>txt\$</i>       | Text to be displayed for the Treeview item                                |
| <i>flag&amp;</i>   | A long integer value to define specific attributes                        |
| <i>hLst</i>        | <u>Handle of the ImageList to be used for graphical items.</u>            |

**Remarks****TREEVIEW DELETE *hDlg, id&, hItem***

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

**TREEVIEW GET BOLD *hDlg, id&, hItem TO datav&***

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value [true](#) (-1) is assigned. If not bold, the value [false](#) (0) is assigned.

**TREEVIEW GET CHECK *hDlg, id&, hItem TO datav&***

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

**TREEVIEW GET CHILD *hDlg, id&, hItem TO datav&***

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET COUNT *hDlg, id& TO datav&***

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

**TREEVIEW GET EXPANDED *hDlg, id&, hItem TO datav&***

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

**TREEVIEW GET NEXT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET PARENT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET PREVIOUS *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is

found, the value zero (0) is assigned to *datav&*.

### **TREEVIEW GET ROOT *hDlg, id& TO datav&***

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

### **TREEVIEW GET SELECT *hDlg, id& TO datav&***

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

### **TREEVIEW GET TEXT *hDlg, id&, hItem TO txtv\$***

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv\$*.

### **TREEVIEW GET USER *hDlg, id&, hItem TO datav&***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

### **TREEVIEW INSERT ITEM *hDlg, id&, hPrnt, hIAftr, image&, selimage&, txt\$ TO hItem***

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI\_FIRST (at the beginning), %TVI\_LAST (at the end), %TVI\_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt\$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

### **TREEVIEW RESET *hDlg, id&***

All data items are deleted from the specified TREEVIEW control.

### **TREEVIEW SELECT *hDlg, id&, hItem***

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

### **TREEVIEW SET BOLD *hDlg, id&, hItem, flag&***

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

### **TREEVIEW SET CHECK *hDlg, id&, hItem, flag&***

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

**TREEVIEW SET EXPANDED *hDlg, id&, hItem, flag&***

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

**TREEVIEW SET IMAGELIST *hDlg, id&, hLst***

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

**TREEVIEW SET TEXT *hDlg, id&, hItem, txt\$***

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt\$*.

**TREEVIEW SET USER *hDlg, id&, hItem, NumExpr***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

**TREEVIEW UNSELECT *hDlg, id&***

All items in the TREEVIEW control are set to an unselected state.

See also

[Dynamic Dialog Tools](#), [CONTROL ADD TREEVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [IMAGELIST](#)

**TREEVIEW SET BOLD statement**

## Keyword Template

Purpose

Syntax

Remarks

See also

Example

## TREEVIEW statement

Purpose

A [TreeView](#) control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

Syntax

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
```

```

TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO
hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&

```

|                    |                                                                                             |
|--------------------|---------------------------------------------------------------------------------------------|
| <i>hDlg</i>        | <a href="#">Handle</a> of the <a href="#">dialog</a> that owns the Treeview.                |
| <i>id&amp;</i>     | The <a href="#">control identifier</a> assigned with <a href="#">CONTROL ADD TREEVIEW</a> . |
| <i>hItem</i>       | Handle of a Treeview item, used to uniquely identify the item                               |
| <i>datav&amp;</i>  | A <a href="#">long integer</a> variable to which result data is assigned.                   |
| <i>txtv\$</i>      | A string variable to which result data is assigned.                                         |
| <i>hPrnt</i>       | Handle of the parent item to insert the new item under.                                     |
| <i>hIAftr</i>      | Handle of the item to insert the new item after.                                            |
| <i>image&amp;</i>  | Image index of the new item                                                                 |
| <i>simage&amp;</i> | Selected image index of the new item                                                        |
| <i>txt\$</i>       | Text to be displayed for the Treeview item                                                  |
| <i>flag&amp;</i>   | A long integer value to define specific attributes                                          |
| <i>hLst</i>        | <a href="#">Handle of the ImageList to be used for graphical items.</a>                     |

**Remarks****TREEVIEW DELETE *hDlg, id&, hItem***

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

**TREEVIEW GET BOLD *hDlg, id&, hItem* TO *datav&***

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value [true](#) (-1) is assigned. If not bold, the value [false](#) (0) is assigned.

**TREEVIEW GET CHECK *hDlg, id&, hItem* TO *datav&***

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

**TREEVIEW GET CHILD *hDlg, id&, hItem* TO *datav&***

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET COUNT *hDlg, id&* TO *datav&***

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer

variable specified by *datav&*.

### **TREEVIEW GET EXPANDED *hDlg, id&, hItem TO datav&***

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

### **TREEVIEW GET NEXT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

### **TREEVIEW GET PARENT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

### **TREEVIEW GET PREVIOUS *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

### **TREEVIEW GET ROOT *hDlg, id& TO datav&***

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

### **TREEVIEW GET SELECT *hDlg, id& TO datav&***

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

### **TREEVIEW GET TEXT *hDlg, id&, hItem TO txtv\$***

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv\$*.

### **TREEVIEW GET USER *hDlg, id&, hItem TO datav&***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

### **TREEVIEW INSERT ITEM *hDlg, id&, hPrnt, hIAftr, image&, selimage&, txt\$ TO hItem***

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI\_FIRST (at the beginning), %TVI\_LAST (at the end), %TVI\_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt\$* designates the

text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

### **TREEVIEW RESET *hDlg, id&***

All data items are deleted from the specified TREEVIEW control.

### **TREEVIEW SELECT *hDlg, id&, hItem***

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

### **TREEVIEW SET BOLD *hDlg, id&, hItem, flag&***

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

### **TREEVIEW SET CHECK *hDlg, id&, hItem, flag&***

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

### **TREEVIEW SET EXPANDED *hDlg, id&, hItem, flag&***

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

### **TREEVIEW SET IMAGELIST *hDlg, id&, hLst***

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

### **TREEVIEW SET TEXT *hDlg, id&, hItem, txt\$***

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt\$*.

### **TREEVIEW SET USER *hDlg, id&, hItem, NumExpr***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

### **TREEVIEW UNSELECT *hDlg, id&***

All items in the TREEVIEW control are set to an unselected state.

See also

[Dynamic Dialog Tools](#), [CONTROL ADD TREEVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [IMAGELIST](#)

## TREEVIEW SET CHECK statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## TREEVIEW statement

**Purpose** A [TreeView](#) control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text  
 . Each time you add an item, you must specify its relationship to existing data items.

**Syntax**

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO
hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&
```

*hDlg* [Handle](#) of the [dialog](#) that owns the Treeview.

*id&* The [control identifier](#) assigned with [CONTROL ADD TREEVIEW](#).

*hItem* Handle of a Treeview item, used to uniquely identify the item

*datav&* A [long integer](#) variable to which result data is assigned.

*txtv\$* A string variable to which result data is assigned.

*hPrnt* Handle of the parent item to insert the new item under.

*hIAftr* Handle of the item to insert the new item after.

*image&* Image index of the new item

*simage&* Selected image index of the new item

*txt\$* Text to be displayed for the Treeview item

*flag&* A long integer value to define specific attributes

*hLst* [Handle of the ImageList to be used for graphical items.](#)

## Remarks

**TREEVIEW DELETE *hDlg, id&, hItem***

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

**TREEVIEW GET BOLD *hDlg, id&, hItem TO datav&***

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value [true](#) (-1) is assigned. If not bold, the value [false](#) (0) is assigned.

**TREEVIEW GET CHECK *hDlg, id&, hItem TO datav&***

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

**TREEVIEW GET CHILD *hDlg, id&, hItem TO datav&***

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET COUNT *hDlg, id& TO datav&***

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

**TREEVIEW GET EXPANDED *hDlg, id&, hItem TO datav&***

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

**TREEVIEW GET NEXT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET PARENT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET PREVIOUS *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET ROOT *hDlg, id& TO datav&***

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

**TREEVIEW GET SELECT *hDlg, id& TO datav&***

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

**TREEVIEW GET TEXT *hDlg, id&, hItem TO txtv\$***

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txt\$*.

### **TREEVIEW GET USER *hDlg, id&, hItem TO datav&***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

### **TREEVIEW INSERT ITEM *hDlg, id&, hPrnt, hIAftr, image&, selimage&, txt\$ TO hItem***

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI\_FIRST (at the beginning), %TVI\_LAST (at the end), %TVI\_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt\$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

### **TREEVIEW RESET *hDlg, id&***

All data items are deleted from the specified TREEVIEW control.

### **TREEVIEW SELECT *hDlg, id&, hItem***

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

### **TREEVIEW SET BOLD *hDlg, id&, hItem, flag&***

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

### **TREEVIEW SET CHECK *hDlg, id&, hItem, flag&***

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

### **TREEVIEW SET EXPANDED *hDlg, id&, hItem, flag&***

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

### **TREEVIEW SET IMAGELIST *hDlg, id&, hLst***

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

### **TREEVIEW SET TEXT *hDlg, id&, hItem, txt\$***

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt\$*.

### **TREEVIEW SET USER *hDlg, id&, hItem, NumExpr***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

### **TREEVIEW UNSELECT *hDlg, id&***

All items in the TREEVIEW control are set to an unselected state.

**See also** [Dynamic Dialog Tools](#), [CONTROL ADD TREEVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [IMAGELIST](#)

## TREEVIEW SET EXPANDED statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

# TREEVIEW statement

**Purpose** A [TreeView](#) control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

**Syntax**

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
```

```
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&
```

|                    |                                                                                             |
|--------------------|---------------------------------------------------------------------------------------------|
| <i>hDlg</i>        | <a href="#">Handle</a> of the <a href="#">dialog</a> that owns the Treeview.                |
| <i>id&amp;</i>     | The <a href="#">control identifier</a> assigned with <a href="#">CONTROL.ADD.TREEVIEW</a> . |
| <i>hItem</i>       | Handle of a Treeview item, used to uniquely identify the item                               |
| <i>datav&amp;</i>  | A <a href="#">long integer</a> variable to which result data is assigned.                   |
| <i>txtv\$</i>      | A string variable to which result data is assigned.                                         |
| <i>hPrnt</i>       | Handle of the parent item to insert the new item under.                                     |
| <i>hIAftr</i>      | Handle of the item to insert the new item after.                                            |
| <i>image&amp;</i>  | Image index of the new item                                                                 |
| <i>simage&amp;</i> | Selected image index of the new item                                                        |
| <i>txt\$</i>       | Text to be displayed for the Treeview item                                                  |
| <i>flag&amp;</i>   | A long integer value to define specific attributes                                          |
| <i>hLst</i>        | <a href="#">Handle of the ImageList to be used for graphical items.</a>                     |
| <b>Remarks</b>     | <b><u>TREEVIEW DELETE <i>hDlg, id&amp;, hItem</i></u></b>                                   |

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

#### **TREEVIEW GET BOLD *hDlg, id&, hItem TO datav&***

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value [true](#) (-1) is assigned. If not bold, the value [false](#) (0) is assigned.

#### **TREEVIEW GET CHECK *hDlg, id&, hItem TO datav&***

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

#### **TREEVIEW GET CHILD *hDlg, id&, hItem TO datav&***

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

#### **TREEVIEW GET COUNT *hDlg, id& TO datav&***

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

#### **TREEVIEW GET EXPANDED *hDlg, id&, hItem TO datav&***

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

#### **TREEVIEW GET NEXT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET PARENT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET PREVIOUS *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET ROOT *hDlg, id& TO datav&***

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

**TREEVIEW GET SELECT *hDlg, id& TO datav&***

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

**TREEVIEW GET TEXT *hDlg, id&, hItem TO txtv\$***

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv\$*.

**TREEVIEW GET USER *hDlg, id&, hItem TO datav&***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every [DDI](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

**TREEVIEW INSERT ITEM *hDlg, id&, hPrnt, hIAftr, image&, selimage&, txt\$ TO hItem***

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI\_FIRST (at the beginning), %TVI\_LAST (at the end), %TVI\_SORT (alphabetical order).

If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items.

If no image is needed, the value(s) 0 should be used. The parameter *txt\$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

**TREEVIEW RESET *hDlg, id&***

All data items are deleted from the specified TREEVIEW control.

**TREEVIEW SELECT *hDlg, id&, hItem***

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

**TREEVIEW SET BOLD *hDlg, id&, hItem, flag&***

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

**TREEVIEW SET CHECK *hDlg, id&, hItem, flag&***

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

**TREEVIEW SET EXPANDED *hDlg, id&, hItem, flag&***

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

**TREEVIEW SET IMAGELIST *hDlg, id&, hLst***

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

**TREEVIEW SET TEXT *hDlg, id&, hItem, txt\$***

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt\$*.

**TREEVIEW SET USER *hDlg, id&, hItem, NumExpr***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

**TREEVIEW UNSELECT *hDlg, id&***

All items in the TREEVIEW control are set to an unselected state.

See also

[Dynamic Dialog Tools](#), [CONTROL ADD TREEVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [IMAGELIST](#)

## TREEVIEW SET IMAGELIST statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

# TREEVIEW statement

**Purpose** A [TreeView](#) control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

## Syntax

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO
hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&
```

*hDlg* [Handle](#) of the [dialog](#) that owns the Treeview.

*id&* The [control identifier](#) assigned with [CONTROL ADD TREEVIEW](#).

*hItem* Handle of a Treeview item, used to uniquely identify the item

*datav&* A [long integer](#) variable to which result data is assigned.

*txtv\$* A string variable to which result data is assigned.

*hPrnt* Handle of the parent item to insert the new item under.

*hIAftr* Handle of the item to insert the new item after.

*image&* Image index of the new item

*simage&* Selected image index of the new item

*txt\$* Text to be displayed for the Treeview item

*flag&* A long integer value to define specific attributes

*hLst* [Handle of the ImageList to be used for graphical items.](#)

## Remarks

### **TREEVIEW DELETE hDlg, id&, hItem**

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

### **TREEVIEW GET BOLD hDlg, id&, hItem TO datav&**

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*.

If the item is bold, the value [true](#) (-1) is assigned. If not bold, the value [false](#) (0) is assigned.

### **TREEVIEW GET CHECK hDlg, id&, hItem TO datav&**

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

### **TREEVIEW GET CHILD *hDlg, id&, hItem TO datav&***

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

### **TREEVIEW GET COUNT *hDlg, id& TO datav&***

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

### **TREEVIEW GET EXPANDED *hDlg, id&, hItem TO datav&***

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

### **TREEVIEW GET NEXT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

### **TREEVIEW GET PARENT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

### **TREEVIEW GET PREVIOUS *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

### **TREEVIEW GET ROOT *hDlg, id& TO datav&***

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

### **TREEVIEW GET SELECT *hDlg, id& TO datav&***

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

### **TREEVIEW GET TEXT *hDlg, id&, hItem TO txtv\$***

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv\$*.

### **TREEVIEW GET USER *hDlg, id&, hItem TO datav&***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every [DDI](#)

control offers an additional eight user values which can be accessed with [CONTROL\\_GET\\_USER](#) and [CONTROL\\_SET\\_USER](#).

### **TREEVIEW INSERT ITEM *hDlg, id&, hPrnt, hIAftr, image&, selimage&, txt\$ TO hItem***

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI\_FIRST (at the beginning), %TVI\_LAST (at the end), %TVI\_SORT (alphabetical order).

If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items.

If no image is needed, the value(s) 0 should be used. The parameter *txt\$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

### **TREEVIEW RESET *hDlg, id&***

All data items are deleted from the specified TREEVIEW control.

### **TREEVIEW SELECT *hDlg, id&, hItem***

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

### **TREEVIEW SET BOLD *hDlg, id&, hItem, flag&***

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

### **TREEVIEW SET CHECK *hDlg, id&, hItem, flag&***

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

### **TREEVIEW SET EXPANDED *hDlg, id&, hItem, flag&***

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

### **TREEVIEW SET IMAGELIST *hDlg, id&, hLst***

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

### **TREEVIEW SET TEXT *hDlg, id&, hItem, txt\$***

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt\$*.

### **TREEVIEW SET USER *hDlg, id&, hItem, NumExpr***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight

user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

### **TREEVIEW UNSELECT *hDlg, id&***

All items in the TREEVIEW control are set to an unselected state.

See also [Dynamic Dialog Tools](#), [CONTROL ADD TREEVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [IMAGELIST](#)

## TREEVIEW SET TEXT statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

# TREEVIEW statement

**Purpose** A [TreeView](#) control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

**Syntax**

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&
```

*hDlg* [Handle](#) of the [dialog](#) that owns the Treeview.

*id&* The [control identifier](#) assigned with [CONTROL ADD TREEVIEW](#).

*hItem* Handle of a Treeview item, used to uniquely identify the item

|                    |                                                                           |
|--------------------|---------------------------------------------------------------------------|
| <i>datav&amp;</i>  | A <a href="#">long integer</a> variable to which result data is assigned. |
| <i>txtv\$</i>      | A string variable to which result data is assigned.                       |
| <i>hPrnt</i>       | Handle of the parent item to insert the new item under.                   |
| <i>hIAftr</i>      | Handle of the item to insert the new item after.                          |
| <i>image&amp;</i>  | Image index of the new item                                               |
| <i>simage&amp;</i> | Selected image index of the new item                                      |
| <i>txt\$</i>       | Text to be displayed for the Treeview item                                |
| <i>flag&amp;</i>   | A long integer value to define specific attributes                        |
| <i>hLst</i>        | <u>Handle of the ImageList to be used for graphical items.</u>            |

**Remarks****TREEVIEW DELETE *hDlg, id&, hItem***

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

**TREEVIEW GET BOLD *hDlg, id&, hItem TO datav&***

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value [true](#) (-1) is assigned. If not bold, the value [false](#) (0) is assigned.

**TREEVIEW GET CHECK *hDlg, id&, hItem TO datav&***

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

**TREEVIEW GET CHILD *hDlg, id&, hItem TO datav&***

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET COUNT *hDlg, id& TO datav&***

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

**TREEVIEW GET EXPANDED *hDlg, id&, hItem TO datav&***

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

**TREEVIEW GET NEXT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET PARENT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET PREVIOUS *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is

found, the value zero (0) is assigned to *datav&*.

### **TREEVIEW GET ROOT *hDlg, id& TO datav&***

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

### **TREEVIEW GET SELECT *hDlg, id& TO datav&***

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

### **TREEVIEW GET TEXT *hDlg, id&, hItem TO txtv\$***

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv\$*.

### **TREEVIEW GET USER *hDlg, id&, hItem TO datav&***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

### **TREEVIEW INSERT ITEM *hDlg, id&, hPrnt, hIAftr, image&, selimage&, txt\$ TO hItem***

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI\_FIRST (at the beginning), %TVI\_LAST (at the end), %TVI\_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt\$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

### **TREEVIEW RESET *hDlg, id&***

All data items are deleted from the specified TREEVIEW control.

### **TREEVIEW SELECT *hDlg, id&, hItem***

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

### **TREEVIEW SET BOLD *hDlg, id&, hItem, flag&***

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

### **TREEVIEW SET CHECK *hDlg, id&, hItem, flag&***

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

**TREEVIEW SET EXPANDED *hDlg, id&, hItem, flag&***

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

**TREEVIEW SET IMAGELIST *hDlg, id&, hLst***

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

**TREEVIEW SET TEXT *hDlg, id&, hItem, txt\$***

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt\$*.

**TREEVIEW SET USER *hDlg, id&, hItem, NumExpr***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

**TREEVIEW UNSELECT *hDlg, id&***

All items in the TREEVIEW control are set to an unselected state.

See also

[Dynamic Dialog Tools](#), [CONTROL ADD TREEVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [IMAGELIST](#)

**TREEVIEW SET USER statement**

## Keyword Template

Purpose

Syntax

Remarks

See also

Example

## TREEVIEW statement

**Purpose** A [TreeView](#) control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

**Syntax**

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
```

```

TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO
hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&

```

|                    |                                                                                             |
|--------------------|---------------------------------------------------------------------------------------------|
| <i>hDlg</i>        | <a href="#">Handle</a> of the <a href="#">dialog</a> that owns the Treeview.                |
| <i>id&amp;</i>     | The <a href="#">control identifier</a> assigned with <a href="#">CONTROL ADD TREEVIEW</a> . |
| <i>hItem</i>       | Handle of a Treeview item, used to uniquely identify the item                               |
| <i>datav&amp;</i>  | A <a href="#">long integer</a> variable to which result data is assigned.                   |
| <i>txtv\$</i>      | A string variable to which result data is assigned.                                         |
| <i>hPrnt</i>       | Handle of the parent item to insert the new item under.                                     |
| <i>hIAftr</i>      | Handle of the item to insert the new item after.                                            |
| <i>image&amp;</i>  | Image index of the new item                                                                 |
| <i>simage&amp;</i> | Selected image index of the new item                                                        |
| <i>txt\$</i>       | Text to be displayed for the Treeview item                                                  |
| <i>flag&amp;</i>   | A long integer value to define specific attributes                                          |
| <i>hLst</i>        | <a href="#">Handle of the ImageList to be used for graphical items.</a>                     |

**Remarks****TREEVIEW DELETE *hDlg, id&, hItem***

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

**TREEVIEW GET BOLD *hDlg, id&, hItem* TO *datav&***

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value [true](#) (-1) is assigned. If not bold, the value [false](#) (0) is assigned.

**TREEVIEW GET CHECK *hDlg, id&, hItem* TO *datav&***

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

**TREEVIEW GET CHILD *hDlg, id&, hItem* TO *datav&***

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET COUNT *hDlg, id&* TO *datav&***

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer

variable specified by *datav&*.

### **TREEVIEW GET EXPANDED *hDlg, id&, hItem TO datav&***

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

### **TREEVIEW GET NEXT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

### **TREEVIEW GET PARENT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

### **TREEVIEW GET PREVIOUS *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

### **TREEVIEW GET ROOT *hDlg, id& TO datav&***

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

### **TREEVIEW GET SELECT *hDlg, id& TO datav&***

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

### **TREEVIEW GET TEXT *hDlg, id&, hItem TO txtv\$***

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv\$*.

### **TREEVIEW GET USER *hDlg, id&, hItem TO datav&***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

### **TREEVIEW INSERT ITEM *hDlg, id&, hPrnt, hIAftr, image&, selimage&, txt\$ TO hItem***

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI\_FIRST (at the beginning), %TVI\_LAST (at the end), %TVI\_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt\$* designates the

text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

### **TREEVIEW RESET *hDlg, id&***

All data items are deleted from the specified TREEVIEW control.

### **TREEVIEW SELECT *hDlg, id&, hItem***

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

### **TREEVIEW SET BOLD *hDlg, id&, hItem, flag&***

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

### **TREEVIEW SET CHECK *hDlg, id&, hItem, flag&***

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

### **TREEVIEW SET EXPANDED *hDlg, id&, hItem, flag&***

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

### **TREEVIEW SET IMAGELIST *hDlg, id&, hLst***

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

### **TREEVIEW SET TEXT *hDlg, id&, hItem, txt\$***

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt\$*.

### **TREEVIEW SET USER *hDlg, id&, hItem, NumExpr***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

### **TREEVIEW UNSELECT *hDlg, id&***

All items in the TREEVIEW control are set to an unselected state.

See also

[Dynamic Dialog Tools](#), [CONTROL ADD TREEVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [IMAGELIST](#)

## TREEVIEW UNSELECT statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## TREEVIEW statement

**Purpose** A [TreeView](#) control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text  
 . Each time you add an item, you must specify its relationship to existing data items.

**Syntax**

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO
hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&
```

*hDlg* [Handle](#) of the [dialog](#) that owns the Treeview.

*id&* The [control identifier](#) assigned with [CONTROL ADD TREEVIEW](#).

*hItem* Handle of a Treeview item, used to uniquely identify the item

*datav&* A [long integer](#) variable to which result data is assigned.

*txtv\$* A string variable to which result data is assigned.

*hPrnt* Handle of the parent item to insert the new item under.

*hIAftr* Handle of the item to insert the new item after.

*image&* Image index of the new item

*simage&* Selected image index of the new item

*txt\$* Text to be displayed for the Treeview item

*flag&* A long integer value to define specific attributes

*hLst* [Handle of the ImageList to be used for graphical items.](#)

## Remarks

**TREEVIEW DELETE *hDlg, id&, hItem***

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

**TREEVIEW GET BOLD *hDlg, id&, hItem TO datav&***

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value [true](#) (-1) is assigned. If not bold, the value [false](#) (0) is assigned.

**TREEVIEW GET CHECK *hDlg, id&, hItem TO datav&***

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

**TREEVIEW GET CHILD *hDlg, id&, hItem TO datav&***

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET COUNT *hDlg, id& TO datav&***

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

**TREEVIEW GET EXPANDED *hDlg, id&, hItem TO datav&***

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

**TREEVIEW GET NEXT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET PARENT *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET PREVIOUS *hDlg, id&, hItem TO datav&***

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

**TREEVIEW GET ROOT *hDlg, id& TO datav&***

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

**TREEVIEW GET SELECT *hDlg, id& TO datav&***

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

**TREEVIEW GET TEXT *hDlg, id&, hItem TO txtv\$***

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txt\$*.

### **TREEVIEW GET USER *hDlg, id&, hItem TO datav&***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every [DDT](#) control offers an additional eight user values which can be accessed with [CONTROL GET USER](#) and [CONTROL SET USER](#).

### **TREEVIEW INSERT ITEM *hDlg, id&, hPrnt, hIAftr, image&, selimage&, txt\$ TO hItem***

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI\_FIRST (at the beginning), %TVI\_LAST (at the end), %TVI\_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt\$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

### **TREEVIEW RESET *hDlg, id&***

All data items are deleted from the specified TREEVIEW control.

### **TREEVIEW SELECT *hDlg, id&, hItem***

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

### **TREEVIEW SET BOLD *hDlg, id&, hItem, flag&***

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

### **TREEVIEW SET CHECK *hDlg, id&, hItem, flag&***

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

### **TREEVIEW SET EXPANDED *hDlg, id&, hItem, flag&***

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

### **TREEVIEW SET IMAGELIST *hDlg, id&, hLst***

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

### **TREEVIEW SET TEXT *hDlg, id&, hItem, txt\$***

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt\$*.

### **TREEVIEW SET USER *hDlg, id&, hItem, NumExpr***

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

### **TREEVIEW UNSELECT *hDlg, id&***

All items in the TREEVIEW control are set to an unselected state.

**See also** [Dynamic Dialog Tools](#), [CONTROL ADD TREEVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [IMAGELIST](#)

## TRIM\$ function

# TRIM\$ function IMPROVED

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>      | Removes leading and trailing characters or substrings.                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Syntax</b>       | <i>NewString\$</i> = TRIM\$( <i>OldString\$</i> [, [ANY] <i>CharsToTrim\$</i> ])<br><i>NewString\$</i> = TRIM\$( <i>NumrExpr</i> [, <i>Digits&amp;</i> ])                                                                                                                                                                                                                                                                                                                         |
| <b>Remarks</b>      | TRIM\$ combines the functionality of <a href="#">LTRIM\$</a> and <a href="#">RTRIM\$</a> into a single <a href="#">function</a> . <i>OldString\$</i> is the <a href="#">string expression</a> from which to remove characters, and <i>CharsToTrim\$</i> is the string expression to remove leading and trailing occurrences. If <i>CharsToTrim\$</i> is not specified, TRIM\$ removes leading and trailing spaces.                                                                |
| ANY                 | If the ANY keyword is included, <i>CharsToTrim\$</i> specifies a list of single characters to be searched for individually, a match on any one of which as a leading or trailing character will cause the character to be removed from the result.                                                                                                                                                                                                                                |
| <i>NumrExpr</i>     | If a numeric expression is provided as the parameter, it is converted to a string (just like <a href="#">STR\$</a> ), but with no leading or trailing spaces.                                                                                                                                                                                                                                                                                                                     |
| <i>digits&amp;</i>  | The maximum number of significant digits, in the range of 1 to 18. If not included, PowerBASIC supplies a default value of 7 for <a href="#">single precision</a> values, or 16 for more precise values. Use care that <i>digits&amp;</i> is large enough to contain the integral part of a number, or scientific notation must be used to estimate it. For example, TRIM\$(123.456, 2) returns "1.2E+2", while <a href="#">FORMAT\$(123.456, 5)</a> returns the string "123.45". |
| <b>Restrictions</b> | TRIM\$ is case sensitive, so capitalization matters.                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>See also</b>     | <a href="#">CLIP\$</a> , <a href="#">FORMAT\$</a> , <a href="#">INSTR</a> , <a href="#">LCASE\$</a> , <a href="#">LTRIM\$</a> , <a href="#">MCASE\$</a> , <a href="#">MID\$</a> , <a href="#">REMOVE\$</a> , <a href="#">REPLACE</a> , <a href="#">RIGHT\$</a> , <a href="#">RTRIM\$</a> , <a href="#">SHRINK\$</a> , <a href="#">TALLY</a> , <a href="#">UCASE\$</a> , <a href="#">UNWRAP\$</a> , <a href="#">VERIFY</a>                                                         |

## TRY/END TRY block

# TRY/END TRY block

|                |                                                                                     |
|----------------|-------------------------------------------------------------------------------------|
| <b>Purpose</b> | A structured method of trapping and responding to <a href="#">run-time errors</a> . |
| <b>Syntax</b>  | TRY<br>[ <i>statements</i> ]<br>[EXIT TRY]<br>[ <i>statements</i> ]                 |

```

CATCH
 [error handling statements]
 [EXIT TRY]
 [error handling statements]
[FINALLY
 [statements]
 [EXIT TRY]
 [statements]]
END TRY

```

**Remarks** Statements in the TRY section are executed normally. The first time a [run-time error](#) occurs, control is transferred to the CATCH section. If no run-time errors are generated in the TRY section, the CATCH section is skipped entirely.

Then, regardless of error status, the FINALLY section is executed, if it is present. [Error trapping](#) and control transfer are disabled in the CATCH and FINALLY sections, so you would normally use conventional "

[ERR = ...](#)" tests to check the success of error-prone operations in those sections.

However, TRY structures can be nested to any level, so it may be desirable to use another TRY block within these clauses.

**Restrictions** CATCH is a mandatory section of this structure, although the FINALLY section is optional.

Because of the nesting requirements, the ERR value is [local](#) to the TRY structure. Upon exit, the prior ERR value is restored, so be sure to save the value of ERR if it will be needed outside of the TRY structure.

To leave the TRY structure, execution must pass normally through END TRY, or by an EXIT TRY statement. Leaving a TRY block any other way is strongly discouraged because error trapping will remain disabled, and the previous ERR value will not be restored. Future versions of PowerBASIC may disallow such practices.

[ON ERROR GOTO](#) is invalid within a TRY structure, but may be used within the same [Sub/Function/Method/Property](#).

**See also** [#DEBUG ERROR](#), [ERL](#), [ERR](#), [ERRCLEAR](#), [ERROR](#), [Error Overview](#), [ERROR\\$](#), [Error Trapping](#), [ON ERROR](#)

**Example**

```

TRY
 OPEN "file.dat" FOR INPUT LOCK READ WRITE AS #1
CATCH
 CALL NotifyUserOfError(ERR)
 EXIT TRY
FINALLY
 CALL UpdateDataBase()
 CLOSE #1
END TRY

```

## TXT.CELL method

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

# TXT pseudo-object **New!**

**Purpose** Displays and inputs text on a specially created TEXT WINDOW. This is similar to a CONSOLE window, with some advantages. Generally speaking, a Text Window is more attractive. But, just like a Console Window, only fixed-width text may be displayed.

**Syntax** `TXT.membername(params)`  
`RetVal = TXT.membername(params)`  
`TXT.membername(params) TO ReturnVariable`

**Remarks** Text Windows offer a specific, but limited capability. They are very easy to implement and use, and they offer an excellent means to produce quick and straightforward programs in text mode.

Text Windows offer an excellent path for the beginning programmer, or for anyone who needs a procedural code model. As the name implies, they display only fixed-width text. Further, only one Text Window may exist at a time. If you need snazzy graphics, more specialized fonts, multiple windows, or a GUI interface, you should look to [GRAPHIC WINDOWS](#) and [GRAPHIC CONTROLS](#) instead.

Text Window methods are accessed like any other [object](#). The object name TXT is followed by a period separator, and the name of the method or property:

```
TXT.Cell = RowValue&, ColumnVal&
```

Text Window methods which return a value may be used in two forms, a statement with a TO clause, or a function which may be used as a term in an expression:

```
TXT.Row TO RowVar&
RowVar& = TXT.Row
```

The two examples above are functionally identical. The choice is simply a matter of your personal preference. If you use the second form (as a [function](#) which returns a value), it can be a term in any expression of any complexity.

Most PowerBASIC functions specify graphic and [pixel](#) positions as x,y (the horizontal term first, then the vertical term). However, for compatibility with most current and prior versions of BASIC (PowerBASIC included), the functions which reference text rows and columns name the vertical term first (rows, columns).

Text Windows handle text wrapping and auto-scrolling much like a typical Console Window. When printing exceeds the end of a line, the print position wraps to the first column of the next row. When printing exceeds the last row, the entire page is scrolled to open a new line at the bottom.

In order to use the TXT object successfully, you must use care to first create a Text Window in your program. To do this, you can execute the TXT.WINDOW method.

All Text Windows are stable. They cannot be closed unexpectedly by the user, so there are no surprises when you find you are trying to print to a window which no longer exists. There is no Close Box, no System Menu, nor is ALT-F4 recognized as a close command. They can only be closed by executing TXT.END, or by terminating the entire application.

## TXT METHODS

### TXT.CELL

**Syntax** `TXT.CELL = RowValue&, ColValue&`  
`TXT.CELL TO RowVar&, ColVar&`  
`TXT.COL TO ColVar& <or> ColVar& = TXT.COL`  
`TXT.ROW TO RowVar& <or> RowVar& = TXT.ROW`

**Remarks** TXT.CELL is used to set or retrieve the cursor position, based upon the row and column position of a Text Cell. That is the row and column position where the next printed text will be displayed. *RowValue&* specifies the horizontal screen row (starting at 1) at which to position the cursor. *ColValue&* specifies the vertical screen column (starting at 1) at which to position the cursor. Since row and column numbers start at one (1), the upper

left corner of the Text Window is considered to be cell 1,1.

The first form of TXT.CELL moves the cursor to the desired row and column. If a value given is zero (0), that parameter is ignored and that position is not changed. The second form of TXT.CELL retrieves the current cursor position, and assigns the values to the variables specified by *RowVar&* and *ColVar&*.

The last two forms allow you to retrieve just a single value, either row or column, and are supported in both statement and function form.

### **TXT.CLS**

**Syntax**

`TXT.CLS`

**Remarks**

The text window is cleared, and the caret (next print position) is moved to the upper left corner (row 1, column 1).

### **TXT.COLOR**

**Syntax**

`TXT.COLOR = RGBColor&`

**Remarks**

TXT.COLOR is used to change the foreground color of new text drawn with TXT.PRINT. Existing text on the Text Window is not changed. PowerBASIC includes many [built-in RGB color equates](#) which may be used here, like %RGB\_RED, %RGB\_BLUE, etc.

### **TXT.END**

**Syntax**

`TXT.END`

**Remarks**

The Text Window currently attached to your program is destroyed and detached from the process. No errors are generated, even if no Text Window is currently attached.

### **TXT.INKEY\$**

**Syntax**

`TXT.INKEY$ TO InkeyVar$`  
`InkeyVar$ = TXT.INKEY$`

**Remarks**

Reads a keyboard character if one is ready. TXT.INKEY\$ returns a  
of 0 or 1 characters that reflects the status of the keyboard buffer for the current text window. A null string ([LEN=0](#)) means that the buffer is empty - no key was pressed. A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.  
TXT.INKEY\$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

### **TXT.INSTAT**

**Syntax**

`TXT.INSTAT TO InStatVar&`  
`InstatVar& = TXT.INSTAT`

**Remarks**

Determines whether a keyboard character is ready. The  
variable receives the keyboard buffer status for the current text window. The value assigned is [TRUE](#) (non-zero) if a keyboard character is ready to be retrieved, or [FALSE](#) (zero) if not.  
TXT.INSTAT does not remove the character from the buffer, so repeated execution will continue to return TRUE until the character is read with TXT.INKEY\$, TXT.LINE.INPUT, etc.

### **TXT.LINE.INPUT**

**Syntax**

`TXT.LINE.INPUT(["prompt"], StringVar)`

**Remarks**

Reads an entire line from the keyboard into a string variable, ignoring any delimiters which may be embedded. The prompt is an optional string [constant](#) or string equate. Upon

execution, the prompt is displayed and the program waits for keyboard input. Keystrokes are accepted until the user presses ENTER, at which time the resulting string is stored into the *StringVar*.

The *StringVar* may be a [fixed-length](#), [nul-terminated](#), or a [dynamic](#) string. For fixed-length and nul-terminated strings, keyboard input longer than the string is truncated to fit.

Dynamic strings receive the complete keyboard input without truncation. *StringVar* may not be a [UDT](#) variable, although fixed-length and nul-terminated UDT member variables are allowed.

### **TXT.PRINT**

#### **Syntax**

```
TXT.PRINT([ExprList] [SPC(n)] [TAB(n)] [,] [;]...)
```

#### **Remarks**

Write text data to the TEXT WINDOW at the current caret location. The TXT.PRINT method has the following parts, which may occur in any order and quantity:

*ExprList*: Numeric and/or string expression(s) to be written to the TEXT WINDOW.

*SPC*(*n*) An optional function used to insert *n* spaces into the printed output. Multiple use of the SPC argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.

*TAB*(*n*) An optional function used to tab to the *n*th column before printing an expression. Multiple use of the TAB argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.

; and , are special characters that determine the position of the next text item printed. A semicolon (;) means the next text item is printed immediately; a comma (,) means the next text item is printed at the start of the next print zone. Print zones begin every 14 columns.

If the final argument of TXT.PRINT is a semicolon or comma, the caret position is maintained at the current location, rather than the default action of moving the print position to the start of the next line. For example:

```
TXT.PRINT "Hello";
TXT.PRINT " world!";
```

...produces the contiguous result "Hello world!"

If you omit all arguments, TXT.PRINT prints a blank line. Printing always begins at the current caret position.

Any control codes, such as Carriage Return, Line-Feed and Backspace are not interpreted. They will display on the screen as symbols.

It is not possible to print a User-Defined Type (UDT), a [Variant](#), an object variable, or an entire [array](#). Individual member values must be extracted with the appropriate function before they can be displayed.

### **TXT.WAITKEY\$**

#### **Syntax**

```
TXT.WAITKEY$ [TO WaitVar$]
WaitVar$ = TXT.WAITKEY$
```

#### **Remarks**

Reads a keyboard character, waiting until one is ready. It removes the character from the keyboard buffer for the Text Window, and optionally assigns it to the string variable. If the TO clause is omitted, the keyboard character is discarded.

TXT.WAITKEY\$ returns a string of 0 or 1 characters that reflects the status of the keyboard buffer for the Text Window. A null string (LEN=0) means that there was an error, such as the case when no Text Window currently exists.

A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

TXT.WAITKEY\$ only processes standard characters. Extended keys, like function keys

and the insert key, are ignored.

### **TXT.WINDOW**

**Syntax**

`TXT.WINDOW(Cap$, x, y [,Rows, Cols]) TO hWin`

**Remarks**

A new Text Window is created and attached to your program. The size of the Window is determined by rows and cols, or defaults to 25 rows and 80 columns. Subsequent TXT Methods will act upon this newly created Text Window.

If the Text Window is created successfully, the [handle](#) will be assigned to the variable specified by *hWin*. If it fails, the value zero (0) will be assigned instead. If you try to create a Text Window while another still exists, it will fail. In this case, you must first destroy the prior Text Window, as only one may exist at a time.

The parameters *x* and *y* specify the requested location of the window, relative to the upper left corner of the desktop. The parameters are always given in pixels. Rows and columns optionally specify the size of the window, given in the number of characters which will fit within the borders. If not given, the method defaults to 25 vertical rows by 80 horizontal columns.

**See also**

[DIALOG NEW](#), [GRAPHIC WINDOW](#), [INPUTBOX\\$](#), [MSGBOX](#)

## TXT.CLS method

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

# TXT pseudo-object New!

**Purpose**

Displays and inputs text on a specially created TEXT WINDOW. This is similar to a CONSOLE window, with some advantages. Generally speaking, a Text Window is more attractive. But, just like a Console Window, only fixed-width text may be displayed.

**Syntax**

`TXT.membername(params)`  
`RetVal = TXT.membername(params)`  
`TXT.membername(params) TO ReturnVariable`

**Remarks**

Text Windows offer a specific, but limited capability. They are very easy to implement and use, and they offer an excellent means to produce quick and straightforward programs in text mode.

Text Windows offer an excellent path for the beginning programmer, or for anyone who needs a procedural code model. As the name implies, they display only fixed-width text. Further, only one Text Window may exist at a time. If you need snazzy graphics, more specialized fonts, multiple windows, or a GUI interface, you should look to [GRAPHIC WINDOWS](#) and [GRAPHIC CONTROLS](#) instead.

Text Window methods are accessed like any other [object](#). The object name TXT is followed by a period separator, and the name of the method or property:

`TXT.Cell = RowValue&, ColumnVal&`

Text Window methods which return a value may be used in two forms, a statement with a TO clause, or a function which may be used as a term in an expression:

`TXT.Row TO RowVar&`

```
RowVar& = TXT.Row
```

The two examples above are functionally identical. The choice is simply a matter of your personal preference. If you use the second form (as a [function](#) which returns a value), it can be a term in any expression of any complexity.

Most PowerBASIC functions specify graphic and [pixel](#) positions as x,y (the horizontal term first, then the vertical term). However, for compatibility with most current and prior versions of BASIC (PowerBASIC included), the functions which reference text rows and columns name the vertical term first (rows, columns).

Text Windows handle text wrapping and auto-scrolling much like a typical Console Window. When printing exceeds the end of a line, the print position wraps to the first column of the next row. When printing exceeds the last row, the entire page is scrolled to open a new line at the bottom.

In order to use the TXT object successfully, you must use care to first create a Text Window in your program. To do this, you can execute the TXT.WINDOW method.

All Text Windows are stable. They cannot be closed unexpectedly by the user, so there are no surprises when you find you are trying to print to a window which no longer exists. There is no Close Box, no System Menu, nor is ALT-F4 recognized as a close command. They can only be closed by executing TXT.END, or by terminating the entire application.

## TXT METHODS

### TXT.CELL

#### Syntax

```
TXT.CELL = RowValue&, ColValue&
TXT.CELL TO RowVar&, ColVar&
TXT.COL TO ColVar& <or> ColVar& = TXT.COL
TXT.ROW TO RowVar& <or> RowVar& = TXT.ROW
```

#### Remarks

TXT.CELL is used to set or retrieve the cursor position, based upon the row and column position of a Text Cell. That is the row and column position where the next printed text will be displayed. *RowValue&* specifies the horizontal screen row (starting at 1) at which to position the cursor. *ColValue&* specifies the vertical screen column (starting at 1) at which to position the cursor. Since row and column numbers start at one (1), the upper left corner of the Text Window is considered to be cell 1,1.

The first form of TXT.CELL moves the cursor to the desired row and column. If a value given is zero (0), that parameter is ignored and that position is not changed. The second form of TXT.CELL retrieves the current cursor position, and assigns the values to the variables specified by *RowVar&* and *ColVar&*.

The last two forms allow you to retrieve just a single value, either row or column, and are supported in both statement and function form.

### TXT.CLS

#### Syntax

```
TXT.CLS
```

#### Remarks

The text window is cleared, and the caret (next print position) is moved to the upper left corner (row 1, column 1).

### TXT.COLOR

#### Syntax

```
TXT.COLOR = RGBColor&
```

#### Remarks

TXT.COLOR is used to change the foreground color of new text drawn with TXT.PRINT. Existing text on the Text Window is not changed. PowerBASIC includes many [built-in RGB color equates](#) which may be used here, like %RGB\_RED, %RGB\_BLUE, etc.

### TXT.END

#### Syntax

```
TXT.END
```

**Remarks** The Text Window currently attached to your program is destroyed and detached from the process. No errors are generated, even if no Text Window is currently attached.

### **TXT.INKEY\$**

**Syntax** `TXT.INKEY$ TO InkeyVar$`  
`InkeyVar$ = TXT.INKEY$`

**Remarks** Reads a keyboard character if one is ready. TXT.INKEY\$ returns a string of 0 or 1 characters that reflects the status of the keyboard buffer for the current text window. A null string (LEN=0) means that the buffer is empty - no key was pressed. A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

TXT.INKEY\$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

### **TXT.INSTAT**

**Syntax** `TXT.INSTAT TO InStatVar&`  
`InStatVar& = TXT.INSTAT`

**Remarks** Determines whether a keyboard character is ready. The *InStatVar&* variable receives the keyboard buffer status for the current text window. The value assigned is **TRUE** (non-zero) if a keyboard character is ready to be retrieved, or **FALSE** (zero) if not.

TXT.INSTAT does not remove the character from the buffer, so repeated execution will continue to return TRUE until the character is read with TXT.INKEY\$, TXT.LINE.INPUT, etc.

### **TXT.LINE.INPUT**

**Syntax** `TXT.LINE.INPUT(["prompt",] StringVar)`

**Remarks** Reads an entire line from the keyboard into a string variable, ignoring any delimiters which may be embedded. The prompt is an optional string [constant](#) or string equate. Upon execution, the prompt is displayed and the program waits for keyboard input. Keystrokes are accepted until the user presses ENTER, at which time the resulting string is stored into the *StringVar*.

The *StringVar* may be a [fixed-length](#), [nul-terminated](#), or a [dynamic](#) string. For fixed-length and nul-terminated strings, keyboard input longer than the string is truncated to fit.

Dynamic strings receive the complete keyboard input without truncation. *StringVar* may not be a [UDT](#) variable, although fixed-length and nul-terminated UDT member variables are allowed.

### **TXT.PRINT**

**Syntax** `TXT.PRINT([ExprList] [SPC(n)] [TAB(n)] [,] [;]...)`

**Remarks** Write text data to the TEXT WINDOW at the current caret location. The TXT.PRINT method has the following parts, which may occur in any order and quantity:

*ExprList*: Numeric and/or string expression(s) to be written to the TEXT WINDOW.

*SPC*(*n*) An optional function used to insert *n* spaces into the printed output. Multiple use of the SPC argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.

*TAB*(*n*) An optional function used to tab to the *n*th column before printing an expression. Multiple use of the TAB argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.

; and , are special characters that determine the position of the next text item printed. A

semicolon (;) means the next text item is printed immediately; a comma (,) means the next text item is printed at the start of the next print zone. Print zones begin every 14 columns.

If the final argument of TXT.PRINT is a semicolon or comma, the caret position is maintained at the current location, rather than the default action of moving the print position to the start of the next line. For example:

```
TXT.PRINT "Hello";
TXT.PRINT " world!";
```

...produces the contiguous result "Hello world!"

If you omit all arguments, TXT.PRINT prints a blank line. Printing always begins at the current caret position.

Any control codes, such as Carriage Return, Line-Feed and Backspace are not interpreted. They will display on the screen as symbols.

It is not possible to print a User-Defined Type (UDT), a [Variant](#), an object variable, or an entire [array](#). Individual member values must be extracted with the appropriate function before they can be displayed.

### **TXT.WAITKEY\$**

#### **Syntax**

```
TXT.WAITKEY$ [TO WaitVar$]
WaitVar$ = TXT.WAITKEY$
```

#### **Remarks**

Reads a keyboard character, waiting until one is ready. It removes the character from the keyboard buffer for the Text Window, and optionally assigns it to the string variable. If the TO clause is omitted, the keyboard character is discarded.

TXT.WAITKEY\$ returns a string of 0 or 1 characters that reflects the status of the keyboard buffer for the Text Window. A null string (LEN=0) means that there was an error, such as the case when no Text Window currently exists.

A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

TXT.WAITKEY\$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

### **TXT.WINDOW**

#### **Syntax**

```
TXT.WINDOW(Cap$, x, y [,Rows, Cols]) TO hWin
```

#### **Remarks**

A new Text Window is created and attached to your program. The size of the Window is determined by rows and cols, or defaults to 25 rows and 80 columns. Subsequent TXT Methods will act upon this newly created Text Window.

If the Text Window is created successfully, the [handle](#) will be assigned to the variable specified by *hWin*. If it fails, the value zero (0) will be assigned instead. If you try to create a Text Window while another still exists, it will fail. In this case, you must first destroy the prior Text Window, as only one may exist at a time.

The parameters *x* and *y* specify the requested location of the window, relative to the upper left corner of the desktop. The parameters are always given in pixels. Rows and columns optionally specify the size of the window, given in the number of characters which will fit within the borders. If not given, the method defaults to 25 vertical rows by 80 horizontal columns.

#### **See also**

[DIALOG NEW](#), [GRAPHIC WINDOW](#), [INPUTBOX\\$](#), [MSGBOX](#)

## **TXT.COLOR method**

# **Keyword Template**

**Purpose**  
**Syntax**  
**Remarks**  
**See also**  
**Example**

## TXT pseudo-object **New!**

**Purpose** Displays and inputs text on a specially created TEXT WINDOW. This is similar to a CONSOLE window, with some advantages. Generally speaking, a Text Window is more attractive. But, just like a Console Window, only fixed-width text may be displayed.

**Syntax**

```
TXT.membername (params)
RetVal = TXT.membername(params)
TXT.membername(params) TO ReturnVariable
```

**Remarks** Text Windows offer a specific, but limited capability. They are very easy to implement and use, and they offer an excellent means to produce quick and straightforward programs in text mode.

Text Windows offer an excellent path for the beginning programmer, or for anyone who needs a procedural code model. As the name implies, they display only fixed-width text. Further, only one Text Window may exist at a time. If you need snazzy graphics, more specialized fonts, multiple windows, or a GUI interface, you should look to [GRAPHIC WINDOWS](#) and [GRAPHIC CONTROLS](#) instead.

Text Window methods are accessed like any other [object](#). The object name TXT is followed by a period separator, and the name of the method or property:

```
TXT.Cell = RowValue&, ColumnVal&
```

Text Window methods which return a value may be used in two forms, a statement with a TO clause, or a function which may be used as a term in an expression:

```
TXT.Row TO RowVar&
RowVar& = TXT.Row
```

The two examples above are functionally identical. The choice is simply a matter of your personal preference. If you use the second form (as a [function](#) which returns a value), it can be a term in any expression of any complexity.

Most PowerBASIC functions specify graphic and [pixel](#) positions as x,y (the horizontal term first, then the vertical term). However, for compatibility with most current and prior versions of BASIC (PowerBASIC included), the functions which reference text rows and columns name the vertical term first (rows, columns).

Text Windows handle text wrapping and auto-scrolling much like a typical Console Window. When printing exceeds the end of a line, the print position wraps to the first column of the next row. When printing exceeds the last row, the entire page is scrolled to open a new line at the bottom.

In order to use the TXT object successfully, you must use care to first create a Text Window in your program. To do this, you can execute the TXT.WINDOW method.

All Text Windows are stable. They cannot be closed unexpectedly by the user, so there are no surprises when you find you are trying to print to a window which no longer exists. There is no Close Box, no System Menu, nor is ALT-F4 recognized as a close command. They can only be closed by executing TXT.END, or by terminating the entire application.

### TXT METHODS

#### TXT.CELL

**Syntax**

```
TXT.CELL = RowValue&, ColValue&
TXT.CELL TO RowVar&, ColVar&
TXT.COL TO ColVar& <or> ColVar& = TXT.COL
TXT.ROW TO RowVar& <or> RowVar& = TXT.ROW
```

**Remarks**

TXT.CELL is used to set or retrieve the cursor position, based upon the row and column position of a Text Cell. That is the row and column position where the next printed text will be displayed. *RowValue&* specifies the horizontal screen row (starting at 1) at which to position the cursor. *ColValue&* specifies the vertical screen column (starting at 1) at which to position the cursor. Since row and column numbers start at one (1), the upper left corner of the Text Window is considered to be cell 1,1.

The first form of TXT.CELL moves the cursor to the desired row and column. If a value given is zero (0), that parameter is ignored and that position is not changed. The second form of TXT.CELL retrieves the current cursor position, and assigns the values to the variables specified by *RowVar&* and *ColVar&*.

The last two forms allow you to retrieve just a single value, either row or column, and are supported in both statement and function form.

### TXT.CLS

**Syntax**

```
TXT.CLS
```

**Remarks**

The text window is cleared, and the caret (next print position) is moved to the upper left corner (row 1, column 1).

### TXT.COLOR

**Syntax**

```
TXT.COLOR = RGBColor&
```

**Remarks**

TXT.COLOR is used to change the foreground color of new text drawn with TXT.PRINT. Existing text on the Text Window is not changed. PowerBASIC includes many [built-in RGB color equates](#) which may be used here, like %RGB\_RED, %RGB\_BLUE, etc.

### TXT.END

**Syntax**

```
TXT.END
```

**Remarks**

The Text Window currently attached to your program is destroyed and detached from the process. No errors are generated, even if no Text Window is currently attached.

### TXT.INKEY\$

**Syntax**

```
TXT.INKEY$ TO InkeyVar$
InkeyVar$ = TXT.INKEY$
```

**Remarks**

Reads a keyboard character if one is ready. TXT.INKEY\$ returns a  
of 0 or 1 characters that reflects the status of the keyboard buffer for the current text window. A null string ([LEN=0](#)) means that the buffer is empty - no key was pressed. A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

TXT.INKEY\$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

### TXT.INSTAT

**Syntax**

```
TXT.INSTAT TO InStatVar&
InStatVar& = TXT.INSTAT
```

**Remarks**

Determines whether a keyboard character is ready. The  
variable receives the keyboard buffer status for the current text window. The value assigned is [TRUE](#) (non-zero) if a keyboard character is ready to be retrieved, or [FALSE](#) (zero) if not.

TXT.INSTAT does not remove the character from the buffer, so repeated execution will continue to return TRUE until the character is read with TXT.INKEY\$, TXT.LINE.INPUT, etc.

### TXT.LINE.INPUT

#### Syntax

```
TXT.LINE.INPUT(["prompt"], StringVar)
```

#### Remarks

Reads an entire line from the keyboard into a string variable, ignoring any delimiters which may be embedded. The prompt is an optional string [constant](#) or string equate. Upon execution, the prompt is displayed and the program waits for keyboard input. Keystrokes are accepted until the user presses ENTER, at which time the resulting string is stored into the *StringVar*.

The *StringVar* may be a [fixed-length](#), [nul-terminated](#), or a [dynamic](#) string. For fixed-length and nul-terminated strings, keyboard input longer than the string is truncated to fit.

Dynamic strings receive the complete keyboard input without truncation. *StringVar* may not be a [UDT](#) variable, although fixed-length and nul-terminated UDT member variables are allowed.

### TXT.PRINT

#### Syntax

```
TXT.PRINT([ExprList] [SPC(n)] [TAB(n)] [,] [;]...)
```

#### Remarks

Write text data to the TEXT WINDOW at the current caret location. The TXT.PRINT method has the following parts, which may occur in any order and quantity:

ExprList: Numeric and/or string expression(s) to be written to the TEXT WINDOW.

SPC(*n*) An optional function used to insert *n* spaces into the printed output. Multiple use of the SPC argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.

TAB(*n*) An optional function used to tab to the *n*th column before printing an expression. Multiple use of the TAB argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.

; and , are special characters that determine the position of the next text item printed. A semicolon (;) means the next text item is printed immediately; a comma (,) means the next text item is printed at the start of the next print zone. Print zones begin every 14 columns.

If the final argument of TXT.PRINT is a semicolon or comma, the caret position is maintained at the current location, rather than the default action of moving the print position to the start of the next line. For example:

```
TXT.PRINT "Hello";
TXT.PRINT " world!";
```

...produces the contiguous result "Hello world!"

If you omit all arguments, TXT.PRINT prints a blank line. Printing always begins at the current caret position.

Any control codes, such as Carriage Return, Line-Feed and Backspace are not interpreted. They will display on the screen as symbols.

It is not possible to print a User-Defined Type (UDT), a [Variant](#), an object variable, or an entire [array](#). Individual member values must be extracted with the appropriate function before they can be displayed.

### TXT.WAITKEY\$

#### Syntax

```
TXT.WAITKEY$ [TO WaitVar$]
WaitVar$ = TXT.WAITKEY$
```

#### Remarks

Reads a keyboard character, waiting until one is ready. It removes the character from the keyboard buffer for the Text Window, and optionally assigns it to the string variable. If the

TO clause is omitted, the keyboard character is discarded.

TXT.WAITKEY\$ returns a string of 0 or 1 characters that reflects the status of the keyboard buffer for the Text Window. A null string (LEN=0) means that there was an error, such as the case when no Text Window currently exists.

A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

TXT.WAITKEY\$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

### **TXT.WINDOW**

#### **Syntax**

`TXT.WINDOW(Cap$, x, y [,Rows, Cols]) TO hWin`

#### **Remarks**

A new Text Window is created and attached to your program. The size of the Window is determined by rows and cols, or defaults to 25 rows and 80 columns. Subsequent TXT Methods will act upon this newly created Text Window.

If the Text Window is created successfully, the [handle](#) will be assigned to the variable specified by *hWin*. If it fails, the value zero (0) will be assigned instead. If you try to create a Text Window while another still exists, it will fail. In this case, you must first destroy the prior Text Window, as only one may exist at a time.

The parameters *x* and *y* specify the requested location of the window, relative to the upper left corner of the desktop. The parameters are always given in pixels. Rows and columns optionally specify the size of the window, given in the number of characters which will fit within the borders. If not given, the method defaults to 25 vertical rows by 80 horizontal columns.

#### **See also**

[DIALOG NEW](#), [GRAPHIC WINDOW](#), [INPUTBOX\\$](#), [MSGBOX](#)

## **TXT.END method**

# **Keyword Template**

#### **Purpose**

#### **Syntax**

#### **Remarks**

#### **See also**

#### **Example**

## **TXT pseudo-object New!**

#### **Purpose**

Displays and inputs text on a specially created TEXT WINDOW. This is similar to a CONSOLE window, with some advantages. Generally speaking, a Text Window is more attractive. But, just like a Console Window, only fixed-width text may be displayed.

#### **Syntax**

`TXT.membername(params)`  
`RetVal = TXT.membername(params)`  
`TXT.membername(params) TO ReturnVariable`

#### **Remarks**

Text Windows offer a specific, but limited capability. They are very easy to implement and use, and they offer an excellent means to produce quick and straightforward programs in text mode.

Text Windows offer an excellent path for the beginning programmer, or for anyone who needs a procedural code model. As the name implies, they display only fixed-width text. Further, only one Text Window may exist at a time. If you need snazzy graphics, more

specialized fonts, multiple windows, or a GUI interface, you should look to [GRAPHIC WINDOWS](#) and [GRAPHIC CONTROLS](#) instead.

Text Window methods are accessed like any other [object](#). The object name TXT is followed by a period separator, and the name of the method or property:

```
TXT.Cell = RowValue&, ColumnVal&
```

Text Window methods which return a value may be used in two forms, a statement with a TO clause, or a function which may be used as a term in an expression:

```
TXT.Row TO RowVar&
RowVar& = TXT.Row
```

The two examples above are functionally identical. The choice is simply a matter of your personal preference. If you use the second form (as a [function](#) which returns a value), it can be a term in any expression of any complexity.

Most PowerBASIC functions specify graphic and [pixel](#) positions as x,y (the horizontal term first, then the vertical term). However, for compatibility with most current and prior versions of BASIC (PowerBASIC included), the functions which reference text rows and columns name the vertical term first (rows, columns).

Text Windows handle text wrapping and auto-scrolling much like a typical Console Window. When printing exceeds the end of a line, the print position wraps to the first column of the next row. When printing exceeds the last row, the entire page is scrolled to open a new line at the bottom.

In order to use the TXT object successfully, you must use care to first create a Text Window in your program. To do this, you can execute the TXT.WINDOW method.

All Text Windows are stable. They cannot be closed unexpectedly by the user, so there are no surprises when you find you are trying to print to a window which no longer exists.

There is no Close Box, no System Menu, nor is ALT-F4 recognized as a close command. They can only be closed by executing TXT.END, or by terminating the entire application.

## TXT METHODS

### TXT.CELL

#### Syntax

```
TXT.CELL = RowValue&, ColValue&
TXT.CELL TO RowVar&, ColVar&
TXT.COL TO ColVar& <or> ColVar& = TXT.COL
TXT.ROW TO RowVar& <or> RowVar& = TXT.ROW
```

#### Remarks

TXT.CELL is used to set or retrieve the cursor position, based upon the row and column position of a Text Cell. That is the row and column position where the next printed text will be displayed. *RowValue&* specifies the horizontal screen row (starting at 1) at which to position the cursor. *ColValue&* specifies the vertical screen column (starting at 1) at which to position the cursor. Since row and column numbers start at one (1), the upper left corner of the Text Window is considered to be cell 1,1.

The first form of TXT.CELL moves the cursor to the desired row and column. If a value given is zero (0), that parameter is ignored and that position is not changed. The second form of TXT.CELL retrieves the current cursor position, and assigns the values to the variables specified by *RowVar&* and *ColVar&*.

The last two forms allow you to retrieve just a single value, either row or column, and are supported in both statement and function form.

### TXT.CLS

#### Syntax

```
TXT.CLS
```

#### Remarks

The text window is cleared, and the caret (next print position) is moved to the upper left corner (row 1, column 1).

**TXT.COLOR**

**Syntax** `TXT.COLOR = RGBColor&`

**Remarks** TXT.COLOR is used to change the foreground color of new text drawn with TXT.PRINT. Existing text on the Text Window is not changed. PowerBASIC includes many [built-in RGB color equates](#) which may be used here, like %RGB\_RED, %RGB\_BLUE, etc.

**TXT.END**

**Syntax** `TXT.END`

**Remarks** The Text Window currently attached to your program is destroyed and detached from the process. No errors are generated, even if no Text Window is currently attached.

**TXT.INKEY\$**

**Syntax** `TXT.INKEY$ TO InkeyVar$`  
`InkeyVar$ = TXT.INKEY$`

**Remarks** Reads a keyboard character if one is ready. TXT.INKEY\$ returns a string of 0 or 1 characters that reflects the status of the keyboard buffer for the current text window. A null string ([LEN=0](#)) means that the buffer is empty - no key was pressed. A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

TXT.INKEY\$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

**TXT.INSTAT**

**Syntax** `TXT.INSTAT TO InStatVar&`  
`InstatVar& = TXT.INSTAT`

**Remarks** Determines whether a keyboard character is ready. The `InstatVar&` variable receives the keyboard buffer status for the current text window. The value assigned is [TRUE](#) (non-zero) if a keyboard character is ready to be retrieved, or [FALSE](#) (zero) if not.

TXT.INSTAT does not remove the character from the buffer, so repeated execution will continue to return TRUE until the character is read with TXT.INKEY\$, TXT.LINE.INPUT, etc.

**TXT.LINE.INPUT**

**Syntax** `TXT.LINE.INPUT(["prompt"], StringVar)`

**Remarks** Reads an entire line from the keyboard into a string variable, ignoring any delimiters which may be embedded. The prompt is an optional string [constant](#) or string equate. Upon execution, the prompt is displayed and the program waits for keyboard input. Keystrokes are accepted until the user presses ENTER, at which time the resulting string is stored into the `StringVar`.

The `StringVar` may be a [fixed-length](#), [nul-terminated](#), or a [dynamic](#) string. For fixed-length and nul-terminated strings, keyboard input longer than the string is truncated to fit. Dynamic strings receive the complete keyboard input without truncation. `StringVar` may not be a [UDT](#) variable, although fixed-length and nul-terminated UDT member variables are allowed.

**TXT.PRINT**

**Syntax** `TXT.PRINT([ExprList] [SPC(n)] [TAB(n)] [,] [;]...)`

**Remarks** Write text data to the TEXT WINDOW at the current caret location. The TXT.PRINT method has the following parts, which may occur in any order and quantity:

ExprList: Numeric and/or string expression(s) to be written to the TEXT WINDOW.

SPC(*n*) An optional function used to insert *n* spaces into the printed output. Multiple use of the SPC argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.

TAB(*n*) An optional function used to tab to the *n*th column before printing an expression. Multiple use of the TAB argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.

; and , are special characters that determine the position of the next text item printed. A semicolon (;) means the next text item is printed immediately; a comma (,) means the next text item is printed at the start of the next print zone. Print zones begin every 14 columns.

If the final argument of TXT.PRINT is a semicolon or comma, the caret position is maintained at the current location, rather than the default action of moving the print position to the start of the next line. For example:

```
TXT.PRINT "Hello";
TXT.PRINT " world!";
```

...produces the contiguous result "Hello world!"

If you omit all arguments, TXT.PRINT prints a blank line. Printing always begins at the current caret position.

Any control codes, such as Carriage Return, Line-Feed and Backspace are not interpreted. They will display on the screen as symbols.

It is not possible to print a User-Defined Type (UDT), a [Variant](#), an object variable, or an entire [array](#). Individual member values must be extracted with the appropriate function before they can be displayed.

### **TXT.WAITKEY\$**

#### **Syntax**

```
TXT.WAITKEY$ [TO WaitVar$]
WaitVar$ = TXT.WAITKEY$
```

#### **Remarks**

Reads a keyboard character, waiting until one is ready. It removes the character from the keyboard buffer for the Text Window, and optionally assigns it to the string variable. If the TO clause is omitted, the keyboard character is discarded.

TXT.WAITKEY\$ returns a string of 0 or 1 characters that reflects the status of the keyboard buffer for the Text Window. A null string (LEN=0) means that there was an error, such as the case when no Text Window currently exists.

A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

TXT.WAITKEY\$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

### **TXT.WINDOW**

#### **Syntax**

```
TXT.WINDOW(Cap$, x, y [,Rows, Cols]) TO hWin
```

#### **Remarks**

A new Text Window is created and attached to your program. The size of the Window is determined by rows and cols, or defaults to 25 rows and 80 columns. Subsequent TXT Methods will act upon this newly created Text Window.

If the Text Window is created successfully, the [handle](#) will be assigned to the variable specified by *hWin*. If it fails, the value zero (0) will be assigned instead. If you try to create a Text Window while another still exists, it will fail. In this case, you must first destroy the prior Text Window, as only one may exist at a time.

The parameters *x* and *y* specify the requested location of the window, relative to the upper left corner of the desktop. The parameters are always given in pixels. Rows and columns

optionally specify the size of the window, given in the number of characters which will fit within the borders. If not given, the method defaults to 25 vertical rows by 80 horizontal columns.

**See also** [DIALOG NEW](#), [GRAPHIC WINDOW](#), [INPUTBOX\\$](#), [MSGBOX](#)

## TXT.INKEY\$ method

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

# TXT pseudo-object New!

**Purpose** Displays and inputs text on a specially created TEXT WINDOW. This is similar to a CONSOLE window, with some advantages. Generally speaking, a Text Window is more attractive. But, just like a Console Window, only fixed-width text may be displayed.

**Syntax**

```
TXT.membername(params)
RetVal = TXT.membername(params)
TXT.membername(params) TO ReturnVariable
```

**Remarks** Text Windows offer a specific, but limited capability. They are very easy to implement and use, and they offer an excellent means to produce quick and straightforward programs in text mode.

Text Windows offer an excellent path for the beginning programmer, or for anyone who needs a procedural code model. As the name implies, they display only fixed-width text. Further, only one Text Window may exist at a time. If you need snazzy graphics, more specialized fonts, multiple windows, or a GUI interface, you should look to [GRAPHIC WINDOWS](#) and [GRAPHIC CONTROLS](#) instead.

Text Window methods are accessed like any other [object](#). The object name TXT is followed by a period separator, and the name of the method or property:

```
TXT.Cell = RowValue&, ColumnVal&
```

Text Window methods which return a value may be used in two forms, a statement with a TO clause, or a function which may be used as a term in an expression:

```
TXT.Row TO RowVar&
RowVar& = TXT.Row
```

The two examples above are functionally identical. The choice is simply a matter of your personal preference. If you use the second form (as a [function](#) which returns a value), it can be a term in any expression of any complexity.

Most PowerBASIC functions specify graphic and [pixel](#) positions as x,y (the horizontal term first, then the vertical term). However, for compatibility with most current and prior versions of BASIC (PowerBASIC included), the functions which reference text rows and columns name the vertical term first (rows, columns).

Text Windows handle text wrapping and auto-scrolling much like a typical Console Window. When printing exceeds the end of a line, the print position wraps to the first column of the next row. When printing exceeds the last row, the entire page is scrolled to open a new line at the bottom.

In order to use the TXT object successfully, you must use care to first create a Text

Window in your program. To do this, you can execute the `TXT.WINDOW` method.

All Text Windows are stable. They cannot be closed unexpectedly by the user, so there are no surprises when you find you are trying to print to a window which no longer exists.

There is no Close Box, no System Menu, nor is ALT-F4 recognized as a close command. They can only be closed by executing `TXT.END`, or by terminating the entire application.

## **TXT METHODS**

### **TXT.CELL**

#### **Syntax**

```
TXT.CELL = RowValue&, ColValue&
TXT.CELL TO RowVar&, ColVar&
TXT.COL TO ColVar& <or> ColVar& = TXT.COL
TXT.ROW TO RowVar& <or> RowVar& = TXT.ROW
```

#### **Remarks**

`TXT.CELL` is used to set or retrieve the cursor position, based upon the row and column position of a Text Cell. That is the row and column position where the next printed text will be displayed. *RowValue&* specifies the horizontal screen row (starting at 1) at which to position the cursor. *ColValue&* specifies the vertical screen column (starting at 1) at which to position the cursor. Since row and column numbers start at one (1), the upper left corner of the Text Window is considered to be cell 1,1.

The first form of `TXT.CELL` moves the cursor to the desired row and column. If a value given is zero (0), that parameter is ignored and that position is not changed. The second form of `TXT.CELL` retrieves the current cursor position, and assigns the values to the variables specified by *RowVar&* and *ColVar&*.

The last two forms allow you to retrieve just a single value, either row or column, and are supported in both statement and function form.

### **TXT.CLS**

#### **Syntax**

```
TXT.CLS
```

#### **Remarks**

The text window is cleared, and the caret (next print position) is moved to the upper left corner (row 1, column 1).

### **TXT.COLOR**

#### **Syntax**

```
TXT.COLOR = RGBColor&
```

#### **Remarks**

`TXT.COLOR` is used to change the foreground color of new text drawn with `TXT.PRINT`. Existing text on the Text Window is not changed. PowerBASIC includes many [built-in RGB color equates](#) which may be used here, like `%RGB_RED`, `%RGB_BLUE`, etc.

### **TXT.END**

#### **Syntax**

```
TXT.END
```

#### **Remarks**

The Text Window currently attached to your program is destroyed and detached from the process. No errors are generated, even if no Text Window is currently attached.

### **TXT.INKEY\$**

#### **Syntax**

```
TXT.INKEY$ TO InkeyVar$
InkeyVar$ = TXT.INKEY$
```

#### **Remarks**

Reads a keyboard character if one is ready. `TXT.INKEY$` returns a of 0 or 1 characters that reflects the status of the keyboard buffer for the current text window. A null string (`LEN=0`) means that the buffer is empty - no key was pressed. A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

`TXT.INKEY$` only processes standard characters. Extended keys, like function keys and

the insert key, are ignored.

### **TXT.INSTAT**

#### **Syntax**

```
TXT.INSTAT TO InStatVar&
InStatVar& = TXT.INSTAT
```

#### **Remarks**

Determines whether a keyboard character is ready. The variable receives the keyboard buffer status for the current text window. The value assigned is [TRUE](#) (non-zero) if a keyboard character is ready to be retrieved, or [FALSE](#) (zero) if not.

TXT.INSTAT does not remove the character from the buffer, so repeated execution will continue to return TRUE until the character is read with TXT.INKEY\$, TXT.LINE.INPUT, etc.

### **TXT.LINE.INPUT**

#### **Syntax**

```
TXT.LINE.INPUT(["prompt",] StringVar)
```

#### **Remarks**

Reads an entire line from the keyboard into a string variable, ignoring any delimiters which may be embedded. The prompt is an optional string [constant](#) or string equate. Upon execution, the prompt is displayed and the program waits for keyboard input. Keystrokes are accepted until the user presses ENTER, at which time the resulting string is stored into the *StringVar*.

The *StringVar* may be a [fixed-length](#), [nul-terminated](#), or a [dynamic](#) string. For fixed-length and nul-terminated strings, keyboard input longer than the string is truncated to fit.

Dynamic strings receive the complete keyboard input without truncation. *StringVar* may not be a [UDT](#) variable, although fixed-length and nul-terminated UDT member variables are allowed.

### **TXT.PRINT**

#### **Syntax**

```
TXT.PRINT([ExprList] [SPC(n)] [TAB(n)] [,] [;]...)
```

#### **Remarks**

Write text data to the TEXT WINDOW at the current caret location. The TXT.PRINT method has the following parts, which may occur in any order and quantity:

*ExprList*: Numeric and/or string expression(s) to be written to the TEXT WINDOW.

*SPC*(*n*) An optional function used to insert *n* spaces into the printed output. Multiple use of the SPC argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.

*TAB*(*n*) An optional function used to tab to the *n*th column before printing an expression. Multiple use of the TAB argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.

; and , are special characters that determine the position of the next text item printed. A semicolon (;) means the next text item is printed immediately; a comma (,) means the next text item is printed at the start of the next print zone. Print zones begin every 14 columns.

If the final argument of TXT.PRINT is a semicolon or comma, the caret position is maintained at the current location, rather than the default action of moving the print position to the start of the next line. For example:

```
TXT.PRINT "Hello";
TXT.PRINT " world!";
```

...produces the contiguous result "Hello world!"

If you omit all arguments, TXT.PRINT prints a blank line. Printing always begins at the current caret position.

Any control codes, such as Carriage Return, Line-Feed and Backspace are not

interpreted. They will display on the screen as symbols.

It is not possible to print a User-Defined Type (UDT), a [Variant](#), an object variable, or an entire [array](#). Individual member values must be extracted with the appropriate function before they can be displayed.

### **TXT.WAITKEY\$**

#### **Syntax**

```
TXT.WAITKEY$ [TO WaitVar$]
WaitVar$ = TXT.WAITKEY$
```

#### **Remarks**

Reads a keyboard character, waiting until one is ready. It removes the character from the keyboard buffer for the Text Window, and optionally assigns it to the string variable. If the TO clause is omitted, the keyboard character is discarded.

TXT.WAITKEY\$ returns a string of 0 or 1 characters that reflects the status of the keyboard buffer for the Text Window. A null string (LEN=0) means that there was an error, such as the case when no Text Window currently exists.

A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

TXT.WAITKEY\$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

### **TXT.WINDOW**

#### **Syntax**

```
TXT.WINDOW(Cap$, x, y [,Rows, Cols]) TO hWin
```

#### **Remarks**

A new Text Window is created and attached to your program. The size of the Window is determined by rows and cols, or defaults to 25 rows and 80 columns. Subsequent TXT Methods will act upon this newly created Text Window.

If the Text Window is created successfully, the [handle](#) will be assigned to the variable specified by *hWin*. If it fails, the value zero (0) will be assigned instead. If you try to create a Text Window while another still exists, it will fail. In this case, you must first destroy the prior Text Window, as only one may exist at a time.

The parameters *x* and *y* specify the requested location of the window, relative to the upper left corner of the desktop. The parameters are always given in pixels. Rows and columns optionally specify the size of the window, given in the number of characters which will fit within the borders. If not given, the method defaults to 25 vertical rows by 80 horizontal columns.

#### **See also**

[DIALOG NEW](#), [GRAPHIC WINDOW](#), [INPUTBOX\\$](#), [MSGBOX](#)

## **TXT.INSTAT method**

# **Keyword Template**

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## **TXT pseudo-object New!**

**Purpose**

Displays and inputs text on a specially created TEXT WINDOW. This is similar to a CONSOLE window, with some advantages. Generally speaking, a Text Window is more

attractive. But, just like a Console Window, only fixed-width text may be displayed.

### Syntax

```
TXT.membername(params)
RetVal = TXT.membername(params)
TXT.membername(params) TO ReturnVariable
```

### Remarks

Text Windows offer a specific, but limited capability. They are very easy to implement and use, and they offer an excellent means to produce quick and straightforward programs in text mode.

Text Windows offer an excellent path for the beginning programmer, or for anyone who needs a procedural code model. As the name implies, they display only fixed-width text. Further, only one Text Window may exist at a time. If you need snazzy graphics, more specialized fonts, multiple windows, or a GUI interface, you should look to [GRAPHIC WINDOWS](#) and [GRAPHIC CONTROLS](#) instead.

Text Window methods are accessed like any other [object](#). The object name TXT is followed by a period separator, and the name of the method or property:

```
TXT.Cell = RowValue&, ColumnVal&
```

Text Window methods which return a value may be used in two forms, a statement with a TO clause, or a function which may be used as a term in an expression:

```
TXT.Row TO RowVar&
RowVar& = TXT.Row
```

The two examples above are functionally identical. The choice is simply a matter of your personal preference. If you use the second form (as a [function](#) which returns a value), it can be a term in any expression of any complexity.

Most PowerBASIC functions specify graphic and [pixel](#) positions as x,y (the horizontal term first, then the vertical term). However, for compatibility with most current and prior versions of BASIC (PowerBASIC included), the functions which reference text rows and columns name the vertical term first (rows, columns).

Text Windows handle text wrapping and auto-scrolling much like a typical Console Window. When printing exceeds the end of a line, the print position wraps to the first column of the next row. When printing exceeds the last row, the entire page is scrolled to open a new line at the bottom.

In order to use the TXT object successfully, you must use care to first create a Text Window in your program. To do this, you can execute the TXT.WINDOW method.

All Text Windows are stable. They cannot be closed unexpectedly by the user, so there are no surprises when you find you are trying to print to a window which no longer exists.

There is no Close Box, no System Menu, nor is ALT-F4 recognized as a close command. They can only be closed by executing TXT.END, or by terminating the entire application.

## TXT METHODS

### TXT.CELL

### Syntax

```
TXT.CELL = RowValue&, ColValue&
TXT.CELL TO RowVar&, ColVar&
TXT.COL TO ColVar& <or> ColVar& = TXT.COL
TXT.ROW TO RowVar& <or> RowVar& = TXT.ROW
```

### Remarks

TXT.CELL is used to set or retrieve the cursor position, based upon the row and column position of a Text Cell. That is the row and column position where the next printed text will be displayed. *RowValue&* specifies the horizontal screen row (starting at 1) at which to position the cursor. *ColValue&* specifies the vertical screen column (starting at 1) at which to position the cursor. Since row and column numbers start at one (1), the upper left corner of the Text Window is considered to be cell 1,1.

The first form of TXT.CELL moves the cursor to the desired row and column. If a value given is zero (0), that parameter is ignored and that position is not changed. The second form of TXT.CELL retrieves the current cursor position, and assigns the values to the

variables specified by *RowVar&* and *ColVar&*.

The last two forms allow you to retrieve just a single value, either row or column, and are supported in both statement and function form.

### **TXT.CLS**

**Syntax**

`TXT.CLS`

**Remarks**

The text window is cleared, and the caret (next print position) is moved to the upper left corner (row 1, column 1).

### **TXT.COLOR**

**Syntax**

`TXT.COLOR = RGBColor&`

**Remarks**

TXT.COLOR is used to change the foreground color of new text drawn with TXT.PRINT. Existing text on the Text Window is not changed. PowerBASIC includes many [built-in RGB color equates](#) which may be used here, like %RGB\_RED, %RGB\_BLUE, etc.

### **TXT.END**

**Syntax**

`TXT.END`

**Remarks**

The Text Window currently attached to your program is destroyed and detached from the process. No errors are generated, even if no Text Window is currently attached.

### **TXT.INKEY\$**

**Syntax**

`TXT.INKEY$ TO InkeyVar$`  
`InkeyVar$ = TXT.INKEY$`

**Remarks**

Reads a keyboard character if one is ready. TXT.INKEY\$ returns a string of 0 or 1 characters that reflects the status of the keyboard buffer for the current text window. A null string ([LEN=0](#)) means that the buffer is empty - no key was pressed. A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code. TXT.INKEY\$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

### **TXT.INSTAT**

**Syntax**

`TXT.INSTAT TO InStatVar&`  
`InstatVar& = TXT.INSTAT`

**Remarks**

Determines whether a keyboard character is ready. The `InstatVar&` variable receives the keyboard buffer status for the current text window. The value assigned is [TRUE](#) (non-zero) if a keyboard character is ready to be retrieved, or [FALSE](#) (zero) if not.

TXT.INSTAT does not remove the character from the buffer, so repeated execution will continue to return TRUE until the character is read with TXT.INKEY\$, TXT.LINE.INPUT, etc.

### **TXT.LINE.INPUT**

**Syntax**

`TXT.LINE.INPUT([ "prompt", ] StringVar)`

**Remarks**

Reads an entire line from the keyboard into a string variable, ignoring any delimiters which may be embedded. The prompt is an optional string [constant](#) or string equate. Upon execution, the prompt is displayed and the program waits for keyboard input. Keystrokes are accepted until the user presses ENTER, at which time the resulting string is stored into the *StringVar*.

The *StringVar* may be a [fixed-length](#), [nul-terminated](#), or a [dynamic](#) string. For fixed-length

and nul-terminated strings, keyboard input longer than the string is truncated to fit.

Dynamic strings receive the complete keyboard input without truncation. *StringVar* may not be a [UDT](#) variable, although fixed-length and nul-terminated UDT member variables are allowed.

### **TXT.PRINT**

#### **Syntax**

```
TXT.PRINT([ExprList] [SPC(n)] [TAB(n)] [,] [;]...)
```

#### **Remarks**

Write text data to the TEXT WINDOW at the current caret location. The TXT.PRINT method has the following parts, which may occur in any order and quantity:

*ExprList*: Numeric and/or string expression(s) to be written to the TEXT WINDOW.

*SPC*(*n*) An optional function used to insert *n* spaces into the printed output. Multiple use of the SPC argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.

*TAB*(*n*) An optional function used to tab to the *n*th column before printing an expression. Multiple use of the TAB argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.

; and , are special characters that determine the position of the next text item printed. A semicolon (;) means the next text item is printed immediately; a comma (,) means the next text item is printed at the start of the next print zone. Print zones begin every 14 columns.

If the final argument of TXT.PRINT is a semicolon or comma, the caret position is maintained at the current location, rather than the default action of moving the print position to the start of the next line. For example:

```
TXT.PRINT "Hello";
TXT.PRINT " world!";
```

...produces the contiguous result "Hello world!"

If you omit all arguments, TXT.PRINT prints a blank line. Printing always begins at the current caret position.

Any control codes, such as Carriage Return, Line-Feed and Backspace are not interpreted. They will display on the screen as symbols.

It is not possible to print a User-Defined Type (UDT), a [Variant](#), an object variable, or an entire [array](#). Individual member values must be extracted with the appropriate function before they can be displayed.

### **TXT.WAITKEY\$**

#### **Syntax**

```
TXT.WAITKEY$ [TO WaitVar$]
WaitVar$ = TXT.WAITKEY$
```

#### **Remarks**

Reads a keyboard character, waiting until one is ready. It removes the character from the keyboard buffer for the Text Window, and optionally assigns it to the string variable. If the TO clause is omitted, the keyboard character is discarded.

TXT.WAITKEY\$ returns a string of 0 or 1 characters that reflects the status of the keyboard buffer for the Text Window. A null string (LEN=0) means that there was an error, such as the case when no Text Window currently exists.

A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

TXT.WAITKEY\$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

### **TXT.WINDOW**

#### **Syntax**

```
TXT.WINDOW(Cap$, x, y [,Rows, Cols]) TO hWin
```

**Remarks** A new Text Window is created and attached to your program. The size of the Window is determined by rows and cols, or defaults to 25 rows and 80 columns. Subsequent TXT Methods will act upon this newly created Text Window.

If the Text Window is created successfully, the [handle](#) will be assigned to the variable specified by *hWin*. If it fails, the value zero (0) will be assigned instead. If you try to create a Text Window while another still exists, it will fail. In this case, you must first destroy the prior Text Window, as only one may exist at a time.

The parameters *x* and *y* specify the requested location of the window, relative to the upper left corner of the desktop. The parameters are always given in pixels. Rows and columns optionally specify the size of the window, given in the number of characters which will fit within the borders. If not given, the method defaults to 25 vertical rows by 80 horizontal columns.

**See also** [DIALOG NEW](#), [GRAPHIC WINDOW](#), [INPUTBOX\\$](#), [MSGBOX](#)

## TXT.LINE.INPUT method

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

# TXT pseudo-object New!

**Purpose** Displays and inputs text on a specially created TEXT WINDOW. This is similar to a CONSOLE window, with some advantages. Generally speaking, a Text Window is more attractive. But, just like a Console Window, only fixed-width text may be displayed.

**Syntax**

```
TXT.membername(params)
RetVal = TXT.membername(params)
TXT.membername(params) TO ReturnVariable
```

**Remarks** Text Windows offer a specific, but limited capability. They are very easy to implement and use, and they offer an excellent means to produce quick and straightforward programs in text mode.

Text Windows offer an excellent path for the beginning programmer, or for anyone who needs a procedural code model. As the name implies, they display only fixed-width text. Further, only one Text Window may exist at a time. If you need snazzy graphics, more specialized fonts, multiple windows, or a GUI interface, you should look to [GRAPHIC WINDOWS](#) and [GRAPHIC CONTROLS](#) instead.

Text Window methods are accessed like any other [object](#). The object name TXT is followed by a period separator, and the name of the method or property:

```
TXT.Cell = RowValue&, ColumnVal&
```

Text Window methods which return a value may be used in two forms, a statement with a TO clause, or a function which may be used as a term in an expression:

```
TXT.Row TO RowVar&
RowVar& = TXT.Row
```

The two examples above are functionally identical. The choice is simply a matter of your personal preference. If you use the second form (as a [function](#) which returns a value), it can be a term in any expression of any complexity.

Most PowerBASIC functions specify graphic and [pixel](#) positions as x,y (the horizontal term first, then the vertical term). However, for compatibility with most current and prior versions of BASIC (PowerBASIC included), the functions which reference text rows and columns name the vertical term first (rows, columns).

Text Windows handle text wrapping and auto-scrolling much like a typical Console Window. When printing exceeds the end of a line, the print position wraps to the first column of the next row. When printing exceeds the last row, the entire page is scrolled to open a new line at the bottom.

In order to use the TXT object successfully, you must use care to first create a Text Window in your program. To do this, you can execute the TXT.WINDOW method.

All Text Windows are stable. They cannot be closed unexpectedly by the user, so there are no surprises when you find you are trying to print to a window which no longer exists.

There is no Close Box, no System Menu, nor is ALT-F4 recognized as a close command. They can only be closed by executing TXT.END, or by terminating the entire application.

## TXT METHODS

### TXT.CELL

#### Syntax

```
TXT.CELL = RowValue&, ColValue&
TXT.CELL TO RowVar&, ColVar&
TXT.COL TO ColVar& <or> ColVar& = TXT.COL
TXT.ROW TO RowVar& <or> RowVar& = TXT.ROW
```

#### Remarks

TXT.CELL is used to set or retrieve the cursor position, based upon the row and column position of a Text Cell. That is the row and column position where the next printed text will be displayed. *RowValue&* specifies the horizontal screen row (starting at 1) at which to position the cursor. *ColValue&* specifies the vertical screen column (starting at 1) at which to position the cursor. Since row and column numbers start at one (1), the upper left corner of the Text Window is considered to be cell 1,1.

The first form of TXT.CELL moves the cursor to the desired row and column. If a value given is zero (0), that parameter is ignored and that position is not changed. The second form of TXT.CELL retrieves the current cursor position, and assigns the values to the variables specified by *RowVar&* and *ColVar&*.

The last two forms allow you to retrieve just a single value, either row or column, and are supported in both statement and function form.

### TXT.CLS

#### Syntax

```
TXT.CLS
```

#### Remarks

The text window is cleared, and the caret (next print position) is moved to the upper left corner (row 1, column 1).

### TXT.COLOR

#### Syntax

```
TXT.COLOR = RGBColor&
```

#### Remarks

TXT.COLOR is used to change the foreground color of new text drawn with TXT.PRINT. Existing text on the Text Window is not changed. PowerBASIC includes many [built-in RGB color equates](#) which may be used here, like %RGB\_RED, %RGB\_BLUE, etc.

### TXT.END

#### Syntax

```
TXT.END
```

#### Remarks

The Text Window currently attached to your program is destroyed and detached from the process. No errors are generated, even if no Text Window is currently attached.

### TXT.INKEY\$

**Syntax** `TXT.INKEY$ TO InkeyVar$`  
`InkeyVar$ = TXT.INKEY$`

**Remarks** Reads a keyboard character if one is ready. `TXT.INKEY$` returns a string of 0 or 1 characters that reflects the status of the keyboard buffer for the current text window. A null string (`LEN=0`) means that the buffer is empty - no key was pressed. A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

`TXT.INKEY$` only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

### **TXT.INSTAT**

**Syntax** `TXT.INSTAT TO InStatVar&`  
`InStatVar& = TXT.INSTAT`

**Remarks** Determines whether a keyboard character is ready. The `InStatVar&` variable receives the keyboard buffer status for the current text window. The value assigned is `TRUE` (non-zero) if a keyboard character is ready to be retrieved, or `FALSE` (zero) if not.

`TXT.INSTAT` does not remove the character from the buffer, so repeated execution will continue to return `TRUE` until the character is read with `TXT.INKEY$`, `TXT.LINE.INPUT`, etc.

### **TXT.LINE.INPUT**

**Syntax** `TXT.LINE.INPUT(["prompt",] StringVar)`

**Remarks** Reads an entire line from the keyboard into a string variable, ignoring any delimiters which may be embedded. The prompt is an optional string `constant` or string equate. Upon execution, the prompt is displayed and the program waits for keyboard input. Keystrokes are accepted until the user presses ENTER, at which time the resulting string is stored into the `StringVar`.

The `StringVar` may be a `fixed-length`, `nul-terminated`, or a `dynamic` string. For fixed-length and nul-terminated strings, keyboard input longer than the string is truncated to fit.

Dynamic strings receive the complete keyboard input without truncation. `StringVar` may not be a `UDT` variable, although fixed-length and nul-terminated UDT member variables are allowed.

### **TXT.PRINT**

**Syntax** `TXT.PRINT([ExprList] [SPC(n)] [TAB(n)] [,] [;]...)`

**Remarks** Write text data to the TEXT WINDOW at the current caret location. The `TXT.PRINT` method has the following parts, which may occur in any order and quantity:

`ExprList`: Numeric and/or string expression(s) to be written to the TEXT WINDOW.

`SPC`(*n*) An optional function used to insert *n* spaces into the printed output. Multiple use of the `SPC` argument is permitted in `TXT.PRINT`, such as positions between expressions. Values of *n* less than 1 are ignored.

`TAB`(*n*) An optional function used to tab to the *n*th column before printing an expression. Multiple use of the `TAB` argument is permitted in `TXT.PRINT`, such as positions between expressions. Values of *n* less than 1 are ignored.

; and , are special characters that determine the position of the next text item printed. A semicolon (;) means the next text item is printed immediately; a comma (,) means the next text item is printed at the start of the next print zone. Print zones begin every 14 columns.

If the final argument of `TXT.PRINT` is a semicolon or comma, the caret position is

maintained at the current location, rather than the default action of moving the print position to the start of the next line. For example:

```
TXT.PRINT "Hello";
TXT.PRINT " world!";
```

...produces the contiguous result "Hello world!"

If you omit all arguments, TXT.PRINT prints a blank line. Printing always begins at the current caret position.

Any control codes, such as Carriage Return, Line-Feed and Backspace are not interpreted. They will display on the screen as symbols.

It is not possible to print a User-Defined Type (UDT), a [Variant](#), an object variable, or an entire [array](#). Individual member values must be extracted with the appropriate function before they can be displayed.

### **TXT.WAITKEY\$**

#### **Syntax**

```
TXT.WAITKEY$ [TO WaitVar$]
WaitVar$ = TXT.WAITKEY$
```

#### **Remarks**

Reads a keyboard character, waiting until one is ready. It removes the character from the keyboard buffer for the Text Window, and optionally assigns it to the string variable. If the TO clause is omitted, the keyboard character is discarded.

TXT.WAITKEY\$ returns a string of 0 or 1 characters that reflects the status of the keyboard buffer for the Text Window. A null string (LEN=0) means that there was an error, such as the case when no Text Window currently exists.

A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

TXT.WAITKEY\$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

### **TXT.WINDOW**

#### **Syntax**

```
TXT.WINDOW(Cap$, x, y [,Rows, Cols]) TO hWin
```

#### **Remarks**

A new Text Window is created and attached to your program. The size of the Window is determined by rows and cols, or defaults to 25 rows and 80 columns. Subsequent TXT Methods will act upon this newly created Text Window.

If the Text Window is created successfully, the [handle](#) will be assigned to the variable specified by *hWin*. If it fails, the value zero (0) will be assigned instead. If you try to create a Text Window while another still exists, it will fail. In this case, you must first destroy the prior Text Window, as only one may exist at a time.

The parameters *x* and *y* specify the requested location of the window, relative to the upper left corner of the desktop. The parameters are always given in pixels. Rows and columns optionally specify the size of the window, given in the number of characters which will fit within the borders. If not given, the method defaults to 25 vertical rows by 80 horizontal columns.

#### **See also**

[DIALOG NEW](#), [GRAPHIC WINDOW](#), [INPUTBOX\\$](#), [MSGBOX](#)

## **TXT.PRINT method**

# **Keyword Template**

**Purpose**

**Syntax**

**Remarks**

See also

Example

## TXT pseudo-object **New!**

**Purpose** Displays and inputs text on a specially created TEXT WINDOW. This is similar to a CONSOLE window, with some advantages. Generally speaking, a Text Window is more attractive. But, just like a Console Window, only fixed-width text may be displayed.

**Syntax**

```
TXT.membername(params)
RetVal = TXT.membername(params)
TXT.membername(params) TO ReturnVariable
```

**Remarks** Text Windows offer a specific, but limited capability. They are very easy to implement and use, and they offer an excellent means to produce quick and straightforward programs in text mode.

Text Windows offer an excellent path for the beginning programmer, or for anyone who needs a procedural code model. As the name implies, they display only fixed-width text.

Further, only one Text Window may exist at a time. If you need snazzy graphics, more specialized fonts, multiple windows, or a GUI interface, you should look to [GRAPHIC WINDOWS](#) and [GRAPHIC CONTROLS](#) instead.

Text Window methods are accessed like any other [object](#). The object name TXT is followed by a period separator, and the name of the method or property:

```
TXT.Cell = RowValue&, ColumnVal&
```

Text Window methods which return a value may be used in two forms, a statement with a TO clause, or a function which may be used as a term in an expression:

```
TXT.Row TO RowVar&
RowVar& = TXT.Row
```

The two examples above are functionally identical. The choice is simply a matter of your personal preference. If you use the second form (as a [function](#) which returns a value), it can be a term in any expression of any complexity.

Most PowerBASIC functions specify graphic and [pixel](#) positions as x,y (the horizontal term first, then the vertical term). However, for compatibility with most current and prior versions of BASIC (PowerBASIC included), the functions which reference text rows and columns name the vertical term first (rows, columns).

Text Windows handle text wrapping and auto-scrolling much like a typical Console Window. When printing exceeds the end of a line, the print position wraps to the first column of the next row. When printing exceeds the last row, the entire page is scrolled to open a new line at the bottom.

In order to use the TXT object successfully, you must use care to first create a Text Window in your program. To do this, you can execute the TXT.WINDOW method.

All Text Windows are stable. They cannot be closed unexpectedly by the user, so there are no surprises when you find you are trying to print to a window which no longer exists.

There is no Close Box, no System Menu, nor is ALT-F4 recognized as a close command. They can only be closed by executing TXT.END, or by terminating the entire application.

### TXT METHODS

#### TXT.CELL

**Syntax**

```
TXT.CELL = RowValue&, ColValue&
TXT.CELL TO RowVar&, ColVar&
TXT.COL TO ColVar& <or> ColVar& = TXT.COL
TXT.ROW TO RowVar& <or> RowVar& = TXT.ROW
```

**Remarks** TXT.CELL is used to set or retrieve the cursor position, based upon the row and column

position of a Text Cell. That is the row and column position where the next printed text will be displayed. *RowValue&* specifies the horizontal screen row (starting at 1) at which to position the cursor. *ColValue&* specifies the vertical screen column (starting at 1) at which to position the cursor. Since row and column numbers start at one (1), the upper left corner of the Text Window is considered to be cell 1,1.

The first form of TXT.CELL moves the cursor to the desired row and column. If a value given is zero (0), that parameter is ignored and that position is not changed. The second form of TXT.CELL retrieves the current cursor position, and assigns the values to the variables specified by *RowVar&* and *ColVar&*.

The last two forms allow you to retrieve just a single value, either row or column, and are supported in both statement and function form.

### **TXT.CLS**

**Syntax**

`TXT.CLS`

**Remarks**

The text window is cleared, and the caret (next print position) is moved to the upper left corner (row 1, column 1).

### **TXT.COLOR**

**Syntax**

`TXT.COLOR = RGBColor&`

**Remarks**

TXT.COLOR is used to change the foreground color of new text drawn with TXT.PRINT. Existing text on the Text Window is not changed. PowerBASIC includes many [built-in RGB color equates](#) which may be used here, like %RGB\_RED, %RGB\_BLUE, etc.

### **TXT.END**

**Syntax**

`TXT.END`

**Remarks**

The Text Window currently attached to your program is destroyed and detached from the process. No errors are generated, even if no Text Window is currently attached.

### **TXT.INKEY\$**

**Syntax**

`TXT.INKEY$ TO InkeyVar$`  
`InkeyVar$ = TXT.INKEY$`

**Remarks**

Reads a keyboard character if one is ready. TXT.INKEY\$ returns a string of 0 or 1 characters that reflects the status of the keyboard buffer for the current text window. A null string (`LEN=0`) means that the buffer is empty - no key was pressed. A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

TXT.INKEY\$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

### **TXT.INSTAT**

**Syntax**

`TXT.INSTAT TO InStatVar&`  
`InstatVar& = TXT.INSTAT`

**Remarks**

Determines whether a keyboard character is ready. The variable receives the keyboard buffer status for the current text window. The value assigned is `TRUE` (non-zero) if a keyboard character is ready to be retrieved, or `FALSE` (zero) if not.

TXT.INSTAT does not remove the character from the buffer, so repeated execution will continue to return TRUE until the character is read with TXT.INKEY\$, TXT.LINE.INPUT, etc.

### **TXT.LINE.INPUT**

**Syntax** `TEXT.LINE.INPUT(["prompt"], StringVar)`

**Remarks** Reads an entire line from the keyboard into a string variable, ignoring any delimiters which may be embedded. The prompt is an optional string [constant](#) or string equate. Upon execution, the prompt is displayed and the program waits for keyboard input. Keystrokes are accepted until the user presses ENTER, at which time the resulting string is stored into the *StringVar*.

The *StringVar* may be a [fixed-length](#), [nul-terminated](#), or a [dynamic](#) string. For fixed-length and nul-terminated strings, keyboard input longer than the string is truncated to fit.

Dynamic strings receive the complete keyboard input without truncation. *StringVar* may not be a [UDT](#) variable, although fixed-length and nul-terminated UDT member variables are allowed.

### **TXT.PRINT**

**Syntax** `TXT.PRINT([ExprList] [SPC(n)] [TAB(n)] [,] [;]...)`

**Remarks** Write text data to the TEXT WINDOW at the current caret location. The TXT.PRINT method has the following parts, which may occur in any order and quantity:

ExprList: Numeric and/or string expression(s) to be written to the TEXT WINDOW.

SPC(*n*) An optional function used to insert *n* spaces into the printed output. Multiple use of the SPC argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.

TAB(*n*) An optional function used to tab to the *n*th column before printing an expression. Multiple use of the TAB argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.

; and , are special characters that determine the position of the next text item printed. A semicolon (;) means the next text item is printed immediately; a comma (,) means the next text item is printed at the start of the next print zone. Print zones begin every 14 columns.

If the final argument of TXT.PRINT is a semicolon or comma, the caret position is maintained at the current location, rather than the default action of moving the print position to the start of the next line. For example:

```
TXT.PRINT "Hello";
TXT.PRINT " world!";
```

...produces the contiguous result "Hello world!"

If you omit all arguments, TXT.PRINT prints a blank line. Printing always begins at the current caret position.

Any control codes, such as Carriage Return, Line-Feed and Backspace are not interpreted. They will display on the screen as symbols.

It is not possible to print a User-Defined Type (UDT), a [Variant](#), an object variable, or an entire [array](#). Individual member values must be extracted with the appropriate function before they can be displayed.

### **TXT.WAITKEY\$**

**Syntax** `TXT.WAITKEY$ [TO WaitVar$]`

`WaitVar$ = TXT.WAITKEY$`

**Remarks** Reads a keyboard character, waiting until one is ready. It removes the character from the keyboard buffer for the Text Window, and optionally assigns it to the string variable. If the TO clause is omitted, the keyboard character is discarded.

TXT.WAITKEY\$ returns a string of 0 or 1 characters that reflects the status of the keyboard buffer for the Text Window. A null string (LEN=0) means that there was an error, such as the case when no Text Window currently exists.

A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

TXT.WAITKEY\$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

### **TXT.WINDOW**

#### **Syntax**

`TXT.WINDOW(Cap$, x, y [,Rows, Cols]) TO hWin`

#### **Remarks**

A new Text Window is created and attached to your program. The size of the Window is determined by rows and cols, or defaults to 25 rows and 80 columns. Subsequent TXT Methods will act upon this newly created Text Window.

If the Text Window is created successfully, the [handle](#) will be assigned to the variable specified by *hWin*. If it fails, the value zero (0) will be assigned instead. If you try to create a Text Window while another still exists, it will fail. In this case, you must first destroy the prior Text Window, as only one may exist at a time.

The parameters *x* and *y* specify the requested location of the window, relative to the upper left corner of the desktop. The parameters are always given in pixels. Rows and columns optionally specify the size of the window, given in the number of characters which will fit within the borders. If not given, the method defaults to 25 vertical rows by 80 horizontal columns.

#### **See also**

[DIALOG NEW](#), [GRAPHIC WINDOW](#), [INPUTBOX\\$](#), [MSGBOX](#)

## TXT.WAITKEY\$ method

# Keyword Template

#### **Purpose**

#### **Syntax**

#### **Remarks**

#### **See also**

#### **Example**

## TXT pseudo-object New!

#### **Purpose**

Displays and inputs text on a specially created TEXT WINDOW. This is similar to a CONSOLE window, with some advantages. Generally speaking, a Text Window is more attractive. But, just like a Console Window, only fixed-width text may be displayed.

#### **Syntax**

```
TXT.membername(params)
RetVal = TXT.membername(params)
TXT.membername(params) TO ReturnVariable
```

#### **Remarks**

Text Windows offer a specific, but limited capability. They are very easy to implement and use, and they offer an excellent means to produce quick and straightforward programs in text mode.

Text Windows offer an excellent path for the beginning programmer, or for anyone who needs a procedural code model. As the name implies, they display only fixed-width text.

Further, only one Text Window may exist at a time. If you need snazzy graphics, more specialized fonts, multiple windows, or a GUI interface, you should look to [GRAPHIC WINDOWS](#) and [GRAPHIC CONTROLS](#) instead.

Text Window methods are accessed like any other [object](#). The object name TXT is followed by a period separator, and the name of the method or property:

```
TXT.Cell = RowValue&, ColumnVal&
```

Text Window methods which return a value may be used in two forms, a statement with a TO clause, or a function which may be used as a term in an expression:

```
TXT.Row TO RowVar&
RowVar& = TXT.Row
```

The two examples above are functionally identical. The choice is simply a matter of your personal preference. If you use the second form (as a [function](#) which returns a value), it can be a term in any expression of any complexity.

Most PowerBASIC functions specify graphic and [pixel](#) positions as x,y (the horizontal term first, then the vertical term). However, for compatibility with most current and prior versions of BASIC (PowerBASIC included), the functions which reference text rows and columns name the vertical term first (rows, columns).

Text Windows handle text wrapping and auto-scrolling much like a typical Console Window. When printing exceeds the end of a line, the print position wraps to the first column of the next row. When printing exceeds the last row, the entire page is scrolled to open a new line at the bottom.

In order to use the TXT object successfully, you must use care to first create a Text Window in your program. To do this, you can execute the TXT.WINDOW method.

All Text Windows are stable. They cannot be closed unexpectedly by the user, so there are no surprises when you find you are trying to print to a window which no longer exists. There is no Close Box, no System Menu, nor is ALT-F4 recognized as a close command. They can only be closed by executing TXT.END, or by terminating the entire application.

## TXT METHODS

### TXT.CELL

#### Syntax

```
TXT.CELL = RowValue&, ColValue&
TXT.CELL TO RowVar&, ColVar&
TXT.COL TO ColVar& <or> ColVar& = TXT.COL
TXT.ROW TO RowVar& <or> RowVar& = TXT.ROW
```

#### Remarks

TXT.CELL is used to set or retrieve the cursor position, based upon the row and column position of a Text Cell. That is the row and column position where the next printed text will be displayed. *RowValue&* specifies the horizontal screen row (starting at 1) at which to position the cursor. *ColValue&* specifies the vertical screen column (starting at 1) at which to position the cursor. Since row and column numbers start at one (1), the upper left corner of the Text Window is considered to be cell 1,1.

The first form of TXT.CELL moves the cursor to the desired row and column. If a value given is zero (0), that parameter is ignored and that position is not changed. The second form of TXT.CELL retrieves the current cursor position, and assigns the values to the variables specified by *RowVar&* and *ColVar&*.

The last two forms allow you to retrieve just a single value, either row or column, and are supported in both statement and function form.

### TXT.CLS

#### Syntax

```
TXT.CLS
```

#### Remarks

The text window is cleared, and the caret (next print position) is moved to the upper left corner (row 1, column 1).

### TXT.COLOR

#### Syntax

```
TXT.COLOR = RGBColor&
```

#### Remarks

TXT.COLOR is used to change the foreground color of new text drawn with TXT.PRINT. Existing text on the Text Window is not changed. PowerBASIC includes many [built-in RGB color equates](#) which may be used here, like %RGB\_RED, %RGB\_BLUE, etc.

**TXT.END****Syntax**

```
TXT.END
```

**Remarks**

The Text Window currently attached to your program is destroyed and detached from the process. No errors are generated, even if no Text Window is currently attached.

**TXT.INKEY\$****Syntax**

```
TXT.INKEY$ TO InkeyVar$
InkeyVar$ = TXT.INKEY$
```

**Remarks**

Reads a keyboard character if one is ready. `TXT.INKEY$` returns a string of 0 or 1 characters that reflects the status of the keyboard buffer for the current text window. A null string (`LEN=0`) means that the buffer is empty - no key was pressed. A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

`TXT.INKEY$` only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

**TXT.INSTAT****Syntax**

```
TXT.INSTAT TO InStatVar&
InstatVar& = TXT.INSTAT
```

**Remarks**

Determines whether a keyboard character is ready. The `InStatVar&` variable receives the keyboard buffer status for the current text window. The value assigned is `TRUE` (non-zero) if a keyboard character is ready to be retrieved, or `FALSE` (zero) if not.

`TXT.INSTAT` does not remove the character from the buffer, so repeated execution will continue to return `TRUE` until the character is read with `TXT.INKEY$`, `TXT.LINE.INPUT`, etc.

**TXT.LINE.INPUT****Syntax**

```
TXT.LINE.INPUT(["prompt"], StringVar)
```

**Remarks**

Reads an entire line from the keyboard into a string variable, ignoring any delimiters which may be embedded. The prompt is an optional string [constant](#) or string equate. Upon execution, the prompt is displayed and the program waits for keyboard input. Keystrokes are accepted until the user presses ENTER, at which time the resulting string is stored into the `StringVar`.

The `StringVar` may be a [fixed-length](#), [nul-terminated](#), or a [dynamic](#) string. For fixed-length and nul-terminated strings, keyboard input longer than the string is truncated to fit. Dynamic strings receive the complete keyboard input without truncation. `StringVar` may not be a [UDT](#) variable, although fixed-length and nul-terminated UDT member variables are allowed.

**TXT.PRINT****Syntax**

```
TXT.PRINT([ExprList] [SPC(n)] [TAB(n)] [,] [;]...)
```

**Remarks**

Write text data to the TEXT WINDOW at the current caret location. The `TXT.PRINT` method has the following parts, which may occur in any order and quantity:

`ExprList`: Numeric and/or string expression(s) to be written to the TEXT WINDOW.

`SPC`(*n*) An optional function used to insert *n* spaces into the printed output. Multiple use of the `SPC` argument is permitted in `TXT.PRINT`, such as positions between expressions. Values of *n* less than 1 are ignored.

`TAB`(*n*) An optional function used to tab to the *n*th column before printing an expression. Multiple use of the `TAB` argument is permitted in `TXT.PRINT`,

such as positions between expressions. Values of *n* less than 1 are ignored.

; and , are special characters that determine the position of the next text item printed. A semicolon (;) means the next text item is printed immediately; a comma (,) means the next text item is printed at the start of the next print zone. Print zones begin every 14 columns.

If the final argument of TXT.PRINT is a semicolon or comma, the caret position is maintained at the current location, rather than the default action of moving the print position to the start of the next line. For example:

```
TXT.PRINT "Hello";
TXT.PRINT " world!";
```

...produces the contiguous result "Hello world!"

If you omit all arguments, TXT.PRINT prints a blank line. Printing always begins at the current caret position.

Any control codes, such as Carriage Return, Line-Feed and Backspace are not interpreted. They will display on the screen as symbols.

It is not possible to print a User-Defined Type (UDT), a [Variant](#), an object variable, or an entire [array](#). Individual member values must be extracted with the appropriate function before they can be displayed.

### **TXT.WAITKEY\$**

#### **Syntax**

```
TXT.WAITKEY$ [TO WaitVar$]
WaitVar$ = TXT.WAITKEY$
```

#### **Remarks**

Reads a keyboard character, waiting until one is ready. It removes the character from the keyboard buffer for the Text Window, and optionally assigns it to the string variable. If the TO clause is omitted, the keyboard character is discarded.

TXT.WAITKEY\$ returns a string of 0 or 1 characters that reflects the status of the keyboard buffer for the Text Window. A null string (LEN=0) means that there was an error, such as the case when no Text Window currently exists.

A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

TXT.WAITKEY\$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

### **TXT.WINDOW**

#### **Syntax**

```
TXT.WINDOW(Cap$, x, y [,Rows, Cols]) TO hWin
```

#### **Remarks**

A new Text Window is created and attached to your program. The size of the Window is determined by rows and cols, or defaults to 25 rows and 80 columns. Subsequent TXT Methods will act upon this newly created Text Window.

If the Text Window is created successfully, the [handle](#) will be assigned to the variable specified by *hWin*. If it fails, the value zero (0) will be assigned instead. If you try to create a Text Window while another still exists, it will fail. In this case, you must first destroy the prior Text Window, as only one may exist at a time.

The parameters *x* and *y* specify the requested location of the window, relative to the upper left corner of the desktop. The parameters are always given in pixels. Rows and columns optionally specify the size of the window, given in the number of characters which will fit within the borders. If not given, the method defaults to 25 vertical rows by 80 horizontal columns.

#### **See also**

[DIALOG NEW](#), [GRAPHIC WINDOW](#), [INPUTBOX\\$](#), [MSGBOX](#)

**TXT.WINDOW** method

# Keyword Template

**Purpose****Syntax****Remarks****See also****Example**

## TXT pseudo-object **New!**

**Purpose**

Displays and inputs text on a specially created TEXT WINDOW. This is similar to a CONSOLE window, with some advantages. Generally speaking, a Text Window is more attractive. But, just like a Console Window, only fixed-width text may be displayed.

**Syntax**

```
TXT.membername(params)
RetVal = TXT.membername(params)
TXT.membername(params) TO ReturnVariable
```

**Remarks**

Text Windows offer a specific, but limited capability. They are very easy to implement and use, and they offer an excellent means to produce quick and straightforward programs in text mode.

Text Windows offer an excellent path for the beginning programmer, or for anyone who needs a procedural code model. As the name implies, they display only fixed-width text. Further, only one Text Window may exist at a time. If you need snazzy graphics, more specialized fonts, multiple windows, or a GUI interface, you should look to [GRAPHIC WINDOWS](#) and [GRAPHIC CONTROLS](#) instead.

Text Window methods are accessed like any other [object](#). The object name TXT is followed by a period separator, and the name of the method or property:

```
TXT.Cell = RowValue&, ColumnVal&
```

Text Window methods which return a value may be used in two forms, a statement with a TO clause, or a function which may be used as a term in an expression:

```
TXT.Row TO RowVar&
RowVar& = TXT.Row
```

The two examples above are functionally identical. The choice is simply a matter of your personal preference. If you use the second form (as a [function](#) which returns a value), it can be a term in any expression of any complexity.

Most PowerBASIC functions specify graphic and [pixel](#) positions as x,y (the horizontal term first, then the vertical term). However, for compatibility with most current and prior versions of BASIC (PowerBASIC included), the functions which reference text rows and columns name the vertical term first (rows, columns).

Text Windows handle text wrapping and auto-scrolling much like a typical Console Window. When printing exceeds the end of a line, the print position wraps to the first column of the next row. When printing exceeds the last row, the entire page is scrolled to open a new line at the bottom.

In order to use the TXT object successfully, you must use care to first create a Text Window in your program. To do this, you can execute the TXT.WINDOW method.

All Text Windows are stable. They cannot be closed unexpectedly by the user, so there are no surprises when you find you are trying to print to a window which no longer exists. There is no Close Box, no System Menu, nor is ALT-F4 recognized as a close command. They can only be closed by executing TXT.END, or by terminating the entire application.

**TXT METHODS****TXT.CELL****Syntax**

```
TXT.CELL = RowValue&, ColValue&
TXT.CELL TO RowVar&, ColVar&
TXT.COL TO ColVar& <or> ColVar& = TXT.COL
TXT.ROW TO RowVar& <or> RowVar& = TXT.ROW
```

**Remarks**

TXT.CELL is used to set or retrieve the cursor position, based upon the row and column position of a Text Cell. That is the row and column position where the next printed text will be displayed. *RowValue&* specifies the horizontal screen row (starting at 1) at which to position the cursor. *ColValue&* specifies the vertical screen column (starting at 1) at which to position the cursor. Since row and column numbers start at one (1), the upper left corner of the Text Window is considered to be cell 1,1.

The first form of TXT.CELL moves the cursor to the desired row and column. If a value given is zero (0), that parameter is ignored and that position is not changed. The second form of TXT.CELL retrieves the current cursor position, and assigns the values to the variables specified by *RowVar&* and *ColVar&*.

The last two forms allow you to retrieve just a single value, either row or column, and are supported in both statement and function form.

**TXT.CLS****Syntax**

```
TXT.CLS
```

**Remarks**

The text window is cleared, and the caret (next print position) is moved to the upper left corner (row 1, column 1).

**TXT.COLOR****Syntax**

```
TXT.COLOR = RGBColor&
```

**Remarks**

TXT.COLOR is used to change the foreground color of new text drawn with TXT.PRINT. Existing text on the Text Window is not changed. PowerBASIC includes many [built-in RGB color equates](#) which may be used here, like %RGB\_RED, %RGB\_BLUE, etc.

**TXT.END****Syntax**

```
TXT.END
```

**Remarks**

The Text Window currently attached to your program is destroyed and detached from the process. No errors are generated, even if no Text Window is currently attached.

**TXT.INKEY\$****Syntax**

```
TXT.INKEY$ TO InkeyVar$
InkeyVar$ = TXT.INKEY$
```

**Remarks**

Reads a keyboard character if one is ready. TXT.INKEY\$ returns a  
of 0 or 1 characters that reflects the status of the keyboard buffer for the current text window. A null string (LEN=0) means that the buffer is empty - no key was pressed. A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

TXT.INKEY\$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

**TXT.INSTAT****Syntax**

```
TXT.INSTAT TO InStatVar&
InStatVar& = TXT.INSTAT
```

**Remarks**

Determines whether a keyboard character is ready. The

variable receives the keyboard buffer status for the current text window. The value assigned is **TRUE** (non-zero) if a keyboard character is ready to be retrieved, or **FALSE** (zero) if not.

TXT.INSTAT does not remove the character from the buffer, so repeated execution will continue to return TRUE until the character is read with TXT.INKEY\$, TXT.LINE.INPUT, etc.

### **TXT.LINE.INPUT**

#### **Syntax**

```
TXT.LINE.INPUT(["prompt"], StringVar)
```

#### **Remarks**

Reads an entire line from the keyboard into a string variable, ignoring any delimiters which may be embedded. The prompt is an optional string [constant](#) or string equate. Upon execution, the prompt is displayed and the program waits for keyboard input. Keystrokes are accepted until the user presses ENTER, at which time the resulting string is stored into the *StringVar*.

The *StringVar* may be a [fixed-length](#), [nul-terminated](#), or a [dynamic](#) string. For fixed-length and nul-terminated strings, keyboard input longer than the string is truncated to fit.

Dynamic strings receive the complete keyboard input without truncation. *StringVar* may not be a [UDT](#) variable, although fixed-length and nul-terminated UDT member variables are allowed.

### **TXT.PRINT**

#### **Syntax**

```
TXT.PRINT([ExprList] [SPC(n)] [TAB(n)] [,] [;]...)
```

#### **Remarks**

Write text data to the TEXT WINDOW at the current caret location. The TXT.PRINT method has the following parts, which may occur in any order and quantity:

ExprList: Numeric and/or string expression(s) to be written to the TEXT WINDOW.

SPC(*n*) An optional function used to insert *n* spaces into the printed output. Multiple use of the SPC argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.

TAB(*n*) An optional function used to tab to the *n*th column before printing an expression. Multiple use of the TAB argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.

; and , are special characters that determine the position of the next text item printed. A semicolon (;) means the next text item is printed immediately; a comma (,) means the next text item is printed at the start of the next print zone. Print zones begin every 14 columns.

If the final argument of TXT.PRINT is a semicolon or comma, the caret position is maintained at the current location, rather than the default action of moving the print position to the start of the next line. For example:

```
TXT.PRINT "Hello";
TXT.PRINT " world!";
```

...produces the contiguous result "Hello world!"

If you omit all arguments, TXT.PRINT prints a blank line. Printing always begins at the current caret position.

Any control codes, such as Carriage Return, Line-Feed and Backspace are not interpreted. They will display on the screen as symbols.

It is not possible to print a User-Defined Type (UDT), a [Variant](#), an object variable, or an entire [array](#). Individual member values must be extracted with the appropriate function before they can be displayed.

### **TXT.WAITKEY\$**

#### **Syntax**

```
TXT.WAITKEY$ [TO WaitVar$]
```

```
WaitVar$ = TXT.WAITKEY$
```

**Remarks** Reads a keyboard character, waiting until one is ready. It removes the character from the keyboard buffer for the Text Window, and optionally assigns it to the string variable. If the TO clause is omitted, the keyboard character is discarded.

TXT.WAITKEY\$ returns a string of 0 or 1 characters that reflects the status of the keyboard buffer for the Text Window. A null string (LEN=0) means that there was an error, such as the case when no Text Window currently exists.

A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

TXT.WAITKEY\$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

### **TXT.WINDOW**

**Syntax** `TXT.WINDOW(Cap$, x, y [,Rows, Cols]) TO hWin`

**Remarks** A new Text Window is created and attached to your program. The size of the Window is determined by rows and cols, or defaults to 25 rows and 80 columns. Subsequent TXT Methods will act upon this newly created Text Window.

If the Text Window is created successfully, the [handle](#) will be assigned to the variable specified by *hWin*. If it fails, the value zero (0) will be assigned instead. If you try to create a Text Window while another still exists, it will fail. In this case, you must first destroy the prior Text Window, as only one may exist at a time.

The parameters *x* and *y* specify the requested location of the window, relative to the upper left corner of the desktop. The parameters are always given in pixels. Rows and columns optionally specify the size of the window, given in the number of characters which will fit within the borders. If not given, the method defaults to 25 vertical rows by 80 horizontal columns.

**See also** [DIALOG NEW](#), [GRAPHIC WINDOW](#), [INPUTBOX\\$](#), [MSGBOX](#)

## TYPE/END TYPE block

# TYPE/END TYPE block

**Purpose** Define a [User-Defined Data Type](#) (UDT), containing one or more member elements.

**Syntax**

```
TYPE MyType [BYTE | WORD | DWORD | QWORD] [FILL]
 [MemberName [(subscripts)] AS TypeName
 [MemberName [(subscripts)] AS TypeName]
 [...]
END TYPE
```

**Remarks** The TYPE statement has the following parts:

TYPE The beginning of a User-Defined Type definition.

*MyType* The name of the User-Defined Type, which must conform to standard [variable](#) naming conventions.

### **Member alignment**

TYPE definitions may optionally specify an alignment of [BYTE](#) (the default), [WORD](#), [DWORD](#), or [QWORD](#), as well as FILL characteristics. With standard alignment, each member of a Type Structure will be located on the specified boundary. For example, with DWORD, up to 3 bytes may be skipped between members to accomplish alignment.

However, when a user-defined type is defined as a member of a larger user-defined type, this "sub-type" retains its original size and alignment, just as first declared.

BYTE Each member will be aligned on a BYTE boundary - no padding or alignment is applied to

the structure. This is the default alignment method.

|       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| WORD  | Each member will be aligned on a WORD boundary. Any odd byte between members of TYPE will be automatically skipped and ignored. The UDT structure may also be padded with one trailing byte to ensure the total structure size is a multiple of 2 bytes.                                                                                                                                                                                                                                                                                                                                                                                  |
| DWORD | Each member will be aligned on a DWORD boundary. Up to three bytes will be skipped to accomplish this alignment. The UDT structure is also padded with up to three trailing bytes to ensure the total structure size is a multiple of 4 bytes.                                                                                                                                                                                                                                                                                                                                                                                            |
| QWORD | QWORD alignment is included for compatibility with Windows, it cannot be fully implemented in a 32-bit operating system. With QWORD, individual members are 64-bit aligned for the appropriate structure size, but variables of that type may only be aligned on 32-bit boundaries, as stack pointer alignment is not guaranteed.                                                                                                                                                                                                                                                                                                         |
| FILL  | If the FILL option is specified, such as TYPE xxx DWORD FILL, the following rules apply: <ol style="list-style-type: none"> <li>1. No bytes are skipped if the next member of the Type will fit entirely into that space to be skipped.</li> <li>2. Fixed-length strings are considered to be an array of bytes, so no bytes are skipped preceding them.</li> <li>3. The total size of an array is considered to determine if FILL should affect its placement within the structure. For example, with DWORD FILL, an array of two integers would be started on a 4-byte boundary, even if two or three bytes must be skipped.</li> </ol> |

### Type members

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>MemberName</i> | The name of a member of the User-Defined Type. This too must follow the standard variable naming conventions.                                                                                                                                                                                                                                                                                                                                 |
| <i>subscripts</i> | The dimensions of a member <a href="#">array</a> . Arrays of one and two dimensions are supported, but must be defined with <a href="#">constant or numeric literal</a> values. That is, the total size of a UDT must be known at compile-time, so items like <a href="#">dynamic strings</a> , which vary in size, cannot be part of a TYPE structure. A STRING PTR can, however, since a <a href="#">pointer</a> is implemented as a DWORD. |

Like conventional arrays, the default lower array boundary is zero, but positive non-zero values may be used to specify a specific range of subscript index values for the array, separated from the upper array boundary [subscript](#) with the TO keyword. Additionally, both the lower and upper subscript index values must be zero or greater (ie, negative subscript values are not permitted). Examples of valid syntax follow:

```

TYPE MYTYPE
 id AS INTEGER ' Scalar UDT member
 Styles(6) AS DWORD ' 7 elements (0 TO 6)
 Yrs(1980 TO 2010) AS LONG ' 31 elements
 Team(100 TO 101) AS BYTE ' 2 elements
 Rating(1 TO 10) AS DWORD ' 10 elements
 X(1 TO 5, 0 TO 5) AS EXT ' 30 elements (5x6)
 Y(4,3) AS QUAD ' 20 elements (5x4)
END TYPE

```

**Individual UDT structures can be up to 16 MB each. A single member element of a UDT may also occupy the entire 16 MB. For example, arrays within a UDT, [nul-terminated strings](#), and [fixed-length strings](#). UDT member arrays are not resizable at runtime. Additionally, the**

cannot be used directly on a UDT member array. Instead, use [DIM..AT](#) to declare a conventional array at the same memory address as the UDT member array, and the ARRAY statement can then be used on that array.

|                 |                                                                                                                          |
|-----------------|--------------------------------------------------------------------------------------------------------------------------|
| <i>TypeName</i> | One of the supported data types, including User-Defined Types and <a href="#">Unions</a> , with the exception of arrays. |
| END TYPE        | Marks the end of the User-Defined Type definition.                                                                       |

It is often very convenient to be able to refer to several different types of things as a single unit or data structure. For example, in an accounting program, an account number and amount are part of what makes up a single journal entry. The TYPE/END TYPE block statements make it easy to create a single UDT that holds such information.

```
TYPE JournalType DWORD ' type name and alignment
 AccountNumber AS LONG ' member name and data type
 Amount AS CUR ' this is another one
END TYPE ' end of type declaration
```

```
DIM JournalEntry AS JournalType ' declare a record
```

TYPE/END TYPE blocks must be defined outside of a [Sub](#), [Function](#), or [Class](#) and may be defined only once in any program. It is usually easiest to put your TYPE/END TYPE block definitions in an Include file and use the [#INCLUDE](#) metastatement in any module that may need to use them.

TYPE/END TYPE blocks do not declare any variables; instead, they simply define a new type. You can declare variables of that type using the DIM or [REDIM](#) statements, or any statement that lets you use an AS clause:

```
DIM TypeVariable as TypeVariableType
```

Once you have a User-Defined Type variable declared, you can access its member elements using the following format:

```
TypeVariable.Element
```

For example, to change the account number in the *JournalEntryType* type, you might use a statement like:

```
JournalEntry.AccountNumber = 1000
```

A User-Defined Type can be used like any built-in PowerBASIC type. For example, you can define an array of record variables:

```
DIM JournalEntries(1 TO 100) AS JournalEntryType
```

...or even create a procedure that accepts a record variable:

```
SUB PrintJournalEntry(aJournalEntry AS JournalEntryType)
 ' Print journal
END SUB
```

You can also use pointers in a TYPE definition. *Note* that the first member in the next example is auto-aligned to start on a DWORD boundary, and three bytes are skipped so that the second member is also aligned on a DWORD boundary:

```
TYPE MyType DWORD
 Count AS BYTE ' Aligned to a DWORD boundary
 y AS INTEGER PTR ' Aligned to next DWORD boundary
 z AS STRING PTR
END TYPE
```

Since pointers are stored as a DWORD, their length is 4 bytes when used in a TYPE/END TYPE, regardless of the length of their target. To access the target of a pointer, you must place the at-sign in front of the TYPE/END TYPE member, not the name of the TYPE itself:

```
iResult% = @MyType.y ' Invalid
iResult% = MyType.@y ' Valid
```

You can also declare a variable that is a pointer to a TYPE:

```
TYPE MyData
 Val1 AS INTEGER
 Val2 AS INTEGER
 Val3 AS INTEGER
 Val4 AS INTEGER
END TYPE

DIM Info AS MyData PTR
Info = VARPTR(YourData)
```

```

Message$ = HEX$(@Info.Val1) + $CRLF + _
 HEX$(@Info.Val2) + $CRLF + _
 HEX$(@Info.Val3) + $CRLF + _
 HEX$(@Info.Val4)

```

**Note** that the target specifier is in front of the TYPE name since it is the pointer. Val1, Val2, Val3, and Val4 represent offsets from that pointer. PowerBASIC does support a pointer within a structure pointer, but you should be *very* careful in their use. Changing the structure pointer itself could make all member pointers invalid. See the topic on [pointers](#) for more information.

## Bit Variables

TYPE structures may contain bit variables, which are named BIT (unsigned values) or SBIT (signed values). Each bit variable may occupy from 1 to 31 bits, and they may be packed one after another up to a total of 32 bits per bit field. The size of a bit variable is defined as follows:

```
var AS BIT * nlit [IN BYTE|WORD|DWORD]
```

...where the term "*\* nlit*" defines the number of bits (1 to 31), and the optional term "IN BYTE|WORD|DWORD", if present, defines the start of a new bit field of 1, 2, or 4 bytes. For example:

```

TYPE ABCD
 Valu2 AS BIT * 31 IN DWORD
 Sign1 AS SBIT * 1
 nybl2 AS BIT * 4 IN BYTE
 nybl1 AS BIT * 4
END TYPE

```

The example TYPE structure above is 5 bytes in size, containing a 4-byte bit field and a 1-byte bit field. In this case, each contains two bit-variables of varying size. The range of values which may be stored depends upon the number of bits available. For example, "BIT \* 4" has a range of 0 to 15, "SBIT \* 1" has a range of -1 to 0, and "SBIT \* 5" has a range of -16 to +15.

## Structures within structures

Structures (TYPE/UNION) may be embedded within another structure, for simplification in referencing deeply nested items, by simply stating the structure name alone at the appropriate position. The internal alignment of the member structure is precisely maintained regardless of other alignment specifications, to foster inheritance issues. For example:

|              |                   |                    |
|--------------|-------------------|--------------------|
| TYPE ABCD3   | TYPE <b>ABCD2</b> | UNION <b>ABCD1</b> |
| A AS LONG    | D AS DWORD        | F AS DWORD         |
| <b>ABCD2</b> | E AS DOUBLE       | G AS LONG          |
| C AS LONG    | <b>ABCD1</b>      | H AS SINGLE        |
| END TYPE     | END TYPE          | END UNION          |

In this case, you could access the lone [Single-precision float](#) member of this structure very simply. Assuming DIM X AS ABCD3, you could reference the Single-precision Union member with the statement X.H, instead of the extended syntax X.ABCD2.ABCD1.H

**For related information, please refer to the [UNION/END UNION](#) and [User-Defined Types and Unions](#) sections.**

## Restrictions

When measuring the size of a padded (aligned) UDT structure with the [LEN](#) or [SIZEOF](#) statements, the measured length includes any padding that was added to the structure. For example, the following UDT structure:

```

TYPE LengthTestType DWORD
 a AS INTEGER

```

```

END TYPE
' more code here
DIM abc AS LengthTestType
x& = LEN(abc)

```

Returns a length of 4 bytes in x&, since the UDT was padded with 2 additional bytes to enforce DWORD alignment. Note that the LEN and SIZEOF of individual UDT members will return the true size of the member without regard to padding or alignment. In the previous example, LEN(abc.a) returns 2.

**Individual UDT structures can be up to 16 MB each. Arrays within a UDT, null-terminated strings and fixed-length strings may occupy the full 16 MB structure size limit.**

[Field strings](#) and [dynamic strings](#) cannot be used in UDT or UNION structures. Attempting to do so results in a compile-time [Error 485](#) ("Dynamic/Field strings not allowed").

**See also** [DIM](#), [LEN](#), [REDIM](#), [LET \(with Types\)](#), [SIZEOF](#), [TYPE SET](#), [UNION/END UNION](#), [User-Defined Types](#), [Unions](#)

**Example**

```

TYPE JournalEntryType
 AccountName AS STRING * 20
 AccountNumber AS LONG
 Amount AS CUR
END TYPE

DIM JournalEntry AS JournalEntryType

JournalEntry.AccountName = "Joe Smith"
JournalEntry.AccountNumber = 7467047&
JournalEntry.Amount = 42.01@
' process journal entry here
JournalEntry.AccountNumber = 705233476&
JournalEntry.Amount = 69.35@
' process journal entry here

```

## TYPE SET statement

# TYPE SET statement

**Purpose** Assign the value of a [User-Defined Type](#) or byte [string expression](#) into another User-Defined Type [variable](#).

**Syntax** `TYPE SET typevar = {typevar | ByteStringExpr$} [USING ustring_expression]`

**Remarks** TYPE SET is primarily designed to assign the value of a User-Defined Type (UDT) to a different class of User-Defined Type. Additionally, TYPE SET can be used to assign a string expression (*ByteStringExpr\$*) to a UDT, though it is generally not appropriate to assign a wide [Unicode](#) string.

**USING** Any Byte positions remaining after the assignment are filled (padded) in the target *typevar* with the first character of the USING string expression, or binary zeros if not specified.

**See also** [CSET](#), [CSET\\$](#), [LET \(with Types\)](#), [LSET](#), [LSET\\$](#), [RSET](#), [RSET\\$](#), [TYPE/END TYPE](#)

**Example**

```

TYPE udt1
 x AS STRING * 12
 y AS LONG
 z AS INTEGER
END TYPE

TYPE udt2
 a(1 TO 18) AS BYTE

```

```

END TYPE

FUNCTION PBMAIN
 DIM u1 AS udt1
 DIM u2 AS udt2

 u1.x = "ABC"
 TYPE SET u2 = u1
 a$ = CHR$(u2.a(1), u2.a(2), u2.a(3))

 TYPE SET u2 = "1" USING "2"
 b$ = CHR$(u2.a(1), u2.a(2), u2.a(3))
END FUNCTION

Result a$ contains "ABC"
 b$ contains "122"

```

## UBOUND function

# UBOUND function

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>      | Return the largest possible <a href="#">subscript</a> (boundary) for an <a href="#">array's</a> specified dimension.                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Syntax</b>       | <code>y = UBOUND(array [(dimension)])</code><br><code>y = UBOUND(array, dimension)</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Remarks</b>      | <i>array</i> is the array of interest. <i>dimension</i> is an value or expression from 1 up to the number of dimensions in <i>array</i> ; it specifies which dimension's upper bound value will be returned. If you omit <i>dimension</i> , it defaults to 1 (the first dimension). To find the lower bound of an array's dimension, use the <a href="#">LBOUND</a> function. Use LBOUND and UBOUND together to determine an array's size. UBOUND of an undimensioned array returns -1, so that <code>UBOUND(array) - LBOUND(array) + 1</code> yields zero (0) for such an array. |
| <b>Restrictions</b> | UBOUND cannot be used on arrays <i>within</i> <a href="#">User-Defined Types</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>See also</b>     | <a href="#">ARRAYATTR</a> , <a href="#">DIM</a> , <a href="#">LBOUND</a> , <a href="#">REDIM</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Example</b>      | <pre> ' Dimension an array with lower and upper bounds DIM MyArray%(1900 TO 2000,5 TO 10)  ' print out the values of the array Message\$ = "The array's first dimension is from" + _   STR\$(LBOUND(MyArray%(1))) + "to" + _   STR\$(UBOUND(MyArray%(1))) Message\$ = "The array's second dimension is from" + _   STR\$(LBOUND(MyArray%(2))) + "to" + _   STR\$(UBOUND(MyArray%(2))) </pre>                                                                                                                                                                                      |
| <b>Result</b>       | The array's first dimension is from 1900 to 2000<br>The array's second dimension is from 5 to 10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

## UCASE\$ function

# UCASE\$ function

|                |                                                             |
|----------------|-------------------------------------------------------------|
| <b>Purpose</b> | Return an all-uppercase (capitalized) version of a          |
| <b>Syntax</b>  | <code>s\$ = UCASE\$(string_expression [,ANSI   OEM])</code> |

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Remarks</b>  | UCASE\$ returns a string equivalent to <i>string_expression</i> , except that lowercase letters in <i>string_expression</i> are converted to uppercase. The optional <a href="#">ANSI</a> or <a href="#">OEM</a> parameter specifies whether the conversion is made using the ANSI charset for the system, or the original IBM OEM charset. If no charset is specified, PowerBASIC for Windows uses the system ANSI charset, while <a href="#">PB/CC</a> uses the IBM OEM charset. Only "International" characters in the range of <a href="#">CHR\$(128)</a> to <a href="#">CHR\$(255)</a> are affected by this parameter.<br><br>The OEM charset is based upon the original IBM OEM charset to ensure compatibility with programs written for all previous versions of the PowerBASIC compiler. |
| <b>See also</b> | <a href="#">ASC</a> , <a href="#">LCASE\$</a> , <a href="#">MCASE\$</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Example</b>  | <code>x\$ = UCASE\$("Beware of cats!")</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Result</b>   | BEWARE OF CATS!                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

## UCODE\$ function

# UCODE\$ function

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Translates <a href="#">ANSI</a> bytes into <a href="#">Unicode</a> bytes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Syntax</b>   | <code>a\$ = UCODE\$(AnsiStrExpression [,CodePage&amp;])</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Remarks</b>  | <p>This version of PowerBASIC handles all conversions between ANSI strings and UNICODE strings automatically. For example:</p> <pre>MyWideString\$\$ = MyAnsiString\$</pre> <p>In this case, the ANSI characters are transparently converted to WIDE UNICODE characters when they are stored in <i>MyWideString\$</i>. You should not insert a UCODE\$ function here. The simple fact that the variables are of differing types (ANSI/WIDE) causes the compiler to make all conversions for you, whenever they are needed.</p> <p>Of course, this automatic conversion was not available in previous versions of the compiler. In the past, there were no WIDE UNICODE variables offered, so it was necessary to force wide characters into standard byte strings when UNICODE was needed. The <a href="#">ACODE\$</a> and UCODE\$ functions are used for this purpose alone: to support legacy programs which calculated strings in this fashion.</p> <p>New PowerBASIC programs and updates to your older PowerBASIC programs should use the new WIDE UNICODE variables which are now available.</p> <p>UCODE\$ presumes that the <i>AnsiStrExpression</i> contains ANSI byte characters stored in an ANSI byte string. It converts them into WIDE UNICODE characters and returns them as an ANSI byte string. To convert a UNICODE byte string into an ANSI byte string, use the <a href="#">ACODE\$</a> function.</p> <p>If the optional parameter <i>CodePage&amp;</i> is present, it represents the code page to be used for the conversion process. If not given, the default code page for the locale of the executing computer is used.</p> <p>Unicode strings require two bytes to represent a Unicode character, whereas ANSI strings (the native PowerBASIC string format) use one byte to represent a character. Therefore, UCODE\$ returns a string that has double the byte count of the ANSI string, yet represents the same number of characters.</p> |
| <b>See also</b> | <a href="#">ACODE\$</a> , <a href="#">UCODEPAGE</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

## UCODEPAGE statement

# Keyword Template

**Purpose**

Syntax  
 Remarks  
 See also  
 Example

## UCODEPAGE statement IMPROVED

**Purpose** Set the default codepage used for [ANSI](#) / [UNICODE](#) conversions.

**Syntax** `UCODEPAGE ANSI|OEM|NumExpr [TO PrevPage&]`

**Remarks** PowerBASIC will make many conversions between ANSI and UNICODE (wide character) . UCODEPAGE specifies the CodePage to be used for these translations. The default is UCODEPAGE ANSI which will use the system ANSI codepage for your computer. UCODEPAGE OEM will use the system OEM codepage for your computer, while a expression can specify a particular CodePage of your choice. If the optional TO clause is used, the number of the previous default CodePage is assigned to the [long](#) integer variable specified by *PrevPage&*. By saving the previous codepage, you can later restore it, if that's appropriate.

This statement does not change the CodePage in use by your computer. It tells which codepage PowerBASIC should use for ANSI/UNICODE conversions.

By default, the system ANSI CodePage, is used to map the character translation, and this generally works very well, as it represents the usual codepage for your primary language. However, if you are compiling a CONSOLE application which makes use of the high-order ANSI codes, [CHR\\$\(128\)](#) through [CHR\\$\(255\)](#) for line drawing and a few international characters, you should declare an OEM CodePage by placing UCODEPAGE OEM at the start of your MAIN function.

The CodePage specification is maintained on a thread-by-thread basis. At program start, the default is the system ANSI CodePage. If a new is launched, it inherits the CodePage in use by the main thread.

**See also** [ACODE\\$, UCODE\\$](#)

## UDP CLOSE statement

### UDP CLOSE statement

**Purpose** Close a previously opened [UDP](#) socket that was created with the [UDP OPEN](#) statement.

**Syntax** `UDP CLOSE [#] fNum&`

**Remarks** Close the previously opened UDP/IP port specified by *fNum&*.

**See also** [TCP and UDP Communication](#), [TCP CLOSE](#), [UDP NOTIFY](#), [UDP OPEN](#), [UDP RECV](#), [UDP SEND](#)

## UDP NOTIFY statement

### UDP NOTIFY statement

**Purpose** Designate which [UDP/IP](#) events will generate a notification message.

**Syntax** `UDP NOTIFY [#] fNum&, {SEND | RECV | CLOSE} TO hWnd& AS wMsg&`

**Remarks** Designates which events (SEND, RECV, and CLOSE) will generate a notification *wMsg&*

message, to be sent to the window/dialog procedure (CALLBACK), identified by the window handle *hWnd*&.

Your program defines the *wMsg*& value, and this value should be equal or larger than %WM\_USER + 500, to avoid conflict with common Windows callback message values.

When the nominated Callback Function receives the *wMsg*& notification, the *wParam*& parameter identifies the operating system's handle of the socket (see [FILEATTR](#)). The low-order Word of *lParam*& specifies the code of the event (see table below), and the high-order [Word](#) of *lParam*& contains the error code (if any).

| LO(WORD, <i>lParam</i> &) | Definition                                    |
|---------------------------|-----------------------------------------------|
| %FD_READ                  | Data is available to be read from the socket. |
| %FD_WRITE                 | The socket is ready for data to be written.   |
| %FD_CLOSE                 | The socket has been closed.                   |

Notification messages do not arrive in unabated or continuous streams. That is, once a particular notification message arrives, it will not be sent again until the initial message is acted upon. For example, if an %FD\_READ notification is received for a particular socket, it will not be resent until after a UDP\_RECV statement is executed.

The Winsock error codes are listed in WINSOCK2.INC, prefixed with %WSAE.

**See also**

[FILEATTR](#), [TCP and UDP Communication](#), [TCP NOTIFY](#), [UDP CLOSE](#), [UDP OPEN](#), [UDP\\_RECV](#), [UDP SEND](#)

## UDP OPEN statement

# UDP OPEN statement

**Purpose**

Create a socket for an application to communicate with a [UDP](#) server or client using the UDP (connectionless) protocol over [Winsock](#) (UDP/IP).

**Syntax**

```
UDP OPEN [PORT p&] AS [#] fNum& [TIMEOUT timeoutval&]
```

**Remarks**

Open a UDP socket (port or service) for UDP communication. *fNum*& is a file number such as #1, or a variable with a value obtained using the [FREEFILE](#) function.

PORT

If PORT *p*& is specified, the socket is opened as a server that can receive UDP data. Use the [UDP NOTIFY](#) statement to receive server notifications from the socket so that the data can be retrieved. Common port numbers include 7 (Echo, see [RFC862](#)); 37 (Time, see [RFC868](#)); and 123 (NTP - [RFC1305](#)).

TIMEOUT

The TIMEOUT option allows you to specify how long, in milliseconds (*mSec*), a UDP SEND/RECV operation should wait for completion. If the specified number of milliseconds elapses, the UDP operation will fail, and the [ERR](#) system variable will be set to indicate a run-time [Error 24](#) ("Device timeout"). The default timeout is 60000 milliseconds (60 seconds).

**See also**

[TCP and UDP Communication](#), [FREEFILE](#), [TCP OPEN](#), [UDP CLOSE](#), [UDP NOTIFY](#), [UDP\\_RECV](#), [UDP SEND](#)

## UDP RECV statement

# UDP RECV statement

**Purpose**

Receive data from a previously opened [UDP](#) port.

**Syntax**

```
UDP RECV [#] fNum&, FROM ip&, pNum&, Buffer$
```

**Remarks**

Receive any bytes from the previously opened UDP port specified by *fNum*&, and place them into *Buffer*\$. The IP address that sent the UDP packet is placed into the *ip*& variable, and the port number is placed into the *pNum*& [variable](#).

*ip&* and *pNum&* may be subsequently used to send data back in response to data received.

UDP RECV is a blocking statement. That is, execution does not continue until either data is retrieved from the socket, or the timeout period expires.

If a timeout occurs, a run-time [Error 24](#) ("Device timeout") is generated and placed in the [ERR](#) system variable. See [UDP\\_OPEN](#) to specify the UDP socket timeout value.

**See also** [TCP and UDP Communication](#), [TCP\\_RECV](#), [UDP\\_CLOSE](#), [UDP\\_NOTIFY](#), [UDP\\_OPEN](#), [UDP\\_SEND](#)

## UDP SEND statement

# UDP SEND statement

**Purpose** Send a  
of data through a previously opened [UDP](#) socket.

**Syntax** `UDP SEND [#] fNum&, AT ip&, pNum&, string_expression`

**Remarks** Write the specified *string\_expression* to the UDP/IP port *pNum&* at the [IP](#) address specified in *ip&*, using the UDP connection specified by *fNum&*.

**See also** [TCP and UDP Communication](#), [TCP\\_SEND](#), [UDP\\_CLOSE](#), [UDP\\_NOTIFY](#), [UDP\\_OPEN](#), [UDP\\_RECV](#)

## UNION/END UNION block

# UNION/END UNION statements

**Purpose** Create a new [User-Defined Type](#) definition whose member elements overlap in memory.

**Syntax**

```
UNION UnionName
 MemberName [(subscripts)] AS TypeName
 [MemberName [(subscripts)] AS TypeName]
 [...]
END UNION
```

**Remarks** A [union](#) is a type - very similar to a User-Defined Type - except that its elements overlap in memory. While this may seem strange at first, it has enormous potential.

For example, say you are designing an accounting program. You want to make it general purpose so it has widespread appeal. But everyone does their accounting differently; for example, some people use account numbers that are plain integral values, while others may use alphanumeric account names. Using a Union makes this easy. Another common use of a Union is [variable](#) type conversion. The is best described by way of an example:

```
UNION VarConvert
 iLong AS LONG
 iDword AS DWORD
 sStr AS STRING * 4
END UNION

DIM x AS VarConvert, y AS DWORD, z AS STRING
x.iLong = 123456&
y = x.iDword
z = x.sStr
```

Like a User-Defined Type, a Union may also contain [arrays](#), and these follow the same rules as User-Defined Type member arrays (see [Type Members](#) for syntax rules and

additional examples). The following example demonstrates the use of a Union member array:

```

UNION Arrs
 a1(1 TO 1024) AS BYTE
 st AS ASCIIZ * 10
END UNION

FUNCTION PBMAIN
 DIM a AS Arrs
 a.a1(1) = 72
 a.a1(2) = 101
 a.a1(3) = 108
 a.a1(4) = 108
 a.a1(5) = 111
 a.a1(6) = 33
 ' At this point, a.st contains "Hello!"
END FUNCTION

```

### Bit Variables

UNION structures may contain bit variables, which are named BIT (unsigned values) or SBIT (signed values). Each bit variable may occupy from 1 to 31 bits, and they may be packed one after another up to a total of 32 bits per bit field. The size of a bit variable is defined as follows:

```
var AS BIT * nlit [IN BYTE|WORD|DWORD]
```

...where the term "*\* nlit*" defines the number of bits (1 to 31), and the optional term "IN BYTE|WORD|DWORD", if present, defines the start of a new bit field of 1, 2, or 4 bytes. For example:

```

UNION ABCDE
 Odd1 AS BIT * 1 IN DWORD
 Value1 AS LONG
END UNION

```

The example UNION structure above is 4 bytes in size, containing a 1-byte bit field and a 4-byte LONG.

```

UNION abcde
 Part1 AS BIT * 8 IN DWORD
 Part2 AS BIT * 16
END UNION

```

The example union above is 4 bytes in size, containing an 8-bit field and an overlapping 16-bit field.

### Structures within structures

Structures (TYPE/UNION) may be embedded within another structure, for simplification in referencing deeply nested items, by simply stating the structure name alone at the appropriate position. The internal alignment of the member structure is precisely maintained regardless of other alignment specifications, to foster inheritance issues. For example:

|              |                   |                    |
|--------------|-------------------|--------------------|
| TYPE ABCD3   | TYPE <b>ABCD2</b> | UNION <b>ABCD1</b> |
| A AS LONG    | D AS DWORD        | F AS DWORD         |
| <b>ABCD2</b> | E AS DOUBLE       | G AS LONG          |
| C AS LONG    | <b>ABCD1</b>      | H AS SINGLE        |
| END TYPE     | END TYPE          | END UNION          |

In this case, you could access the lone Single-precision float member of this structure very simply. Assuming `DIM X AS ABCD3`, you could reference the [Single-precision](#) Union member with the variable name `X.H`, instead of the extended syntax `X.ABCD2.ABCD1.H`

**Restrictions** A Union can contain elements of dissimilar sizes. The size of a Union structure is always determined by the longest member element. This is usually an important consideration when using a Union within another Union or UDT structure, in order to determine the size of the final structure.

For related information, please refer to the [TYPE/END TYPE](#), [User-Defined Types](#) and [Unions](#) sections.

Field strings cannot be used in UDT or UNION structures. Attempting to do so results in a compile-time [Error 485](#) ("Dynamic/Field strings not allowed").

**See also** [DIM](#), [LEN](#), [LET \(with Types\)](#), [SIZEOF](#), [TYPE/END TYPE](#), [User-Defined Types](#), [Unions](#)

**Example**

```
UNION AccountUnion
 AccountNumber AS LONG
 AccountName AS STRING * 16
END UNION

TYPE JournalEntryType
 Account AS AccountUnion
 Amount AS CUR
END TYPE

DIM JournalEntry AS JournalEntryType

JournalEntry.Account.AccountName = "Smith"
JournalEntry.Amount = 123.01@
' process journal entry here
JournalEntry.Account.AccountNumber = 1001
JournalEntry.Amount = -1.99@
```

## UNLOCK statement

# UNLOCK statement

**Purpose** Remove [locks](#) placed on a [file](#) to permit other threads, processes, and applications to access the locked sections of the file.

**Syntax** UNLOCK [#] *filenum&* [, {*record&&* | *start&&* TO *finish&&*}]

**Remarks** UNLOCK restores access to a record, range of [records](#), [byte](#), or range of bytes locked by the [LOCK](#) statement, in file opened as file number *filenum&*.

If the file was opened in [random-access](#) mode, *record&&*, *start&&*, and *finish&&* specify record numbers.

When used with [binary](#) mode files, *record&&*, *start&&*, and *finish&&* specify byte positions, starting from either one (the default) or zero, depending on the [BASE](#) setting given when the file was Opened.

If a record is specified, only that record (or byte) is unlocked. Otherwise, a range of records (or bytes) is unlocked, from *start&&* to *finish&&*. If no records are specified, or if the file was opened in sequential mode, the entire file is unlocked.

All records (or bytes) to be unlocked must have been previously locked using the LOCK statement. Multiple locks may be placed on a file, and locks may be unlocked in any order. However, the parameters used for each UNLOCK statement must exactly match those used for the previous corresponding LOCK statement.

**All locked records (or bytes) must be unlocked using the UNLOCK statement before the file can be closed.**

If an unlock attempt fails, PowerBASIC sets the [ERR](#) system variable to reflect a run-time [Error 70](#) ("Permission denied"), or [Error 75](#) ("Path/file access error").

**See also** [LOCK](#), [OPEN](#)

**Example** See the example for [LOCK](#).

## UNWRAP\$ function

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## UNWRAP\$ function New!

**Purpose** Remove paired characters from the beginning and end of a

.

**Syntax** `s$ = UNWRAP$(StringExpression, LeftChar$, RightChar$)`

**Remarks** The UNWRAP\$ function removes the characters in *LeftChar\$* from the beginning of *StringExpression*, if there is an exact match. It then removes the characters in *RightChar\$* from the end, if there is an exact match. The remaining character are then returned. For example:

```
UNWRAP$("<MyWord>", "<", ">") returns "MyWord"
```

UNWRAP\$ is particularly useful for removing parentheses, quotes, brackets, etc. from a text item.

**See also** [EXTRACT\\$](#), [LTRIM\\$](#), [MID\\$](#), [REMOVES\\$](#), [REPLACE](#), [RTRIM\\$](#), [SHRINK\\$](#), [TRIM\\$](#), [WRAP\\$](#)

## USING\$ function

# USING\$ function

**Purpose** Format one or more

or expressions, based upon the contents of the format mask string.

**Syntax** `sResult$ = USING$(fmtmask$, expr [, expr [, ...]])`

**Remarks** The rules of formatting are based upon the PRINT USING statement supported in many DOS versions of BASIC, including [PowerBASIC for DOS](#).

However, since it is implemented as a [function](#), it allows far more versatility in that it is not necessary to output a value to gain the benefit of this unique functionality. Also, USING\$ offers a wider range of applications than [FORMAT\\$](#) because it can format both numeric and string expressions, and can take multiple arguments.

*fmtmask\$* A [string expression](#), string [variable](#) or [string literal](#) consisting of format characters that will determine how the complete expression should be formatted. This expression is termed the *mask*. There may be as many format masks in *fmtmask\$*, arranged in the same order as the *expr* arguments are specified. See the examples below for more information.

*expr* A string or numeric expression, variable, or literal value to be formatted. The mask characters available depend on whether *expr* is a string or numeric.

### Character Definition

**(string expr) When *expr* is a string, the following format codes apply within *fmtmask\$*:**

- ! The first character of the string is returned.
- & The entire string is returned.
- \\ The first two characters are returned.
- \\ If backslashes enclose *n* spaces, *n* + 2 characters of the string expression are returned.
- \_ Escape (underscore) character. The following character is interpreted as a literal character instead of a mask format character.

**(numeric expr) When *expr* is numeric, the following format codes apply within *fmtmask\$*:**

- # A numeric digit position, which is space-filled to the left, and zero-filled to the right of the decimal point. If the number is negative, a minus sign occupies a digit position.
  - . The decimal point is placed at this position.
  - ' A numeric digit position, which signifies that whole number digits should be displayed with a comma each three digits.
  - \$\$ Two numeric digit positions which cause a dollar sign to be inserted immediately before the number.
  - \*x Two numeric digit positions which cause leading blank spaces in the field to be replaced with the character in the second position of the pair "x" (where "x" represents your own choice of character). For example, two asterisks "\*\*\*" will convert leading spaces to asterisks, and "\*=" converts leading spaces to equals characters, etc. The \*x mask characters also act as two digit (#) placeholders. Your mask must contain at least three characters to use this.
  - + A plus at the start of the field causes the sign of the value (+ -) to be inserted before the number. A plus at the end of the field causes the sign of the value (+ -) to be added after the number.
  - A minus at the end of the field causes a minus signed to be added after a negative number, or a space to be added after a positive number. A minus at the start of the field is treated as a literal character, which is always inserted.
  - ^ Numbers can be formatted in scientific notation by including three to six carets (^) in the format string. Each caret corresponds to a numeric digit position in the exponent, one for E, one for the exponent sign, and one to four for the actual digits of the exponent value.
  - \_ Escape (underscore) character. The following character is interpreted as a literal character instead of a mask format character. Therefore, to include a literal underscore character in the format mask, use two underscore characters.
- All characters in the format mask string that are not identified above are copied into the output string just as they are encountered. You can override or *escape* any special format code by preceding it with an underscore character ( \_ ) and it will be copied as any other literal character. This provides the flexibility to include literal string text within the formatted return string.

#### Restrictions

The returned string is limited to an absolute length limit of 1024 [bytes](#).

By specifying a single mask in *fmtmask\$*, all *expr* arguments are subjected to the single mask. See the examples below.

If there are fewer *expr* arguments than matching format masks in *fmtmask\$*, parsing of the *fmtmask\$* halts after the last referenced mask position, and subsequent characters in *fmtmask\$* are ignored. This is consistent with the behavior of PRINT USING\$ in PB/DOS.

If a numeric argument overflows its mask (i.e., there are more digits than digit positions), the resulting string will occupy as many spaces as needed to represent the number. In such cases, PB/DOS includes a leading "%" symbol to indicate the mask overflow;

however, PowerBASIC for Windows does not return the additional "%" overflow character.

The semicolon (;) and zero (0) characters are reserved for future use, so it would be prudent to escape such literal characters in USING\$ masks to maintain future compatibility.

**See also** [GRAPHIC PRINT](#), [XPRINT](#), [FORMAT\\$](#), [STR\\$](#)

**Example**

```
a$ = USING$("!", "abc")
' returns "a"

a$ = USING$("You owe $$#,.##", 12345.67@)
' returns "You owe $12,345.67"

DIM p AS BYTE PTR
HOST ADDR "localhost" TO ip&
p = VARPTR(ip&)
a$ = USING$("#_#_#_#_", @p, @p[1], @p[2], @p[3])
' returns "127.0.0.1"

a$ = USING("&=#.#####", "Pi", ATN(1)*4)
' returns "Pi=3.14159265358979"

a$ = USING$("!", "AX", "BX", "CX")
' returns "ABC"

a$ = USING("$#.##_", 1, 20, 300, 4)
' returns "$1.00,$20.00,$300.00,$4.00,"

a$ = USING("$*#####.##_", 1, 20)
' returns "$=====1.00,$=====20.00,"
```

## Utf8ToChr\$ function

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## Utf8ToChr\$ function New!

**Purpose** Translates a byte string of [OEM](#) characters into [ANSI/WIDE](#) characters.

**Syntax** `a$$ = Utf8ToChr$(UtfExpr$)`

**Remarks** *UtfExpr\$* contains a series of bytes in [UTF-8](#) format. `Utf8ToChr$` translates it into either ANSI multi-byte equivalent characters or WIDE (16-bit) Unicode characters, depending upon the context of the source code. PowerBASIC will always choose the correct form with no intervention needed by the programmer.

**See also** [ChrToOem\\$](#), [ChrToUtf8\\$](#), [OemToChr\\$](#)

## VAL function

# VAL function IMPROVED

**Purpose** Convert a text  
to a value.

**Syntax** `y = VAL(string_expression [, offset])`

**Remarks** The VAL function converts a string argument to a number. If the optional Offset parameter is included, it indicates the position in the string where the conversion should begin. If not given, it defaults to one (1), and begins at the first character. Leading white-space characters (spaces, tabs, carriage-returns, and linefeeds) are skipped and ignored. Evaluation of the number continues until a non-numeric character is found, or the end of the string is reached. If no number is found, the VAL() function returns zero (0). Format characters (like commas) are not allowed, and will cause early termination of the evaluation.

VAL interprets the letters "e" and "d" (and "E" and "D") as the symbols for exponentiation and scientific notation:

```
i& = VAL("10.101e3") ' 10101 ~ 10.101*(10^3)
j& = VAL("2D4") ' 20000 ~ 2 * (10 ^ 4)
```

## Hexadecimal, Binary and Octal conversions

VAL can also be used to convert string arguments that are in the form of Hexadecimal, Binary and Octal numbers. Hexadecimal values should be prefixed with "&H" and Binary with "&B". Octal values may be prefixed "&O", "&Q" or just "&". If the *string\_expression* contains a leading zero, the result is returned as an unsigned value; otherwise, a signed value is returned. For example:

```
i& = VAL("&HF5F3") ' Hex, returns -2573 (signed)
j& = VAL("&H0F5F3") ' Hex, returns 62963 (unsigned)
x& = VAL("&B0100101101") ' Binary, returns 301 (unsigned)
y& = VAL("&O4574514") ' Octal, returns 1243468 (signed)
```

Valid hex characters include 0 to 9, A to F (and a to f). Valid Octal characters include 0 to 7, and binary 0 to 1.

Use the [STR\\$](#), [DEC\\$](#), [FORMAT\\$](#), and [USING\\$](#) functions to convert numeric values into decimal strings. Use [BIN\\$](#), [HEX\\$](#) and [OCT\\$](#) to convert them to Binary, Hexadecimal, and Octal representations.

**Restrictions** VAL stops analyzing *string\_expression* when non-numeric characters are encountered. When dealing with Hexadecimal, Binary, and Octal number systems, the period character is classified as non-numeric. This is because PowerBASIC only supports floating-point formats for the decimal number system. VAL accepts the period character as a decimal place for all decimal number system values.

VAL does not analyze trailing type-specifiers for decimal strings. For example, VAL("9.1&") is evaluated as 9.1 rather than 9 because the "&" suffix is treated as a non-numeric character, not a type-specifier. However, type suffixes may be used with binary, octal, and hex values.

**See also** [BIN\\$](#), [DEC\\$](#), [FORMAT\\$](#), [HEX\\$](#), [OCT\\$](#), [STR\\$](#), [USING\\$](#), [VAL statement](#)

**Example** `Price$ = "$ 15,345.92"`  
`Cost@@ = VAL(REMOVE$(Price$, ANY "$, "))`

**Result** 15345.92

## VAL statement

# Keyword Template

**Purpose**

Syntax  
Remarks  
See also  
Example

## VAL statement **New!**

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>      | Convert a text<br>to a value with additional information.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Syntax</b>       | <code>VAL StrgExpr [, offset] TO ValueVar [, DigitsVar&amp;, UnusedVar&amp;]</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Remarks</b>      | <p>The VAL statement converts a string argument to a number, but adds additional information about the conversion. Both Leading and trailing white-space characters (spaces, tabs, carriage-returns, and linefeeds) are skipped and ignored. If no number is found, the value zero (0) is returned. Format characters (like commas) are not allowed, and will cause early termination of the evaluation.</p> <p>VAL interprets the letters "e" and "d" (and "E" and "D") as the symbols for exponentiation and scientific notation:</p> <pre> VAL "10.101e3" TO i&amp;      ' 10101 ~ 10.101*(10^3) VAL "2D4" TO j&amp;          ' 20000 ~ 2 * (10 ^ 4) </pre> <p><b><u>Hexadecimal, Binary and Octal conversions</u></b></p> <p>VAL can also be used to convert string arguments that are in the form of Hexadecimal, Binary and Octal numbers. Hexadecimal values should be prefixed with "&amp;H" and Binary with "&amp;B". Octal values may be prefixed "&amp;O", "&amp;Q" or just "&amp;". If the <i>StrgExpr</i> contains a leading zero, the result is returned as an unsigned value; otherwise, a signed value is returned. For example:</p> <pre> VAL "&amp;HF5F3" TO i&amp;      ' Hex, returns -2573 (signed) VAL "&amp;H0F5F3" TO j&amp;     ' Hex, returns 62963 (unsigned) VAL "&amp;B0100101101" TO x&amp; ' Binary, returns 301 (unsigned) VAL "&amp;O4574514" TO y&amp;   ' Octal, returns 1243468 (signed) </pre> <p>Valid hex characters include 0 to 9, A to F (and a to f). Valid Octal characters include 0 to 7, and binary 0 to 1.</p> <p>Use the <a href="#">STR\$</a>, <a href="#">DEC\$</a>, <a href="#">FORMAT\$</a>, and <a href="#">USING\$</a> functions to convert numeric values into decimal strings. Use <a href="#">BIN\$</a>, <a href="#">HEX\$</a> and <a href="#">OCT\$</a> to convert them to Binary, Hexadecimal, and Octal representations.</p> |
| <b>Offset</b>       | If the optional Offset parameter is included, it indicates the position in the string where the conversion should begin. If not given, it defaults to one (1), and begins at the first character.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>ValueVar</b>     | A numeric variable which receives the result of the conversion.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>DigitsVar</b>    | An optional <a href="#">long integer</a> variable which receives the count of the number of significant digits found in the evaluation. If this value is zero (0), no valid number was found and zero (0) was also assigned to <i>ValueVar</i> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>UnusedVar</b>    | An optional long integer variable which receives the count of the unused characters. Since the evaluation skips both leading and trailing white-space, a non-zero value indicates that additional characters of some significance may be present. You can use <code>RIGHT\$(StrgExpr, UnusedVar)</code> to separate the unused characters.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Restrictions</b> | VAL stops analyzing string_expression when non-numeric characters are encountered. When dealing with Hexadecimal, Binary, and Octal number systems, the period character is classified as non-numeric. This is because PowerBASIC only supports floating-point formats for the decimal number system. VAL accepts the period character as a decimal place for all decimal number system values.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

VAL does not analyze trailing type-specifiers for decimal strings. For example, VAL("9.1&") is evaluated as 9.1 rather than 9 because the "&" suffix is treated as a non-numeric character, not a type-specifier. However, type suffixes may be used with binary, octal, and hex values.

**See also** [BIN\\$, DEC\\$, FORMAT\\$, HEX\\$, OCT\\$, STR\\$, USING\\$, VAL function](#)

**Example**  

```
s = "The total cost is $145.26."
VAL s, INSTR(s, "$")+1 to i
```

**Result** 145.26

## VARIANT# function

# VARIANT# function

**Purpose** Returns the numeric value contained in a [Variant variable](#).

**Syntax** *numericvar* = VARIANT#(*vrntvar*)

**Remarks** The value returned by VARIANT# may be any range from [BYTE](#) to [DOUBLE/QUAD/CURRENCY](#), depending upon the internal representation used within the Variant.

While Variant variables, by definition, do not offer support for [Extended Precision Float](#) data types, you should note that it is possible for a QUAD or CURRENCY value to exceed the precision level offered by a DOUBLE. You should therefore use some judgement in deciding on the

variable type to be used as the destination of this function, based upon the expected return values, and the internal representation, which you can obtain with [VARIANTVT](#).

**Restrictions** VARIANT# presumes that a valid numeric value is present (not an [array](#)); otherwise, the value zero is returned.

**See also** [DIM](#), [LET](#), [OBJECT](#), [LET \(with Variants\)](#), [VARIANT\\$](#), [VARIANT\\$\\$](#), [VARIANTVT](#)

**Example**  

```
DIM vVnt AS VARIANT
vVnt = 999&
a& = VARIANT#(vVnt)
```

## VARIANT\$/VARIANT\$\$ function

# VARIANT\$ / VARIANT\$\$ function

**Purpose** Returns the byte contained in a [Variant](#) variable.

**Syntax**  
*AnsiVar* = VARIANT\$(*VrntVar*)  
*WideVar* = VARIANT\$\$(*VrntVar*)  
*TypeVar* = VARIANT\$(*BYTE*, *VrntVar*)

**Remarks** VARIANT\$ extracts a string from a variant variable if a [dynamic string](#) (VT\_BSTR) is found there. If the variant contains any other [VT type](#), an empty string is returned. By definition, a BSTR is a wide [Unicode](#) string. It is generally safe to assume this is the case, unless the variant was created by PowerBASIC and you know the internal format is bytes rather than wide Unicode words.

The first form of VARIANT\$ converts the wide Unicode contents to [ANSI](#), returning it as an ANSI string. The second form of VARIANT\$\$ returns the contents directly as a wide Unicode string. Of course, in all assignment and parameter situations, PowerBASIC will automatically handle any conversions needed between ANSI and WIDE string values. For

that reason, no additional code should be added to this operation for ANSI/WIDE conversion. Also, keep in mind that the correct choice of function can improve the performance of your program.

**BYTE**

If the BYTE option is specified, you are telling PowerBASIC that the string contains a set of [BYTES](#) rather than wide Unicode words. This would be the case if you stored a [User-Defined Type](#) in a variant:

```
LET VariantVar = ThisUDTVar AS STRING
ThatUDTVar = VARIANT$(BYTE, VariantVar)
```

This form of VARIANT\$ always returns the contents as an ANSI byte string. This result can be assigned to an ANSI string variable or a User-Defined Type.

**Legacy**

Older legacy programs were forced to store Unicode characters in an ANSI string variable because wide string variables were not yet available. These programs should continue to use VARIANT\$ with [ACODES](#) and variant assignment with [UCODES](#) until the program logic is updated to use wide Unicode variables.

**See also**

[DIM](#), [LET](#), [OBJECT](#), [LET \(with Variants\)](#), [VARIANT#](#), [VARIANTVT](#)

**Example**

```
DIM vVnt AS VARIANT
vVnt = "Hello World"$$
a$ = VARIANT$(vVnt)
```

**VARIANTVT function****VARIANTVT function****Purpose**

Determine the internal data type of the data stored in a [Variant variable](#).

**Syntax**

```
numericvar = VARIANTVT(vrntvar)
```

**Remarks**

The VARIANTVT function returns the internal VT data type stored in the Variant. The entire range of %VT prefixed values are documented by the OLE ([COM](#)) specification and are available in WIN32API.INC.

The most important values in this limited context include %VT\_EMPTY (=0) and %VT\_BSTR (=8), since the others are

formats automatically resolved by the [LET \(with Variants\)](#) statement and VARIANT# function.

| Result | Equate       | Content Type                   |
|--------|--------------|--------------------------------|
| 0      | %VT_EMPTY    | An Empty Variant               |
| 1      | %VT_NULL     | Null value                     |
| 2      | %VT_I2       | <a href="#">Integer</a>        |
| 3      | %VT_I4       | <a href="#">Long-Integer</a>   |
| 4      | %VT_R4       | <a href="#">Single</a>         |
| 5      | %VT_R8       | <a href="#">Double</a>         |
| 6      | %VT_CY       | <a href="#">Currency</a>       |
| 7      | %VT_DATE     | Date                           |
| 8      | %VT_BSTR     | <a href="#">Dynamic String</a> |
| 9      | %VT_DISPATCH | <a href="#">IDispatch</a>      |
| 10     | %VT_ERROR    | Error Code                     |
| 11     | %VT_BOOL     | <a href="#">Boolean</a>        |
| 12     | %VT_VARIANT  | Variant                        |
| 13     | %VT_UNKNOWN  | <a href="#">Unknown</a>        |
| 14     | %VT_DECIMAL  | Decimal                        |
| 16     | %VT_I1       | Byte (signed)                  |

|        |                     |                                             |
|--------|---------------------|---------------------------------------------|
| 17     | %VT_UI1             | <a href="#">Byte</a> (unsigned)             |
| 18     | %VT_UI2             | <a href="#">Word</a>                        |
| 19     | %VT_UI4             | <a href="#">DWORD</a>                       |
| 20     | %VT_I8              | <a href="#">Quad</a> (signed)               |
| 21     | %VT_UI8             | Quad (unsigned)                             |
| 22     | %VT_INT             | Long-Integer                                |
| 23     | %VT_UINT            | DWord                                       |
| 24     | %VT_VOID            | A C-style void type                         |
| 25     | %VT_HRESULT         | <a href="#">COM result code</a>             |
| 26     | %VT_PTR             | <a href="#">Pointer</a>                     |
| 27     | %VT_SAFEARRAY       | VB <a href="#">Array</a>                    |
| 28     | %VT_CARRAY          | A C-style array                             |
| 29     | %VT_USERDEFINED     | User Defined Type                           |
| 30     | %VT_LPSTR           | ANSI                                        |
| 31     | %VT_LPWSTR          | Unicode string                              |
| 36     | %VT_RECORD          | <a href="#">UDT</a>                         |
| 64     | %VT_FILETIME        | A FILETIME value                            |
| 65     | %VT_BLOB            | An arbitrary block of memory                |
| 66     | %VT_STREAM          | A stream of bytes                           |
| 67     | %VT_STORAGE         | Name of the storage                         |
| 68     | %VT_STREAMED_OBJECT | A stream that contains an object            |
| 69     | %VT_STORED_OBJECT   | A storage object                            |
| 70     | %VT_BLOB_OBJECT     | A block of memory that represents an object |
| 71     | %VT_CF              | <a href="#">Clipboard format</a>            |
| 72     | %VT_CLSID           | <a href="#">Class</a> ID                    |
| &H1000 | %VT_VECTOR          | An array with a leading count               |
| &H2000 | %VT_ARRAY           | Array                                       |
| &H4000 | %VT_BYREF           | A reference value                           |

If a Variant contains a complete [array](#), the Variant type is determined by adding the base type to the array modifier. That is, for a [string array](#), it would be %VT\_BSTR plus %VT\_ARRAY (= &H2008).

[Quad](#) arrays within Variants are not supported by most versions of Windows. The result from VARIANTVT used to see whether such an array was created properly.

#### See also

[DIM](#), [Just what is COM?](#), [OBJECT](#), [LET \(with Variants\)](#), [VARIANT#](#), [VARIANT\\$](#), [VARIANT\\$\\$](#), [What is an anyway?](#)

## VARPTR function

# VARPTR function

**Purpose** Return the 32-bit address of a [variable](#).

**Syntax** `y = VARPTR(variable)`

**Remarks** VARPTR returns a complete 32-bit address to the specified *variable* as a [Double-word](#) (DWORD) value. *variable* is any `,`, structure variable ([User-Defined Type](#) or [Union](#)), or element of an [array](#). VARPTR returns a [pointer](#) (32-bit address in memory) where the variable data is stored.

VARPTR may also be used to locate an array descriptor, as well as the array data itself. To find the address of an array descriptor, use the array name with empty parentheses: `VARPTR(x())`.

When you use VARPTR to get the address of a [dynamic \(variable length\) string](#), keep in mind that the value being returned is the address of the string *handle*, not the actual *data* in the string. This can be useful for manipulating a dynamic string array using indexed-pointers, For example:

```
DIM A$(100), b$, pA AS STRING PTR, x&
' Assume A$() is filled here
pA = VARPTR(a$(0)) ' 1st element handle
FOR X& = 0 TO 100
 B$ = B$ + @pA[x&] + ","
NEXT x&
```

You can use [STRPTR](#) to find the address of the string's data. When used with pointers, VARPTR returns the address of the pointer itself.

**Restrictions** VARPTR cannot be used on [Register variables](#), because Register variables are stored in internal processor [registers](#) rather than application memory. VARPTR can be used on UDT and Union variables, but not the UDT definition name. For example:

```
TYPE MyType
 ABC AS LONG
END TYPE
' more code here
DIM x AS MyType, y&
y& = VARPTR(x) ' This is legal
y& = VARPTR(MyType) ' This is not
```

**See also** [CODEPTR](#), [PEEK](#), [Pointers](#), [POKE](#), [STRPTR](#)

**Example**

```
DIM x AS INTEGER PTR, a%, b%
a% = 55
x = VARPTR(A%)
b% = @x
CALL DisplayResult("b% contains " + FORMAT$(b%))
```

**Result** b% contains 55

## VERIFY function

# VERIFY function

**Purpose** Determine whether each character of a  
is present in another string.

**Syntax** `x = VERIFY([start&], MainString, MatchString)`

**Remarks** VERIFY returns zero if each character in *MainString* is present in *MatchString*. If not, it returns the position of the first non-matching character in *MainString*.

This function is very useful for determining if a string contains only digits, for example.

VERIFY is case-sensitive, so capitalization matters.

**Restrictions** If *start&* evaluates to a position outside of the string on either side, or if *start&* is zero, VERIFY returns zero.

**See also** [INSTR](#), [LCASE\\$](#), [LTRIM\\$](#), [MID\\$](#), [REMOVE\\$](#), [REPLACE](#), [RIGHT\\$](#), [RTRIM\\$](#), [TALLY](#), [TRIM\\$](#), [UCASE\\$](#)

**Example**

```
' returns 4 since "." is not in "0123456789"
x& = VERIFY("123.65,22.5", "0123456789")
```

```
' returns 7 since 5 starts it past the first non-digit ("." at position 4)
x& = VERIFY(5,"123.65,22.5", "0123456789")
```

## WHILE/WEND statements

# WHILE/WEND statements

**Purpose** Define a block of program statements that are executed repeatedly for as long as certain conditions are met.

**Syntax**

```
WHILE integer_expression
 [statements]
 [EXIT LOOP]
 [statements]
WEND
```

**Remarks** If *integer\_expression* is [TRUE](#) (it evaluates to a non-zero value), all of the statements between the WHILE and the terminating WEND are executed. PowerBASIC then jumps back to the WHILE statement and repeats the test. If it is still TRUE, PowerBASIC executes the enclosed statements again. This process is repeated until the test expression evaluates to zero, or an [EXIT](#) statement is encountered. In either case, execution passes to the statement following WEND.

If *integer\_expression* evaluates to FALSE (zero) on the first pass, none of the statements in the loop are executed.

Loops built with WHILE/WEND statements can be nested (enclosed within each other). Each WEND matches the most recent unmatched WHILE.

One use of a WHILE/WEND loop is to input data from a file until the end of the file is reached:

```
i& = 0
WHILE ISFALSE EOF(1)
 INCR i&
 LINE INPUT #1, FileTxt$(i&)
WEND
```

Although the compiler does not care, it's a good idea to indent the statements between WHILE and WEND, to clarify the structure of the loop you have constructed.

Note that the following code creates an infinite loop:

```
WHILE -1
 [statements]
WEND
```

To exit a WHILE/WEND loop prematurely, use the EXIT LOOP statement.

PowerBASIC's [DO/LOOP](#) construct offers a more flexible way to build conditional loops.

Also see the discussion on the [IF](#) statement for notes on PowerBASIC's Short-circuit evaluation and its possible side effects.

**See also** [#OPTIMIZE](#), [DO/LOOP](#), [EXIT](#), [FOR EACH/NEXT](#), [FOR/NEXT](#), [ITERATE](#), [Short-circuit evaluation](#)

## WINDOW GET HANDLE statement

# Keyword Template

**Purpose**

**Syntax**

Remarks  
See also  
Example

## WINDOW GET statement IMPROVED

**Purpose** Manipulate a Window in the program, which may include setting or retrieving data. The target window may be of any class, including a  
or [Dialog](#).

**Syntax**

```
WINDOW GET HANDLE hWin, ID& TO DataVar&
WINDOW GET ID hWin TO DataVar&
WINDOW GET PARENT hWin TO DataVar&
WINDOW GET STYLE hWin TO DataVar&
WINDOW GET STYLEX hWin TO DataVar&
WINDOW GET USER hWin TO DataVar&
```

*hWin* [Handle](#) of the Window to be used.

*DataVar&* A [long integer](#) variable to which result data is assigned.

**Remarks** The WINDOW statement may be used with any type of window in your program, including a Control or Dialog. Generally speaking, the window to be manipulated or tested is identified by its handle (*hWin*), which is often obtained at the time it is created. However, since a control is usually accessed by a "Parent / ID" combination, you must use WINDOW GET HANDLE or [CONTROL\\_HANDLE](#) to retrieve its handle for this purpose. If the operation fails, the value zero (0) is assigned to the result variable.

### **WINDOW GET HANDLE *hWin*, *ID&* TO *DataVar&***

This statement retrieves the handle of a Window, translating from the [parent](#) handle and the specific integral [control ID](#) given at the time it was created. *hWin* is the handle of the parent, *ID&* is the control ID, and *DataVar&* represents the variable which receives the desired window handle.

### **WINDOW GET ID *hWin* TO *DataVar&***

The integral ID of the window *hWin* is retrieved and assigned to the variable designated by *DataVar&*. Generally, only a CONTROL will have an ID, so windows of other classes will normally return the value zero.

### **WINDOW GET PARENT *hWin* TO *DataVar&***

The handle of the parent is retrieved and assigned to the variable designated by *DataVar&*.

### **WINDOW GET STYLE *hWin* TO *DataVar&***

The window [style](#) value of the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*.

### **WINDOW GET STYLEX *hWin* TO *DataVar&***

The extended window style value of the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*.

### **WINDOW GET USER *hWin* TO *DataVar&***

The 32-bit user data value associated with the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*. This particular user data value is associated with every window in your program, and is maintained by the Windows

operating system. It is separate and apart from user data maintained by [DDT](#) for each dialog and control created with DDT.

See also [CONTROL HANDLE](#), [WINDOW SET](#)

## WINDOW GET ID statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## WINDOW GET statement IMPROVED

**Purpose** Manipulate a Window in the program, which may include setting or retrieving data. The target window may be of any class, including a

or [Dialog](#).

**Syntax**

```
WINDOW GET HANDLE hWin, ID& TO DataVar&
WINDOW GET ID hWin TO DataVar&
WINDOW GET PARENT hWin TO DataVar&
WINDOW GET STYLE hWin TO DataVar&
WINDOW GET STYLEX hWin TO DataVar&
WINDOW GET USER hWin TO DataVar&
```

*hWin* [Handle](#) of the Window to be used.

*DataVar&* A [long integer](#) variable to which result data is assigned.

**Remarks** The WINDOW statement may be used with any type of window in your program, including a Control or Dialog. Generally speaking, the window to be manipulated or tested is identified by its handle (*hWin*), which is often obtained at the time it is created. However, since a control is usually accessed by a "Parent / ID" combination, you must use WINDOW GET HANDLE or [CONTROL HANDLE](#) to retrieve its handle for this purpose. If the operation fails, the value zero (0) is assigned to the result variable.

### WINDOW GET HANDLE *hWin*, *ID&* TO *DataVar&*

This statement retrieves the handle of a Window, translating from the [parent](#) handle and the specific integral [control ID](#) given at the time it was created. *hWin* is the handle of the parent, *ID&* is the control ID, and *DataVar&* represents the variable which receives the desired window handle.

### WINDOW GET ID *hWin* TO *DataVar&*

The integral ID of the window *hWin* is retrieved and assigned to the variable designated by *DataVar&*. Generally, only a CONTROL will have an ID, so windows of other classes will normally return the value zero.

### WINDOW GET PARENT *hWin* TO *DataVar&*

The handle of the parent is retrieved and assigned to the variable designated by *DataVar&*.

### WINDOW GET STYLE *hWin* TO *DataVar&*

The window [style](#) value of the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*.

### **WINDOW GET STYLEX *hWin* TO *DataVar&***

The extended window style value of the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*.

### **WINDOW GET USER *hWin* TO *DataVar&***

The 32-bit user data value associated with the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*. This particular user data value is associated with every window in your program, and is maintained by the Windows operating system. It is separate and apart from user data maintained by [DDT](#) for each dialog and control created with DDT.

See also [CONTROL HANDLE](#), [WINDOW SET](#)

## WINDOW GET PARENT statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## WINDOW GET statement IMPROVED

**Purpose** Manipulate a Window in the program, which may include setting or retrieving data. The target window may be of any class, including a  
or [Dialog](#).

**Syntax**

```
WINDOW GET HANDLE hWin, ID& TO DataVar&
WINDOW GET ID hWin TO DataVar&
WINDOW GET PARENT hWin TO DataVar&
WINDOW GET STYLE hWin TO DataVar&
WINDOW GET STYLEX hWin TO DataVar&
WINDOW GET USER hWin TO DataVar&
```

*hWin* [Handle](#) of the Window to be used.

*DataVar&* A [long integer](#) variable to which result data is assigned.

**Remarks** The WINDOW statement may be used with any type of window in your program, including a Control or Dialog. Generally speaking, the window to be manipulated or tested is identified by its handle (*hWin*), which is often obtained at the time it is created. However, since a control is usually accessed by a "Parent / ID" combination, you must use WINDOW GET HANDLE or [CONTROL HANDLE](#) to retrieve its handle for this purpose. If the operation fails, the value zero (0) is assigned to the result variable.

### **WINDOW GET HANDLE *hWin*, *ID&* TO *DataVar&***

This statement retrieves the handle of a Window, translating from the [parent](#) handle and the specific integral [control ID](#) given at the time it was created. *hWin* is the handle of the parent, *ID&* is the control ID, and *DataVar&* represents the variable which receives the desired window handle.

**WINDOW GET ID *hWin* TO *DataVar&***

The integral ID of the window *hWin* is retrieved and assigned to the variable designated by *DataVar&*. Generally, only a CONTROL will have an ID, so windows of other classes will normally return the value zero.

**WINDOW GET PARENT *hWin* TO *DataVar&***

The handle of the parent is retrieved and assigned to the variable designated by *DataVar&*.

**WINDOW GET STYLE *hWin* TO *DataVar&***

The window [style](#) value of the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*.

**WINDOW GET STYLEX *hWin* TO *DataVar&***

The extended window style value of the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*.

**WINDOW GET USER *hWin* TO *DataVar&***

The 32-bit user data value associated with the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*. This particular user data value is associated with every window in your program, and is maintained by the Windows operating system. It is separate and apart from user data maintained by [DDT](#) for each dialog and control created with DDT.

See also [CONTROL HANDLE](#), [WINDOW SET](#)

**WINDOW GET STYLE statement**

## Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## WINDOW GET statement IMPROVED

**Purpose** Manipulate a Window in the program, which may include setting or retrieving data. The target window may be of any class, including a

or [Dialog](#).

**Syntax**

```
WINDOW GET HANDLE hWin, ID& TO DataVar&
WINDOW GET ID hWin TO DataVar&
WINDOW GET PARENT hWin TO DataVar&
WINDOW GET STYLE hWin TO DataVar&
WINDOW GET STYLEX hWin TO DataVar&
WINDOW GET USER hWin TO DataVar&
```

*hWin* [Handle](#) of the Window to be used.

*DataVar&* A [long integer](#) variable to which result data is assigned.

**Remarks** The WINDOW statement may be used with any type of window in your program, including a Control or Dialog. Generally speaking, the window to be manipulated or tested is identified by its handle (*hWin*), which is often obtained at the time it is created. However, since a control is usually accessed by a "Parent / ID" combination, you must use WINDOW GET HANDLE or [CONTROL HANDLE](#) to retrieve its handle for this purpose. If the operation fails, the value zero (0) is assigned to the result variable.

#### **WINDOW GET HANDLE *hWin, ID& TO DataVar&***

This statement retrieves the handle of a Window, translating from the [parent](#) handle and the specific integral [control ID](#) given at the time it was created. *hWin* is the handle of the parent, *ID&* is the control ID, and *DataVar&* represents the variable which receives the desired window handle.

#### **WINDOW GET ID *hWin To DataVar&***

The integral ID of the window *hWin* is retrieved and assigned to the variable designated by *DataVar&*. Generally, only a CONTROL will have an ID, so windows of other classes will normally return the value zero.

#### **WINDOW GET PARENT *hWin To DataVar&***

The handle of the parent is retrieved and assigned to the variable designated by *DataVar&*.

#### **WINDOW GET STYLE *hWin TO DataVar&***

The window [style](#) value of the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*.

#### **WINDOW GET STYLEX *hWin TO DataVar&***

The extended window style value of the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*.

#### **WINDOW GET USER *hWin TO DataVar&***

The 32-bit user data value associated with the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*. This particular user data value is associated with every window in your program, and is maintained by the Windows operating system. It is separate and apart from user data maintained by [DDT](#) for each dialog and control created with DDT.

**See also** [CONTROL HANDLE](#), [WINDOW SET](#)

## WINDOW GET STYLEX statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

# WINDOW GET statement IMPROVED

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>      | Manipulate a Window in the program, which may include setting or retrieving data. The target window may be of any class, including a<br>or <a href="#">Dialog</a> .                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Syntax</b>       | <pre> WINDOW GET HANDLE <i>hWin</i>, <i>ID&amp;</i> TO <i>DataVar&amp;</i> WINDOW GET ID <i>hWin</i> TO <i>DataVar&amp;</i> WINDOW GET PARENT <i>hWin</i> TO <i>DataVar&amp;</i> WINDOW GET STYLE <i>hWin</i> TO <i>DataVar&amp;</i> WINDOW GET STYLEX <i>hWin</i> TO <i>DataVar&amp;</i> WINDOW GET USER <i>hWin</i> TO <i>DataVar&amp;</i> </pre>                                                                                                                                                                                       |
| <i>hWin</i>         | <a href="#">Handle</a> of the Window to be used.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <i>DataVar&amp;</i> | A <a href="#">long integer</a> variable to which result data is assigned.                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Remarks</b>      | The WINDOW statement may be used with any type of window in your program, including a Control or Dialog. Generally speaking, the window to be manipulated or tested is identified by its handle ( <i>hWin</i> ), which is often obtained at the time it is created. However, since a control is usually accessed by a "Parent / ID" combination, you must use WINDOW GET HANDLE or <a href="#">CONTROL HANDLE</a> to retrieve its handle for this purpose. If the operation fails, the value zero (0) is assigned to the result variable. |

### **WINDOW GET HANDLE *hWin*, *ID&* TO *DataVar&***

This statement retrieves the handle of a Window, translating from the [parent](#) handle and the specific integral [control ID](#) given at the time it was created. *hWin* is the handle of the parent, *ID&* is the control ID, and *DataVar&* represents the variable which receives the desired window handle.

### **WINDOW GET ID *hWin* To *DataVar&***

The integral ID of the window *hWin* is retrieved and assigned to the variable designated by *DataVar&*. Generally, only a CONTROL will have an ID, so windows of other classes will normally return the value zero.

### **WINDOW GET PARENT *hWin* To *DataVar&***

The handle of the parent is retrieved and assigned to the variable designated by *DataVar&*.

### **WINDOW GET STYLE *hWin* TO *DataVar&***

The window [style](#) value of the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*.

### **WINDOW GET STYLEX *hWin* TO *DataVar&***

The extended window style value of the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*.

### **WINDOW GET USER *hWin* TO *DataVar&***

The 32-bit user data value associated with the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*. This particular user data value is associated with every window in your program, and is maintained by the Windows operating system. It is separate and apart from user data maintained by [DDT](#) for each dialog and control created with DDT.

**See also** [CONTROL HANDLE](#), [WINDOW SET](#)

## **WINDOW GET USER statement**

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## WINDOW GET statement IMPROVED

**Purpose** Manipulate a Window in the program, which may include setting or retrieving data. The target window may be of any class, including a

or [Dialog](#).

**Syntax**

```
WINDOW GET HANDLE hWin, ID& TO DataVar&
WINDOW GET ID hWin TO DataVar&
WINDOW GET PARENT hWin TO DataVar&
WINDOW GET STYLE hWin TO DataVar&
WINDOW GET STYLEX hWin TO DataVar&
WINDOW GET USER hWin TO DataVar&
```

*hWin* [Handle](#) of the Window to be used.

*DataVar&* A [long integer](#) variable to which result data is assigned.

**Remarks** The WINDOW statement may be used with any type of window in your program, including a Control or Dialog. Generally speaking, the window to be manipulated or tested is identified by its handle (*hWin*), which is often obtained at the time it is created. However, since a control is usually accessed by a "Parent / ID" combination, you must use WINDOW GET HANDLE or [CONTROL HANDLE](#) to retrieve its handle for this purpose. If the operation fails, the value zero (0) is assigned to the result variable.

### **WINDOW GET HANDLE *hWin*, *ID&* TO *DataVar&***

This statement retrieves the handle of a Window, translating from the [parent](#) handle and the specific integral [control ID](#) given at the time it was created. *hWin* is the handle of the parent, *ID&* is the control ID, and *DataVar&* represents the variable which receives the desired window handle.

### **WINDOW GET ID *hWin* TO *DataVar&***

The integral ID of the window *hWin* is retrieved and assigned to the variable designated by *DataVar&*. Generally, only a CONTROL will have an ID, so windows of other classes will normally return the value zero.

### **WINDOW GET PARENT *hWin* TO *DataVar&***

The handle of the parent is retrieved and assigned to the variable designated by *DataVar&*.

### **WINDOW GET STYLE *hWin* TO *DataVar&***

The window [style](#) value of the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*.

### **WINDOW GET STYLEX *hWin* TO *DataVar&***

The extended window style value of the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*.

**WINDOW GET USER *hWin* TO *DataVar&***

The 32-bit user data value associated with the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*. This particular user data value is associated with every window in your program, and is maintained by the Windows operating system. It is separate and apart from user data maintained by [DDI](#) for each dialog and control created with DDT.

See also [CONTROL HANDLE](#), [WINDOW SET](#)

**WINDOW SET ID statement****Keyword Template**

Purpose

Syntax

Remarks

See also

Example

**WINDOW SET statement New!**

**Purpose** Manipulate a Window in the program, which may include setting or retrieving data. The target window may be of any class, including a

or [Dialog](#).

**Syntax** WINDOW SET ID *hWin*, *NewVal&* TO *OldValVar&*  
 WINDOW SET STYLE *hWin*, *NewVal&* TO *OldValVar&*  
 WINDOW SET STYLEX *hWin*, *NewVal&* TO *OldValVar&*  
 WINDOW SET USER *hWin*, *NewVal&* TO *OldValVar&*

*hWin* [Handle](#) of the Window to be used.

*OldValVar&* A [long](#) integer variable to which the old value of the item is assigned.

**Remarks** The WINDOW SET statement may be used with any type of window in your program, including a Control or Dialog. However, you must use care due to possible side effects. Generally speaking, the window to be manipulated is identified by its handle (*hWin*), which is often obtained at the time it is created. However, since a control is usually accessed by a "Parent / ID" combination, you must use [WINDOW GET HANDLE](#) or [CONTROL HANDLE](#) to retrieve its handle for this purpose.

**WINDOW SET ID *hWin*, *NewVal&* To *OldValVar&***

The integral ID of the window *hWin* is changed to *NewVal&*. The prior ID value is assigned to the variable designated by *OldValVar&*. If the operation fails, the value zero (0) is assigned to *OldValVar&*. As a general rule, you should not change the ID of a Window, Dialog, or Control created with [DDI](#) as it will cause unpredictable results.

**WINDOW SET STYLE *hWin*, *NewVal&* TO *OldValVar&***

The window [style](#) value of the window *hWin* is changed to *NewVal&*. The prior style value is assigned to the variable designated by *OldValVar&*. If the operation fails, the value zero (0) is assigned to *OldValVar&*.

**WINDOW SET STYLEX *hWin*, *NewVal&* TO *OldValVar&***

The extended window style value of the window *hWin* is changed to *NewVal&*. The prior

extended style value is assigned to the variable designated by *OldValVar&*. If the operation fails, the value zero (0) is assigned to *OldValVar&*.

### **WINDOW SET USER *hWin*, *NewVal&* TO *OldValVar&***

The 32-bit user data value associated with the window specified by the handle *hWin* is changed to *NewVal&*. The prior user data value is assigned to the variable designated by *OldValVar&*. This particular user data value is associated with every window in your program, and is maintained by the Windows operating system. It is separate and apart from user data maintained by DDT for each dialog and control created with DDT. If the operation fails, the value zero (0) is assigned to *OldValVar&*. However, this is not a certain indication of failure, since the prior user value might have been zero.

See also [CONTROL HANDLE](#), [WINDOW GET](#)

## WINDOW SET STYLE statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## WINDOW SET statement **New!**

**Purpose** Manipulate a Window in the program, which may include setting or retrieving data. The target window may be of any class, including a

or [Dialog](#).

**Syntax**

```
WINDOW SET ID hWin, NewVal& TO OldValVar&
WINDOW SET STYLE hWin, NewVal& TO OldValVar&
WINDOW SET STYLEX hWin, NewVal& TO OldValVar&
WINDOW SET USER hWin, NewVal& TO OldValVar&
```

*hWin* [Handle](#) of the Window to be used.

*OldValVar&* A [long](#) integer variable to which the old value of the item is assigned.

**Remarks** The WINDOW SET statement may be used with any type of window in your program, including a Control or Dialog. However, you must use care due to possible side effects. Generally speaking, the window to be manipulated is identified by its handle (*hWin*), which is often obtained at the time it is created. However, since a control is usually accessed by a "Parent / ID" combination, you must use [WINDOW GET HANDLE](#) or [CONTROL HANDLE](#) to retrieve its handle for this purpose.

### **WINDOW SET ID *hWin*, *NewVal&* To *OldValVar&***

The integral ID of the window *hWin* is changed to *NewVal&*. The prior ID value is assigned to the variable designated by *OldValVar&*. If the operation fails, the value zero (0) is assigned to *OldValVar&*. As a general rule, you should not change the ID of a Window, Dialog, or Control created with [DDT](#) as it will cause unpredictable results.

### **WINDOW SET STYLE *hWin*, *NewVal&* TO *OldValVar&***

The window [style](#) value of the window *hWin* is changed to *NewVal&*. The prior style value is assigned to the variable designated by *OldValVar&*. If the operation fails, the value zero

(0) is assigned to *OldValVar&*.

### **WINDOW SET STYLEX *hWin, NewVal& TO OldValVar&***

The extended window style value of the window *hWin* is changed to *NewVal&*. The prior extended style value is assigned to the variable designated by *OldValVar&*. If the operation fails, the value zero (0) is assigned to *OldValVar&*.

### **WINDOW SET USER *hWin, NewVal& TO OldValVar&***

The 32-bit user data value associated with the window specified by the handle *hWin* is changed to *NewVal&*. The prior user data value is assigned to the variable designated by *OldValVar&*. This particular user data value is associated with every window in your program, and is maintained by the Windows operating system. It is separate and apart from user data maintained by DDT for each dialog and control created with DDT. If the operation fails, the value zero (0) is assigned to *OldValVar&*. However, this is not a certain indication of failure, since the prior user value might have been zero.

See also [CONTROL HANDLE](#), [WINDOW GET](#)

## WINDOW SET STYLEX statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## WINDOW SET statement New!

**Purpose** Manipulate a Window in the program, which may include setting or retrieving data. The target window may be of any class, including a

or [Dialog](#).

**Syntax**

```
WINDOW SET ID hWin, NewVal& TO OldValVar&
WINDOW SET STYLE hWin, NewVal& TO OldValVar&
WINDOW SET STYLEX hWin, NewVal& TO OldValVar&
WINDOW SET USER hWin, NewVal& TO OldValVar&
```

*hWin* [Handle](#) of the Window to be used.

*OldValVar&* A [long](#) integer variable to which the old value of the item is assigned.

**Remarks** The WINDOW SET statement may be used with any type of window in your program, including a Control or Dialog. However, you must use care due to possible side effects. Generally speaking, the window to be manipulated is identified by its handle (*hWin*), which is often obtained at the time it is created. However, since a control is usually accessed by a "Parent / ID" combination, you must use [WINDOW GET HANDLE](#) or [CONTROL HANDLE](#) to retrieve its handle for this purpose.

### **WINDOW SET ID *hWin, NewVal& To OldValVar&***

The integral ID of the window *hWin* is changed to *NewVal&*. The prior ID value is assigned to the variable designated by *OldValVar&*. If the operation fails, the value zero (0) is assigned to *OldValVar&*. As a general rule, you should not change the ID of a Window, Dialog, or Control created with [DDT](#) as it will cause unpredictable results.

**WINDOW SET STYLE *hWin, NewVal& TO OldValVar&***

The window [style](#) value of the window *hWin* is changed to *NewVal&*. The prior style value is assigned to the variable designated by *OldValVar&*. If the operation fails, the value zero (0) is assigned to *OldValVar&*.

**WINDOW SET STYLEX *hWin, NewVal& TO OldValVar&***

The extended window style value of the window *hWin* is changed to *NewVal&*. The prior extended style value is assigned to the variable designated by *OldValVar&*. If the operation fails, the value zero (0) is assigned to *OldValVar&*.

**WINDOW SET USER *hWin, NewVal& TO OldValVar&***

The 32-bit user data value associated with the window specified by the handle *hWin* is changed to *NewVal&*. The prior user data value is assigned to the variable designated by *OldValVar&*. This particular user data value is associated with every window in your program, and is maintained by the Windows operating system. It is separate and apart from user data maintained by DDT for each dialog and control created with DDT. If the operation fails, the value zero (0) is assigned to *OldValVar&*. However, this is not a certain indication of failure, since the prior user value might have been zero.

See also [CONTROL HANDLE](#), [WINDOW GET](#)

**WINDOW SET USER statement**

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

# WINDOW SET statement New!

**Purpose** Manipulate a Window in the program, which may include setting or retrieving data. The target window may be of any class, including a

or [Dialog](#).

**Syntax**

```
WINDOW SET ID hWin, NewVal& TO OldValVar&
WINDOW SET STYLE hWin, NewVal& TO OldValVar&
WINDOW SET STYLEX hWin, NewVal& TO OldValVar&
WINDOW SET USER hWin, NewVal& TO OldValVar&
```

*hWin* [Handle](#) of the Window to be used.

*OldValVar&* A [long](#) integer variable to which the old value of the item is assigned.

**Remarks** The WINDOW SET statement may be used with any type of window in your program, including a Control or Dialog. However, you must use care due to possible side effects. Generally speaking, the window to be manipulated is identified by its handle (*hWin*), which is often obtained at the time it is created. However, since a control is usually accessed by a "Parent / ID" combination, you must use [WINDOW GET HANDLE](#) or [CONTROL HANDLE](#) to retrieve its handle for this purpose.

**WINDOW SET ID *hWin, NewVal& To OldValVar&***

The integral ID of the window *hWin* is changed to *NewVal&*. The prior ID value is assigned to the variable designated by *OldValVar&*. If the operation fails, the value zero (0) is assigned to *OldValVar&*. As a general rule, you should not change the ID of a Window, Dialog, or Control created with [DDT](#) as it will cause unpredictable results.

### **WINDOW SET STYLE *hWin, NewVal& TO OldValVar&***

The window [style](#) value of the window *hWin* is changed to *NewVal&*. The prior style value is assigned to the variable designated by *OldValVar&*. If the operation fails, the value zero (0) is assigned to *OldValVar&*.

### **WINDOW SET STYLEX *hWin, NewVal& TO OldValVar&***

The extended window style value of the window *hWin* is changed to *NewVal&*. The prior extended style value is assigned to the variable designated by *OldValVar&*. If the operation fails, the value zero (0) is assigned to *OldValVar&*.

### **WINDOW SET USER *hWin, NewVal& TO OldValVar&***

The 32-bit user data value associated with the window specified by the handle *hWin* is changed to *NewVal&*. The prior user data value is assigned to the variable designated by *OldValVar&*. This particular user data value is associated with every window in your program, and is maintained by the Windows operating system. It is separate and apart from user data maintained by DDT for each dialog and control created with DDT. If the operation fails, the value zero (0) is assigned to *OldValVar&*. However, this is not a certain indication of failure, since the prior user value might have been zero.

See also [CONTROL HANDLE](#), [WINDOW GET](#)

## WINMAIN function

# WINMAIN function

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>     | WINMAIN (or its synonym MAIN) is a user-defined function called by Windows to begin execution of an application.                                                                                                                                                                                                                                                                                                               |
| <b>Syntax</b>      | <pre>FUNCTION {WINMAIN   MAIN} ( _     BYVAL <i>hInstance</i> AS DWORD, _     BYVAL <i>hPrevInst</i> AS DWORD, _     BYVAL <i>lpszCmdLine</i> AS WSTRINGZ PTR, _     BYVAL <i>nCmdShow</i> AS LONG ) AS LONG</pre>                                                                                                                                                                                                             |
| <b>Remarks</b>     | The WINMAIN function is called by Windows when an executable application first loads and begins to run. It is often referred to as the "entry point" for the application. When the execution of WINMAIN is completed, the application is deemed to be finished, and Windows releases the application memory back to the heap. WINMAIN receives the following parameters:                                                       |
| <i>hInstance</i>   | The executable's (EXE) <i>instance handle</i> . Each instance of a Windows application has a unique handle. It is used as a parameter to a number of Windows API functions which may need to distinguish between multiple instances of an application.                                                                                                                                                                         |
| <i>hPrevInst</i>   | Not used by 32-bit Windows. It is present merely for compatibility with existing 16-bit code, and always returns zero in 32-bit applications.                                                                                                                                                                                                                                                                                  |
| <i>lpszCmdLine</i> | A pointer to an <a href="#">nul-terminated string</a> that contains a command-line. Note that the string passed in <i>lpszCmdLine</i> is not the same as the string returned by the <i>GetCommandLine</i> API call. The string in <i>lpszCmdLine</i> contains the command-line arguments only (like <a href="#">COMMANDS</a> ), but <i>GetCommandLine</i> returns the program name (including path) followed by the arguments. |
| <i>nCmdShow</i>    | Specifies how to display the application's main window. For example, the calling application can specify %SW_NORMAL or %SW_MINIMIZE, etc. It is up to the                                                                                                                                                                                                                                                                      |

programmer to honor this parameter, and to do so is recommended.

**Return** The return value assigned to WINMAIN is optional, but by convention, the return value is derived from the *wParam*& parameter of a %WM\_QUIT message.

Typically, a [GUI-based](#) application uses the WINMAIN function to create the initial GUI application window, and then enters a message loop. This loop should terminate when a %WM\_QUIT message is received, and the *wParam*& parameter of that message should be passed on as the return value for WINMAIN. If WINMAIN terminates before entering the message loop, WINMAIN should return zero.

[Console](#) applications may use the return value to set an error level that can be passed back to the calling application, in the range 0 to 255 inclusive. Batch files may act on the result through the IF [NOT] ERRORLEVEL batch command.

If the parameters passed to WINMAIN are not required by the application itself, the [PBMAIN](#) function may be used in place of WINMAIN.

**Restrictions** [Pointers](#) may not be passed [BYREF](#), so the *lpzCmdLine* parameter of WINMAIN must be declared to be passed [BYVAL](#).

**See also** [PBMAIN](#)

**Example**

```
#COMPILE EXE
FUNCTION WINMAIN(BYVAL hInst???, BYVAL hPrevInst???, BYVAL pCmdLine AS
WSTRINGZ PTR, BYVAL nCmdShow&) AS LONG
 ' more code here
 FUNCTION = 1
END FUNCTION
```

## WRAP\$ function

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## WRAP\$ function New!

**Purpose** Add paired characters to the beginning and end of a

.

**Syntax** *s\$* = WRAP\$(*StringExpression*, *LeftChar\$*, *RightChar\$*)

**Remarks** The WRAP\$ function prepends *LeftChar\$* to the *StringExpression*, then appends *RightChar\$*, and returns the total result. For example:

```
WRAP$("MyWord", "<", ">") returns "<MyWord>"
```

It is particularly useful for enclosing text with parentheses, quotes, brackets, etc.

**See also** [BUILDS](#), [STRINGBUILDER](#), [STRINSERT\\$](#), [UNWRAP\\$](#)

## WRITE# statement

# WRITE# statement

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>      | Output data to a <a href="#">sequential file</a> in a delimited format.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Syntax</b>       | <code>WRITE #filenum&amp;<br/>WRITE #filenum&amp;, [expression [{; ,} expression] ...] [; ,]</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <i>filenum&amp;</i> | The file number used when the file or device was opened.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <i>expression</i>   | A<br>or a <a href="#">string expression</a> representing the data to be written to the file or device.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Remarks</b>      | WRITE# is similar to <a href="#">PRINT#</a> , except WRITE# inserts a comma in the output file between each expression. It encloses<br>data within quotation marks, and adds no leading or trailing spaces around numeric values.<br>WRITE# is the preferred method of writing data to a sequential file, since it formats the output to be readable by the <a href="#">INPUT#</a> statement. In other words, INPUT# respects the delimiter characters that separate items in a line of text, as created by WRITE#.<br>WRITE# with a file number and a comma but no expressions, outputs a carriage return to the file.<br>To read a delimited file without regard to the delimiter characters, use the <a href="#">LINE INPUT#</a> statement. |
| <b>Restrictions</b> | For best results, strings should not contain quotation marks, as these may interfere with the expected output format.<br>Each expression in the WRITE# statement must be separated from other expressions by a comma or semicolon. If you include a trailing comma or semicolon, the final carriage return / line feed is suppressed and replaced with a comma delimiter. This allows you to append data to the sequential record by executing another WRITE statement.                                                                                                                                                                                                                                                                        |
| <b>See also</b>     | <a href="#">GET</a> , <a href="#">GET\$</a> , <a href="#">GET\$\$</a> , <a href="#">INPUT#</a> , <a href="#">LINE INPUT#</a> , <a href="#">OPEN</a> , <a href="#">PRINT#</a> , <a href="#">PUT</a> , <a href="#">PUT\$</a> , <a href="#">PUT\$\$</a> , <a href="#">SETEOF</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Example</b>      | <pre>' Open a sequential output file and write to it OPEN "FILE.TXT" FOR OUTPUT AS #1 WRITE #1, "TEST" z&amp; = -12345&amp; info1\$ = "Do not covet" info2\$ = "thy neighbors ox" WRITE #1, z&amp;, info1\$, info2\$ WRITE #1, "TEST" CLOSE #1</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Result</b>       | <pre>"TEST" -12345,"Do not covet","thy neighbors ox" "TEST"</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

## XOR operator

# XOR operator

|                |                                                                                                                                                      |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | The XOR operator works as both a logical and a bitwise <a href="#">arithmetic operator</a> .                                                         |
| <b>Syntax</b>  | <code>p XOR q</code>                                                                                                                                 |
| <b>Remarks</b> | <b>XOR as a logical operator</b><br>XOR returns FALSE (zero) if <i>and only if</i> both its operands have the same value. Here is XOR's truth table: |

Truth table

| x | y | x XOR y |
|---|---|---------|
| T | T | F       |
| T | F | T       |

|   |   |   |
|---|---|---|
| F | T | T |
| F | F | F |

## Using XOR as a bitwise arithmetic operator

An XOR mask complements (reverses) selected bits of an

value, without affecting the other bits of that value. For example, to complement the two most-significant bits in &H9700, use XOR with a mask of &HC000; that is, all zeros except for the positions to be complemented:

```

 1001 0111 0000 0000 = &H9700
XOR 1100 0000 0000 0000 = &HC000 (the mask)

 0101 0111 0000 0000 = &H5700 (result)
MSB ↑ ↑ LSB (bit 0)

```

See also [Arithmetic Operators](#), [AND](#), [EQV](#), [IMP](#), [NOT](#), [OR](#)

## XPRINT Code Group

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## XPRINT Code Group

**Purpose** The

Code Group offers statements and functions which draw text and graphics on a Host Printer Page. In addition, it provides a wide variety of support to manage and interact with these items.

**Syntax** `XPRINT DirectorWord [params]`  
`XPRINT DirectorWord [params] TO ReturnVariable(s)`

*Function Form:*

`ReturnVariable = XPRINT(DirectorWord [,params] )`

`ReturnVariable$ = XPRINT$(DirectorWord [,params] )`

**Remarks** Some of the functionality of the XPRINT group was available in prior versions of PowerBASIC, but it has now been expanded. Some XPRINT Procedures (namely those which return a single value) may be used in two forms, a statement with a TO clause, or a function which may be used as a term in an expression:

```

XPRINT GET LINES TO LineCountVar&
LineCountVar& = XPRINT(LINES)

```

The two examples above are functionally identical. The choice is simply a matter of your personal preference. If you use the second form (as a function which returns a value), it can be a term in any expression of any complexity. When a function form is available, it is labeled with the prefix "Function Form".

Some XPRINT procedures return two or more values. As it is not possible to simultaneously inject multiple terms into a valid expression, the function option is not available for them.

### PIXELS and POINTS

For the purposes of this discussion on XPRINT, the terms PIXELS and POINTS are considered to be synonyms. They may be used interchangeably.

### **XPRINT STREAM**

The XPRINT Stream is the connection between XPRINT code and a host printer page.

The XPrint Stream is created when you attach a particular printer with [XPRINT ATTACH](#).

From that moment forward, all XPrint code acts on that selected printer. This continues until such time as you end your print job with [XPRINT CLOSE](#).

### **PAGE UNITS**

PAGE UNITS are used to measure the size of a graphical item, or to define a particular position on an XPrint page. You can define page units to be points or scaled units of your choice.

Initially, each XPrint session begins with Page Units set to points. You can change this to scaled world coordinates of your choice with [XPRINT SCALE](#).

By default, the upper left corner of a printer page is considered to be the X,Y position 0,0 and grows larger to the right or downward. The X axis is horizontal, while the Y axis is vertical. Whenever an X,Y position is given, the X value is stated first.

### **XPRINT POSITION (POS)**

Each time you draw text or graphics, it is displayed at the current XPrint position (POS).

Upon completion, the POS is updated to the last point referenced. You can draw a relative distance from the POS (using a STEP option), or set an entirely new position with [XPRINT SET POS](#).

### **TEXT CELL (ROW/COLUMN POSITION)**

For ease of programming, a few procedures specify text position by row and column. In this case, the position is measured in text cells, which is the space occupied by one character. This works well with fixed width fonts, which is recommended. If a variable width font is chosen, PowerBASIC must use the average character size for these calculations, which can give imprecise results.

For compatibility with most current and prior versions of BASIC (PowerBASIC included), code which references text rows and columns names the vertical term first (ROWS, COLUMNS). Rows and columns are always numbered from one upward.

See also [Printing](#), [Printing Commands](#)

## **XPRINT(CANVAS.X) function**

# **XPRINT GET CANVAS statement** **New!**

**Purpose** Retrieves the writable size of the [attached](#) host printer.

**Syntax** `XPRINT GET CANVAS TO WidthVar!, HeightVar!`

*Function Form:*

`WidthVar! = XPRINT(CANVAS.X)`

`HeightVar! = XPRINT(CANVAS.Y)`

**Remarks** XPRINT GET CANVAS retrieves the logical size of the client area (printable area) for the attached host printer. This is the size of the page, minus the unprintable margins, without any reductions for a [CLIP](#) area. The size is specified in [Page Units](#), so it could return scaled values if they were applied with [XPRINT SCALE](#). This is very similar to [XPRINT GET CLIENT](#), with the single exception that scaled values (set by XPRINT SCALE) are returned if they have been utilized. If executed without a host printer attached, [error 57](#) is generated.

See also [XPRINT GET CLIENT](#), [XPRINT GET CLIP](#), [XPRINT GET SIZE](#), [XPRINT GET SCALE](#), [XPRINT SCALE](#)

## XPRINT(CANVAS.Y) function

# XPRINT GET CANVAS statement **New!**

**Purpose** Retrieves the writable size of the [attached](#) host printer.

**Syntax** XPRINT GET CANVAS TO *WidthVar!*, *HeightVar!*

*Function Form:*

*WidthVar!* = XPRINT(CANVAS.X)

*HeightVar!* = XPRINT(CANVAS.Y)

**Remarks** XPRINT GET CANVAS retrieves the logical size of the client area (printable area) for the attached host printer. This is the size of the page, minus the unprintable margins, without any reductions for a [CLIP](#) area. The size is specified in [Page Units](#), so it could return scaled values if they were applied with [XPRINT SCALE](#). This is very similar to [XPRINT GET CLIENT](#), with the single exception that scaled values (set by XPRINT SCALE) are returned if they have been utilized. If executed without a host printer attached, [error 57](#) is generated.

See also [XPRINT GET CLIENT](#), [XPRINT GET CLIP](#), [XPRINT GET SIZE](#), [XPRINT GET SCALE](#), [XPRINT SCALE](#)

## XPRINT(Cell.Size.X) function

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

# XPRINT CELL SIZE statement **New!**

**Purpose** Retrieve the character [cell](#) size including external leading.

**Syntax** XPRINT CELL SIZE TO *WidthVar*, *HeightVar!*

*Function Form:*

*WidthVar!* = XPRINT(Cell.Size.X)

*HeightVar!* = XPRINT(Cell.Size.Y)

**Remarks** XPRINT CELL SIZE retrieves the size of one character cell, for the current [font](#), on the [attached printer](#). The returned cell size is specified in [PAGE UNITS](#), and allows you to calculate the number of text lines which will fit in a particular space. The height value is the size of the displayed character, including external leading (if any) for this particular font.

If the font is a fixed-width font, like Courier New or Lucida Console, the sizes returned are as exact as possible, given the fractional rounding approximations necessary for some scaled units. If the font is proportional, like Arial or Times New Roman, the width will be the average size for the entire font.

External leading is the vertical distance from the bottom of one character to the top of the

character below it. This value is specified by the font in use. It may vary from zero to a larger value, depending upon the font and point size. To retrieve the exact height of characters without external leading, use [XPRINT CHR SIZE](#).

See also [XPRINT CELL](#), [XPRINT CHR SIZE](#), [XPRINT SET FONT](#), [XPRINT TEXT SIZE](#)

## XPRINT(Cell.Size.Y) function

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## XPRINT CELL SIZE statement New!

**Purpose** Retrieve the character [cell](#) size including external leading.

**Syntax** `XPRINT CELL SIZE TO WidthVar, HeightVar!`

*Function Form:*

`WidthVar! = XPRINT(Cell.Size.X)`

`HeightVar! = XPRINT(Cell.Size.Y)`

**Remarks** XPRINT CELL SIZE retrieves the size of one character cell, for the current [font](#), on the [attached printer](#). The returned cell size is specified in [PAGE UNITS](#), and allows you to calculate the number of text lines which will fit in a particular space. The height value is the size of the displayed character, including external leading (if any) for this particular font.

If the font is a fixed-width font, like Courier New or Lucida Console, the sizes returned are as exact as possible, given the fractional rounding approximations necessary for some scaled units. If the font is proportional, like Arial or Times New Roman, the width will be the average size for the entire font.

External leading is the vertical distance from the bottom of one character to the top of the character below it. This value is specified by the font in use. It may vary from zero to a larger value, depending upon the font and point size. To retrieve the exact height of characters without external leading, use [XPRINT CHR SIZE](#).

See also [XPRINT CELL](#), [XPRINT CHR SIZE](#), [XPRINT SET FONT](#), [XPRINT TEXT SIZE](#)

## XPRINT(Chr.Size.X) function

# XPRINT CHR SIZE statement IMPROVED

**Purpose** Retrieve the character size for the [current font](#) on a [host printer](#) page.

**Syntax** `XPRINT CHR SIZE TO WidthVar!, HeightVar!`

*Function Form:*

`WidthVar! = XPRINT(Chr.Size.X)`

`HeightVar! = XPRINT(Chr.Size.Y)`

**Remarks** The character size is specified in the same terms ([pixels](#) or [scaled units](#)) as originally stated. The height value retrieved is the actual size of the printed character without including any external leading for this particular font.

If the font is a fixed-width font, like Courier New or Lucida Console, the sizes returned are as exact as possible, given the fractional rounding approximations possible when converting from pixels to other coordinates. If the font is proportional, like Arial or Times New Roman, the width will be the average size for the entire font.

External leading is the vertical distance from the bottom of one character to the top of the character below it. This value is specified by the font in use. It may vary from zero to a larger value, depending upon the font and point size. To retrieve the total row height including external leading, use XPRINT CELL SIZE.

**See also** [XPRINT](#), [XPRINT ATTACH](#), [XPRINT CELL SIZE](#), [XPRINT SET FONT](#), [XPRINT TEXT SIZE](#)

## XPRINT(Chr.Size.Y) function

# XPRINT CHR SIZE statement IMPROVED

**Purpose** Retrieve the character size for the [current font](#) on a [host printer](#) page.

**Syntax** XPRINT CHR SIZE TO *WidthVar!*, *HeightVar!*

*Function Form:*

*WidthVar!* = XPRINT(Chr.Size.X)

*HeightVar!* = XPRINT(Chr.Size.Y)

**Remarks** The character size is specified in the same terms ([pixels](#) or [scaled units](#)) as originally stated. The height value retrieved is the actual size of the printed character without including any external leading for this particular font.

If the font is a fixed-width font, like Courier New or Lucida Console, the sizes returned are as exact as possible, given the fractional rounding approximations possible when converting from pixels to other coordinates. If the font is proportional, like Arial or Times New Roman, the width will be the average size for the entire font.

External leading is the vertical distance from the bottom of one character to the top of the character below it. This value is specified by the font in use. It may vary from zero to a larger value, depending upon the font and point size. To retrieve the total row height including external leading, use XPRINT CELL SIZE.

**See also** [XPRINT](#), [XPRINT ATTACH](#), [XPRINT CELL SIZE](#), [XPRINT SET FONT](#), [XPRINT TEXT SIZE](#)

## XPRINT(Client.X) function

# XPRINT GET CLIENT statement IMPROVED

**Purpose** Retrieves the size of the client area (printable area) on the host printer page.

**Syntax** XPRINT GET CLIENT TO *WidthVar!*, *HeightVar!*

*Function Form:*

*WidthVar!* = XPRINT(Client.X)

*HeightVar!* = XPRINT(Client.Y)

**Remarks** XPRINT GET CLIENT retrieves the physical size of the client area (printable area) for the [attached](#) host printer. The size is always specified in [Pixels](#) (points). This is very similar to [XPRINT GET CANVAS](#), with the single exception that scaled values (set by [XPRINT SCALE](#)) are not utilized. If executed without a host printer attached, [error 57](#) is generated.

**See also** [XPRINT ATTACH](#), [XPRINT GET CANVAS](#), [XPRINT GET CLIP](#), [XPRINT GET MARGIN](#), [XPRINT GET PPI](#), [XPRINT GET SIZE](#)

## XPRINT(Client.Y) function

# XPRINT GET CLIENT statement

**IMPROVED**

- Purpose** Retrieves the size of the client area (printable area) on the host printer page.
- Syntax** `XPRINT GET CLIENT To WidthVar!, HeightVar!`  
*Function Form:*  
`WidthVar! = XPRINT(Client.X)`  
`HeightVar! = XPRINT(Client.Y)`
- Remarks** XPRINT GET CLIENT retrieves the physical size of the client area (printable area) for the [attached](#) host printer. The size is always specified in [Pixels](#) (points). This is very similar to [XPRINT GET CANVAS](#), with the single exception that scaled values (set by [XPRINT SCALE](#)) are not utilized. If executed without a host printer attached, [error 57](#) is generated.
- See also** [XPRINT ATTACH](#), [XPRINT GET CANVAS](#), [XPRINT GET CLIP](#), [XPRINT GET MARGIN](#), [XPRINT GET PPI](#), [XPRINT GET SIZE](#)

## XPRINT(Clip.X) function

# Keyword Template

- Purpose**
- Syntax**
- Remarks**
- See also**
- Example**

# XPRINT GET CLIP statement

**New!**

- Purpose** Retrieves the size of the clip area on the selected printer.
- Syntax** `XPRINT GET CLIP TO WidthVar!, HeightVar!`  
*Function Form:*  
`WidthVar! = XPRINT(Clip.X)`  
`HeightVar! = XPRINT(Clip.Y)`
- Remarks** The clip area of the printer is that space where print operations can be written. That is, the clip area is that portion of the [client area](#) which is not protected (clipped) by the [XPRINT SET CLIP](#) statement.
- XPRINT GET CLIP retrieves the size of the clip area, and assigns these values to the variables specified by *WidthVar!* and *HeightVar!*. The size is specified in [PAGE UNITS](#) ([pixels](#)/points or [scaled](#) units). If no printer is selected, the values 0,0 are returned.
- See also** [XPRINT GET CANVAS](#), [XPRINT GET CLIENT](#), [XPRINT SET CLIP](#)

## XPRINT(Clip.Y) function

# Keyword Template

- Purpose**
- Syntax**

Remarks

See also

Example

## XPRINT GET CLIP statement **New!**

**Purpose** Retrieves the size of the clip area on the selected printer.

**Syntax** XPRINT GET CLIP TO *WidthVar!*, *HeightVar!*

*Function Form:*

*WidthVar!* = XPRINT(Clip.X)

*HeightVar!* = XPRINT(Clip.Y)

**Remarks** The clip area of the printer is that space where print operations can be written. That is, the clip area is that portion of the [client area](#) which is not protected (clipped) by the [XPRINT SET CLIP](#) statement.

XPRINT GET CLIP retrieves the size of the clip area, and assigns these values to the variables specified by *WidthVar!* and *HeightVar!*. The size is specified in [PAGE UNITS](#) ([pixels](#)/points or [scaled](#) units). If no printer is selected, the values 0,0 are returned.

**See also** [XPRINT GET CANVAS](#), [XPRINT GET CLIENT](#), [XPRINT SET CLIP](#)

## XPRINT(COL) function

### Keyword Template

Purpose

Syntax

Remarks

See also

Example

## XPRINT CELL statement **New!**

**Purpose** Sets or retrieves the next print position (LPR - Last Point Referenced), based upon the row and column position of a [text cell](#).

**Syntax** XPRINT CELL = *RowValue&*, *ColValue&*  
XPRINT CELL TO *RowVar&*, *ColVar&*  
XPRINT COL TO *ColVar&*  
XPRINT ROW TO *RowVar&*

*Function Form:*

*ColVar&* = XPRINT(COL)

*RowVar&* = XPRINT(ROW)

**Remarks** XPRINT CELL is used to set or retrieve the print position, based upon the row and column position of a Text Cell. That is the row and column position where the next printed text will be displayed. *RowValue&* specifies the horizontal screen row (starting at 1) at which to position the cursor. *ColValue&* specifies the vertical screen column (starting at 1) at which to position the cursor. Since row and column numbers start at one (1), the upper left corner of the page is considered to be cell 1,1.

The first form of XPRINT CELL moves the print position to the desired row and column. If a value given is zero (0), that parameter is ignored and that position is not changed. The second form of XPRINT CELL retrieves the current print position, and assigns the values

to the variables specified by *RowVar&* and *ColVar&*.

The remaining forms allow you to retrieve just a single value, either row or column, and are supported in both statement and function form.

**See also** [XPRINT CELL SIZE](#), [XPRINT SET FONT](#), [XPRINT SET WORDWRAP](#), [XPRINT SET WRAP](#), [XPRINT SPLIT](#)

## XPRINT(COLLATE) function

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## XPRINT GET COLLATE statement

**IMPROVED**

**Purpose** Retrieves the XPRINT [collate status](#).

**Syntax** XPRINT GET COLLATE TO *CollateVar&*

*Function Form:*

*CollateVar&* = XPRINT(COLLATE)

**Remarks** XPRINT allows you to set the collate status, if the printer driver supports both multiple copies and collate capability. XPRINT GET COLLATE retrieves the collate status, assigning the value to the [long](#) integer variable specified by *CollateVar&*. The following equates are predefined in the compiler to symbolically represent the possible collate status:

```
%DMCOLLATE_FALSE = 0
%DMCOLLATE_TRUE = 1
```

If this statement is executed without a host printer [attached](#), [error 57](#) is generated.

**See also** [XPRINT ATTACH](#), [XPRINT SET COLLATE](#)

## XPRINT(COLORMODE) function

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## XPRINT GET COLORMODE statement

**IMPROVED**

**Purpose** Retrieves the XPRINT [colormode status](#).

**Syntax** XPRINT GET COLORMODE TO *ColorVar&*

*Function Form:*

```
ColorVar& = XPRINT(COLORMODE)
```

**Remarks** XPRINT allows you to set the color or monochrome print mode if the printer driver supports it. XPRINT GET COLORMODE retrieves the colormode status, assigning the value to the [long](#) integer variable specified by *ColorVar&*. The value zero may be returned if colormode is not supported by the printer driver. The following equates are predefined in the compiler to symbolically represent the possible status:

```
%DMCOLOR_MONOCHROME = 1
%DMCOLOR_COLOR = 2
```

If this statement is executed without a host printer [attached](#), [error 57](#) is generated.

**See also** [XPRINT ATTACH](#), [XPRINT SET COLORMODE](#)

## XPRINT(COPIES) function

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## XPRINT GET COPIES statement IMPROVED

**Purpose** Retrieves the XPRINT [copy count](#).

**Syntax** XPRINT GET COPIES TO *CopyVar&*

*Function Form:*

```
CopyVar& = XPRINT(COPIES)
```

**Remarks** XPRINT allows you to set the number of copies to be automatically printed, if it is supported by the printer driver. XPRINT GET COPIES retrieves the copy count, assigning the value to the long integer variable specified by *CopyVar&*. The default value is one (1). If this statement is executed without a host printer attached, [error 57](#) is generated.

**See also** [XPRINT ATTACH](#), [XPRINT SET COPIES](#)

## XPRINT(DC) function

## XPRINT GET DC statement IMPROVED

**Purpose** Retrieve the handle of the device context (DC) for the [host printer](#) page.

**Syntax** XPRINT GET DC TO *hDC*

*Function Form:*

```
hDC = XPRINT(DC)
```

**Remarks** If no host printer is currently [attached](#), zero is returned. The DC handle may be used with various Windows API functions to perform specialized operations on the host printer page.

**See also** [XPRINT ATTACH](#)

## XPRINT(DUPLEX) function

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## XPRINT GET DUPLEX statement

IMPROVED

**Purpose** Retrieve the XPRINT [duplex status](#).

**Syntax** XPRINT GET DUPLEX TO *DuplexVar&*

*Function Form:*

*DuplexVar&* = XPRINT(DUPLEX)

**Remarks** XPRINT allows you to get/set the duplex status, if the printer supports printing on both sides of a page. XPRINT GET DUPLEX retrieves the duplex status, assigning the value to the [long integer](#) variable specified by *DuplexVar&*. The following equates are predefined in the compiler to symbolically represent the possible duplex status:

|                   |     |                                       |
|-------------------|-----|---------------------------------------|
| %DMDUP_SIMPLEX    | = 1 | (single sided printing)               |
| %DMDUP_VERTICAL   | = 2 | (page flipped on the vertical edge)   |
| %DMDUP_HORIZONTAL | = 3 | (page flipped on the horizontal edge) |

If the printer does not support duplex printing, the value zero (0) is returned. If this statement is executed without a host printer [attached](#), [error 57](#) is generated.

**See also** [XPRINT ATTACH](#), [XPRINT SET DUPLEX](#)

## XPRINT(LINES) function

## XPRINT GET LINES statement

IMPROVED

**Purpose** Retrieve the number of lines that can be printed.

**Syntax** XPRINT GET LINES TO *LineVar&*

*Function Form:*

*LineVar&* = XPRINT(LINES)

**Remarks** XPRINT GET LINES retrieves the number of lines of text which can be printed on the [host printer](#) page, given the current selected [font](#). Since

statements do not generate an automatic formfeed when text is printed on the last line, this statement can be used to determine when your program should execute an [XPRINT FORMFEED](#) to move to the next printed page on a host printer. If executed without a host printer attached, [error 57](#) is generated.

**See also** [XPRINT](#), [XPRINT ATTACH](#), [XPRINT SET FONT](#), [XPRINT FORMFEED](#)

## XPRINT(MIX) function

## XPRINT GET MIX statement

IMPROVED

**Purpose** Retrieve the color mix mode for a [host printer](#) page.

**Syntax** XPRINT GET MIX TO *MixVar&*

*Function Form:*

```
MixVar& = XPRINT(MIX)
```

**Remarks**

Prior to any

operations, a host printer must first be selected with [XPRINT ATTACH](#). There are 16 mix modes available to use for mixing the drawing color with the color that already exists at the drawing location. The mix mode equates are predefined in PowerBASIC. If executed without a host printer attached, [error 57](#) is generated.

|                  |                                                                                              |
|------------------|----------------------------------------------------------------------------------------------|
| %MIX_BLACKNESS   | Pixel is always 0 (black).                                                                   |
| %MIX_NOTMERGESRC | Pixel is the inverse of the MergeSrc color.                                                  |
| %MIX_MASKNOTSRC  | Pixel is a combination of the colors common to both the pixel and the inverse of the source. |
| %MIX_NOTCOPYSRC  | Pixel is the inverse of the pen color.                                                       |
| %MIX_MASKSRCNOT  | Pixel is a combination of the colors common to both the source and the inverse of the pixel. |
| %MIX_NOT         | Pixel is the inverse of the pixel color.                                                     |
| %MIX_XORSRC      | Pixel is a combination of the colors in the source and in the pixel, but not in both.        |
| %MIX_NOTMASKSRC  | Pixel is the inverse of the MaskSrc color.                                                   |
| %MIX_MASKSRC     | Pixel is a combination of the colors common to both the source and the pixel.                |
| %MIX_NOTXORSRC   | Pixel is the inverse of the XorSrc color.                                                    |
| %MIX_NOP         | Pixel remains unchanged.                                                                     |
| %MIX_MERGENOTSRC | Pixel is a combination of the source color and the inverse of the pixel color.               |
| %MIX_COPYSRC     | Pixel is the source color (default).                                                         |
| %MIX_MERGESRCNOT | Pixel is a combination of the source color and the inverse of the pixel color.               |
| %MIX_MERGESRC    | Pixel is a combination of the source color and the pixel color.                              |
| %MIX_WHITENESS   | Pixel is always 1 (white).                                                                   |

**See also**

[XPRINT ATTACH](#), [XPRINT SET MIX](#)

**XPRINT(ORIENTATION) function****XPRINT GET ORIENTATION statement****IMPROVED****Purpose**

Retrieve the paper [orientation](#) for a [host printer](#) page.

**Syntax**

```
XPRINT GET ORIENTATION To OrentVar&
```

*Function Form:*

```
OrentVar& = XPRINT(ORIENTATION)
```

**Remarks**

XPRINT GET ORIENTATION retrieves the orientation of the paper in the host printer, assigning the value to the [long integer](#) variable specified by *OrentVar&*. The value 1 indicates portrait mode, while 2 indicates landscape mode. If the printer does not support paper orientation, 0 is returned. If a host printer is not attached, [error 57](#) is generated.

**See also**

[XPRINT ATTACH](#), [XPRINT SET ORIENTATION](#)

**XPRINT(OVERLAP) function****XPRINT GET OVERLAP statement****New!****Purpose**

Retrieves the status of XPrint [Overlap Mode](#).

**Syntax**

```
XPRINT GET OVERLAP To OverlapVar&
```

*Function Form:*

```
OverlapVar& = XPRINT(OVERLAP)
```

**Remarks** XPRINT GET OVERLAP retrieves the status of overlap mode and assigns it to the variable specified by *OverlapVar&*. If Overlap Mode is enabled, the value [true](#) (non-zero) is assigned. If it's disabled, the value [false](#) (zero) is assigned instead. The value returned reflects the status of the host printer which is currently [attached](#) to the [XPrint stream](#).

With Overlap Mode, you can control how PowerBASIC treats XPrint operations which involve a bounding rectangle (RECT structure) in their definition. Windows maintains unique conventions for a RECT. The bottom and right coordinates of a RECT are exclusive. In other words, the [pixels](#) at the bottom and right edges lie immediately outside the rectangle. They are ignored. For example:

```
XPRINT BOX (0,0) - (50,50)
```

In this case, a box is drawn from 0,0 to 49,49. The final pixels at the bottom and right edge are simply not drawn. However, if Overlap Mode is enabled with [XPRINT SET OVERLAP](#), the box is drawn from 0,0 to 50,50.

The Overlap Mode affects all XPRINT functions which take a bounding rectangle as a parameter. This includes [XPRINT SCALE](#), [XPRINT BOX](#), [XPRINT ELLIPSE](#), [XPRINT LINE](#), [XPRINT POLYLINE](#), etc.

**See also** [XPRINT SET OVERLAP](#)

## XPRINT(PAPER) function

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

# XPRINT GET PAPER statement IMPROVED

**Purpose** Retrieves the [current paper size/type](#).

**Syntax** XPRINT GET PAPER TO *PaperVar&*

*Function Form:*

```
PaperVar& = XPRINT(PAPER)
```

**Remarks** XPRINT GET PAPER retrieves the paper style for which the [host printer](#) is currently configured. The paper style is identified by an

value which is assigned to the [long integer](#) variable specified by *PaperVar&*. The following equates are predefined in the compiler, and represent the most common paper styles:

|                    |   |    |           |      |   |      |        |
|--------------------|---|----|-----------|------|---|------|--------|
| %DMPAPER_LETTER    | = | 1  | Letter    | 8.5  | x | 11   | inches |
| %DMPAPER_TABLOID   | = | 3  | Tabloid   | 11   | x | 17   | inches |
| %DMPAPER_LEDGER    | = | 4  | Ledger    | 17   | x | 11   | inches |
| %DMPAPER_LEGAL     | = | 5  | Legal     | 8.5  | x | 14   | inches |
| %DMPAPER_STATEMENT | = | 6  | Statement | 5.5  | x | 8.5  | inches |
| %DMPAPER_EXECUTIVE | = | 7  | Executive | 7.25 | x | 10.5 | inches |
| %DMPAPER_A3        | = | 8  | A3        | 297  | x | 420  | mm     |
| %DMPAPER_A4        | = | 9  | A4        | 210  | x | 297  | mm     |
| %DMPAPER_A5        | = | 11 | A5        | 148  | x | 210  | mm     |
| %DMPAPER_B4        | = | 12 | B4        | 250  | x | 354  | mm     |
| %DMPAPER_B5        | = | 13 | B5        | 182  | x | 257  | mm     |

|                 |      |          |       |   |       |        |
|-----------------|------|----------|-------|---|-------|--------|
| %DMPAPER_FOLIO  | = 14 | Folio    | 8.5   | x | 13    | inches |
| %DMPAPER_QUARTO | = 15 | Quarto   | 215   | x | 275   | mm     |
| %DMPAPER_10X14  | = 16 | 10x14    | 10    | x | 14    | inches |
| %DMPAPER_11X17  | = 17 | 11x17    | 11    | x | 17    | inches |
| %DMPAPER_NOTE   | = 18 | Note     | 8.5   | x | 11    | inches |
| %DMPAPER_ENV_9  | = 19 | 9 Envlp  | 3.875 | x | 8.875 | inches |
| %DMPAPER_ENV_10 | = 20 | 10 Envlp | 4.125 | x | 9.5   | inches |

Other paper style codes may be defined by Windows or printer suppliers. You can use [XPRINT GET PAPERS](#) to obtain a list of all the paper styles supported by the [attached](#) host printer.

If the printer does not support paper style changes, the value zero is returned. If executed without a host printer attached, [error 57](#) is generated.

See also [XPRINT ATTACH](#), [XPRINT GET PAPERS](#), [XPRINT SET PAPER](#)

## XPRINT(PIXEL...) function

### XPRINT GET PIXEL statement

IMPROVED

**Purpose** Retrieves the [color](#) of a [pixel](#) on a [host printer](#) page.

**Syntax** XPRINT GET PIXEL [STEP] (x!, y!) TO *PixelVar&*

*Function Form:*

*PixelVar&* = XPRINT(PIXEL [STEP], x!, y!)

**Remarks** Not all printer drivers support the ability to retrieve the color of a pixel. If this feature is not supported, or if the coordinates are outside the printer client area, an invalid color value of -1 is returned. If no host printer is attached, [error 57](#) is generated.

See also [Built In RGB Color Equates](#), [XPRINT ATTACH](#), [XPRINT COLOR](#), [XPRINT SET PIXEL](#)

## XPRINT(POS.X) function

### XPRINT GET POS statement

IMPROVED

**Purpose** Retrieves the last point referenced (POS) by an statement.

**Syntax** XPRINT GET POS TO *XVar!*, *YVar!*

*Function Form:*

*XVar!* = XPRINT(POS.X)

*YVar!* = XPRINT(POS.Y)

**Remarks** XPRINT GET POS allows you to retrieve the last point referenced (POS) by XPRINT statements. The coordinate points are specified in [Page Units](#). If executed without a host printer [attached](#), an [error 57](#) is generated, and the values 0,0 are returned.

See also [XPRINT ATTACH](#), [XPRINT SET POS](#)

## XPRINT(POS.Y) function

### XPRINT GET POS statement

IMPROVED

**Purpose** Retrieves the last point referenced (POS) by an statement.

**Syntax** XPRINT GET POS TO *XVar!*, *YVar!*

*Function Form:**XVar!* = XPRINT(POS.X)*YVar!* = XPRINT(POS.Y)

**Remarks** XPRINT GET POS allows you to retrieve the last point referenced (POS) by XPRINT statements. The coordinate points are specified in [Page Units](#). If executed without a host printer [attached](#), an [error 57](#) is generated, and the values 0,0 are returned.

**See also** [XPRINT ATTACH](#), [XPRINT SET POS](#)

## XPRINT(PPI.X) function

### XPRINT GET PPI statement IMPROVED

**Purpose** Retrieves the resolution of the [host printer](#) page.

**Syntax** XPRINT GET PPI TO *XVar&*, *YVar&*

*Function Form:**XVar&* = XPRINT(PPI.X)*YVar&* = XPRINT(PPI.Y)

**Remarks** XPRINT GET PPI retrieves the resolution (points per inch) of the host printer page. The resolution is always specified in pixels, regardless of any [XPRINT SCALE](#) option. If executed without a host printer attached, [error 57](#) is generated, and the values 0,0 are returned. This statement is particularly useful in drawing items such as rulers and graphs to a particular physical size. There are 25.4 millimeters per inch, so just divide by 25.4 to convert from pixels per inch to pixels per millimeter.

**See also** [XPRINT ATTACH](#), [XPRINT GET CLIENT](#), [XPRINT GET MARGIN](#), [XPRINT GET SIZE](#)

## XPRINT(PPI.Y) function

### XPRINT GET PPI statement IMPROVED

**Purpose** Retrieves the resolution of the [host printer](#) page.

**Syntax** XPRINT GET PPI TO *XVar&*, *YVar&*

*Function Form:**XVar&* = XPRINT(PPI.X)*YVar&* = XPRINT(PPI.Y)

**Remarks** XPRINT GET PPI retrieves the resolution (points per inch) of the host printer page. The resolution is always specified in pixels, regardless of any [XPRINT SCALE](#) option. If executed without a host printer attached, [error 57](#) is generated, and the values 0,0 are returned. This statement is particularly useful in drawing items such as rulers and graphs to a particular physical size. There are 25.4 millimeters per inch, so just divide by 25.4 to convert from pixels per inch to pixels per millimeter.

**See also** [XPRINT ATTACH](#), [XPRINT GET CLIENT](#), [XPRINT GET MARGIN](#), [XPRINT GET SIZE](#)

## XPRINT(QUALITY) function

### XPRINT GET QUALITY statement IMPROVED

**Purpose** Retrieves the [print quality](#) setting for the [host printer](#).

**Syntax** XPRINT GET QUALITY TO *QualVar&*

*Function Form:**QualVar&* = XPRINT(QUALITY)

- Remarks** XPRINT GET QUALITY retrieves the print quality setting for the host printer. The value 1 is draft mode, 2 is low resolution, 3 is medium resolution, and 4 is high resolution. If the printer does not support print quality settings, 0 is returned. If no host printer is attached, [error 57](#) is generated.
- See also** [XPRINT ATTACH](#), [XPRINT SET QUALITY](#)

## XPRINT(ROW) function

# Keyword Template

- Purpose**
- Syntax**
- Remarks**
- See also**
- Example**

# XPRINT CELL statement New!

- Purpose** Sets or retrieves the next print position (LPR - Last Point Referenced), based upon the row and column position of a [text cell](#).
- Syntax**
- ```
XPRINT CELL = RowValue&, ColValue&
XPRINT CELL TO RowVar&, ColVar&
XPRINT COL TO ColVar&
XPRINT ROW TO RowVar&
```
- Function Form:*
- ```
ColVar& = XPRINT(COL)
RowVar& = XPRINT(ROW)
```
- Remarks** XPRINT CELL is used to set or retrieve the print position, based upon the row and column position of a Text Cell. That is the row and column position where the next printed text will be displayed. *RowValue&* specifies the horizontal screen row (starting at 1) at which to position the cursor. *ColValue&* specifies the vertical screen column (starting at 1) at which to position the cursor. Since row and column numbers start at one (1), the upper left corner of the page is considered to be cell 1,1.
- The first form of XPRINT CELL moves the print position to the desired row and column. If a value given is zero (0), that parameter is ignored and that position is not changed. The second form of XPRINT CELL retrieves the current print position, and assigns the values to the variables specified by *RowVar&* and *ColVar&*.
- The remaining forms allow you to retrieve just a single value, either row or column, and are supported in both statement and function form.
- See also** [XPRINT CELL SIZE](#), [XPRINT SET FONT](#), [XPRINT SET WORDWRAP](#), [XPRINT SET WRAP](#), [XPRINT SPLIT](#)

## XPRINT(SELECTION) function

# Keyword Template

- Purpose**
- Syntax**
- Remarks**

See also

Example

## XPRINT GET SELECTION statement New!

**Purpose** Retrieves the status of the SELECTION flag.

**Syntax** XPRINT GET SELECTION TO *SelectVar&*

*Function Form:*

*SelectVar&* = XPRINT(SELECTION)

**Remarks** You may elect to limit a particular print job to just that part of the total which is selected/highlighted. If so, it is the programmer's responsibility to limit XPRINT output to just the selected region.

The selection flag can only be set by the user in the Print Dialog which is displayed when [XPRINT ATTACH](#) is executed with the CHOOSE option. It cannot be set under program control. This flag is maintained only to give the programmer information about the user's request. If you do not wish to honor this option, you should disable it in XPRINT ATTACH CHOOSE.

If XPRINT GET SELECTION is executed without a host printer attached, an [error 57](#) is generated.

See also [XPRINT ATTACH](#)

### XPRINT(SIZE.X) function

## XPRINT GET SIZE statement IMPROVED

**Purpose** Retrieve the total size of the [host printer](#) page.

**Syntax** XPRINT GET SIZE TO *WidthVar&*, *HeightVar&*

*Function Form:*

*WidthVar&* = XPRINT(SIZE.X)

*HeightVar&* = XPRINT(SIZE.Y)

**Remarks** XPRINT GET SIZE allows you to retrieve the full size of the host printer page, including both the printable [client area](#) and any unprintable margins. The sizes are specified in [pixels](#) (points). If no host printer is attached, [error 57](#) is generated, and the values 0,0 are returned.

See also [XPRINT ATTACH](#), [XPRINT GET CLIENT](#), [XPRINT GET MARGIN](#), [XPRINT GET MIX](#), [XPRINT GET PPI](#)

### XPRINT(SIZE.Y) function

## XPRINT GET SIZE statement IMPROVED

**Purpose** Retrieve the total size of the [host printer](#) page.

**Syntax** XPRINT GET SIZE TO *WidthVar&*, *HeightVar&*

*Function Form:*

*WidthVar&* = XPRINT(SIZE.X)

*HeightVar&* = XPRINT(SIZE.Y)

**Remarks** XPRINT GET SIZE allows you to retrieve the full size of the host printer page, including both the printable [client area](#) and any unprintable margins. The sizes are specified in [pixels](#) (points). If no host printer is attached, [error 57](#) is generated, and the values 0,0 are

returned.

**See also** [XPRINT ATTACH](#), [XPRINT GET CLIENT](#), [XPRINT GET MARGIN](#), [XPRINT GET MIX](#), [XPRINT GET PPI](#)

## XPRINT(STRETCHMODE) function

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## XPRINT GET STRETCHMODE statement New!

**Purpose** Retrieves the default bitmap stretching mode for the attached [DC](#).

**Syntax** `XPRINT GET STRETCHMODE TO ModeVar&`

*Function Form:*

`ModeVar& = XPRINT(STRETCHMODE)`

**Remarks** There are several operations in PowerBASIC which involve stretching or condensing images on bitmaps, most notably [XPRINT STRETCH](#). As individual points must be added or removed, there is a good chance that the quality of the image will be degraded. However, if you describe the nature of the image by defining a StretchMode, you can substantially enhance the appearance.

The default StretchMode is maintained individually for each DC. You can retrieve the default mode with this statement, or set it with [XPRINT SET STRETCHMODE](#). Of course, you can also override the default StretchMode when you execute one of the affected statements.

The 4 stretch mode equates are predefined in PowerBASIC.

|                               |   |                                                                                                                                                                                                                                             |
|-------------------------------|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| %<br><b>BLACKONWHIT<br/>E</b> | 1 | This is the default Windows stretch mode, and is most appropriate for monochrome bitmaps, or those with blocks of color. Performs a boolean OR of eliminated and existing pixels. It preserves black pixels at the expense of white pixels. |
| %<br>WHITEONBLAC<br>K         | 2 | Performs a boolean OR of eliminated and existing pixels. It preserves white pixels at the expense of black pixels.                                                                                                                          |
| %<br>COLORONCOL<br>OR         | 3 | Deletes eliminated lines of pixels without trying to preserve their information.                                                                                                                                                            |
| %HALFTONE                     | 4 | This provides the highest quality for complex color bitmaps. The average color of the destination pixel block is kept approximately the same as the source pixel block.                                                                     |

**See also** [XPRINT COPY](#), [XPRINT RENDER](#), [XPRINT STRETCH](#), [XPRINT SET STRETCHMODE](#)

## XPRINT(TEXT.SIZE.X...) function

## XPRINT TEXT SIZE statement IMPROVED

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Calculate the size of text to be printed on a <a href="#">host printer</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Syntax</b>   | <code>XPRINT TEXT SIZE txt\$ To nWidth!, nHeight!</code><br><i>Function Form:</i><br><code>WidthVar! = XPRINT(TEXT.SIZE.X, txt\$)</code><br><code>HeightVar! = XPRINT(TEXT.SIZE.Y, txt\$)</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Remarks</b>  | This statement calculates the total size of the printed text, based upon the current <a href="#">font</a> for the host printer. The sizes returned are specified in <a href="#">Page Units</a> .<br><br>This allows you to easily calculate the appropriate print position, particularly when using a proportional font. If this statement is executed without a host printer <a href="#">attached</a> , <a href="#">error 57</a> is generated.                                                                                                                                                                                                            |
| <b>See also</b> | <a href="#">XPRINT CELL SIZE</a> , <a href="#">XPRINT CHR SIZE</a> , <a href="#">XPRINT SET FONT</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Example</b>  | <pre> FUNCTION PBMAIN   ' The following example draws the text both horizontally   ' and vertically centered on the host printer page    LOCAL x, y, w, h, w2, h2 AS LONG   LOCAL sText AS STRING   sText = "PowerBASIC"    XPRINT ATTACH "Lexmark C750"   XPRINT COLOR %BLUE, -2 ' blue text, clear background   XPRINT FONT "Times New Roman", 18, 3 ' 18p, bold, italic    XPRINT GET CLIENT TO w, h ' get client size   XPRINT TEXT SIZE sText TO w2, h2 ' get text size   x = (w-w2) / 2 ' centered x-pos   y = (h-h2) / 2 ' centered y-pos    XPRINT SET POS (x, y) ' set position   XPRINT sText ' draw the text   XPRINT CLOSE END FUNCTION </pre> |

### XPRINT(TEXT.SIZE.Y...) function

## XPRINT TEXT SIZE statement IMPROVED

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Calculate the size of text to be printed on a <a href="#">host printer</a> .                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Syntax</b>   | <code>XPRINT TEXT SIZE txt\$ To nWidth!, nHeight!</code><br><i>Function Form:</i><br><code>WidthVar! = XPRINT(TEXT.SIZE.X, txt\$)</code><br><code>HeightVar! = XPRINT(TEXT.SIZE.Y, txt\$)</code>                                                                                                                                                                                                                                                |
| <b>Remarks</b>  | This statement calculates the total size of the printed text, based upon the current <a href="#">font</a> for the host printer. The sizes returned are specified in <a href="#">Page Units</a> .<br><br>This allows you to easily calculate the appropriate print position, particularly when using a proportional font. If this statement is executed without a host printer <a href="#">attached</a> , <a href="#">error 57</a> is generated. |
| <b>See also</b> | <a href="#">XPRINT CELL SIZE</a> , <a href="#">XPRINT CHR SIZE</a> , <a href="#">XPRINT SET FONT</a>                                                                                                                                                                                                                                                                                                                                            |
| <b>Example</b>  | <pre> FUNCTION PBMAIN   ' The following example draws the text both horizontally   ' and vertically centered on the host printer page </pre>                                                                                                                                                                                                                                                                                                    |

```

LOCAL x, y, w, h, w2, h2 AS LONG
LOCAL sText AS STRING
sText = "PowerBASIC"

XPRINT ATTACH "Lexmark C750"
XPRINT COLOR %BLUE, -2 ' blue text, clear background
XPRINT FONT "Times New Roman", 18, 3 ' 18p, bold, italic

XPRINT GET CLIENT TO w, h ' get client size
XPRINT TEXT SIZE sText TO w2, h2 ' get text size
x = (w-w2) / 2 ' centered x-pos
y = (h-h2) / 2 ' centered y-pos

XPRINT SET POS (x, y) ' set position
XPRINT sText ' draw the text
XPRINT CLOSE
END FUNCTION

```

## XPRINT(TRAY) function

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## XPRINT GET TRAY statement IMPROVED

**Purpose** Retrieves the [active printer tray](#).

**Syntax** XPRINT GET TRAY TO *TrayVar&*

*Function Form:*

*TrayVar&* = XPRINT(TRAY)

**Remarks** XPRINT GET TRAY retrieves the paper tray which is active on the [host printer](#). A descriptive value is assigned to the long integer variable specified by *TrayVar&*. The following equates are predefined in the compiler, and represent the most common paper trays:

```

%DMBIN_UPPER = 1
%DMBIN_LOWER = 2
%DMBIN_MIDDLE = 3
%DMBIN_MANUAL = 4
%DMBIN_ENVELOPE = 5
%DMBIN_ENVMANUAL = 6
%DMBIN_AUTO = 7
%DMBIN_TRACTOR = 8
%DMBIN_SMALLFMT = 9
%DMBIN_LARGEFORMAT = 10
%DMBIN_LARGEFORMAT = 11
%DMBIN_CASSETTE = 14
%DMBIN_FORMSOURCE = 15

```

Other tray codes may be defined by Windows or printer suppliers, so your program should be written to consider that possibility. You can use [XPRINT GET TRAYS](#) to obtain

a list of all the paper trays supported by the [attached](#) host printer.

If the printer does not support the tray change requested, [error 5](#) is generated. If executed without a host printer attached, [error 57](#) is generated.

**See also** [XPRINT ATTACH](#), [XPRINT GET TRAYS](#), [XPRINT SET TRAY](#)

## XPRINT(WORDWRAP) function

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

# XPRINT GET WORDWRAP statement New!

**Purpose** Retrieves the status of XPRINT [WordWrap Mode](#).

**Syntax** XPRINT GET WORDWRAP TO *WrapVar&*

*Function Form:*

*WrapVar&* = XPRINT(WORDWRAP)

**Remarks** XPRINT GET WORDWRAP retrieves the status of wordwrap mode and assigns it to the variable specified by *WrapVar&*. If WordWrap Mode is enabled, the value [true](#) (non-zero) is assigned. If it's disabled, the value [false](#) (zero) is assigned instead. The value returned reflects the status of the [attached](#) printer.

With WordWrap Mode, you can control how PowerBASIC [prints text](#) on an XPRINT page when it reaches the end of a line. Since XPRINT operates on a full page basis, the default is to ignore text which is printed past the end of the line. This can be modified under program control by using [XPRINT SET WORDWRAP](#).

When WordWrap mode is enabled, it affects only [XPRINT](#) print operations. If XPRINT print attempts to display a word beyond the end of a row, the entire word is automatically wrapped to the first column of the next row.

**See also** [XPRINT CELL](#), [XPRINT GET WRAP](#), [XPRINT SET WORDWRAP](#), [XPRINT SET WRAP](#), [XPRINT SPLIT](#)

## XPRINT(WRAP) function

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

# XPRINT GET WRAP statement New!

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Retrieves the status of XPRINT <a href="#">Wrap Mode</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Syntax</b>   | <code>XPRINT GET WRAP TO <i>WrapVar&amp;</i></code><br><i>Function Form:</i><br><code><i>WrapVar&amp;</i> = XPRINT(WRAP)</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Remarks</b>  | XPRINT GET WRAP retrieves the status of wrap mode and assigns it to the variable specified by <i>WrapVar&amp;</i> . If Wrap Mode is enabled, the value <a href="#">true</a> (non-zero) is assigned. If it's disabled, the value <a href="#">false</a> (zero) is assigned instead. The value returned reflects the status of the <a href="#">attached</a> printer.<br><br>With Wrap Mode, you can control how PowerBASIC <a href="#">prints text</a> on an XPRINT page when it reaches the end of a line. Since XPRINT operates on a full page basis, the default is to ignore text which is printed past the end of the line. This can be modified under program control by using <a href="#">XPRINT SET WRAP</a> .<br><br>When Wrap Mode is enabled, it affects only <a href="#">XPRINT</a> print operations. If XPRINT print attempts to display a character beyond the end of a row, it is automatically wrapped to the first column of the next row. |
| <b>See also</b> | <a href="#">XPRINT CELL</a> , <a href="#">XPRINT GET WORDWRAP</a> , <a href="#">XPRINT SET WORDWRAP</a> , <a href="#">XPRINT SET WRAP</a> , <a href="#">XPRINT SPLIT</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

## XPRINT\$ function

### Keyword Template

**Purpose**  
**Syntax**  
**Remarks**  
**See also**  
**Example**

## XPRINT GET ATTACH statement New!

|                 |                                                                                                                                                                                                                                                                                                      |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Retrieve the name of the <a href="#">attached</a> host printer.                                                                                                                                                                                                                                      |
| <b>Syntax</b>   | <code>XPRINT GET ATTACH TO <i>PrinterVar\$</i></code><br><i>Function Form:</i><br><code><i>PrinterVar\$</i> = XPRINT\$(ATTACH)</code><br><code><i>PrinterVar\$</i> = XPRINT\$</code>                                                                                                                 |
| <b>Remarks</b>  | XPRINT GET ATTACH returns the name of the attached host printer, which is the printer that would be used by XPRINT statements. If there is no attached host printer, an empty string is returned. XPRINT\$ is typically used to detect if an <a href="#">XPRINT ATTACH</a> operation was successful. |
| <b>See also</b> | <a href="#">XPRINT ATTACH</a>                                                                                                                                                                                                                                                                        |

## XPRINT\$(ATTACH) function

### Keyword Template

**Purpose**  
**Syntax**  
**Remarks**

See also

Example

## XPRINT GET ATTACH statement New!

**Purpose** Retrieve the name of the [attached](#) host printer.

**Syntax** XPRINT GET ATTACH TO *PrinterVar\$*

*Function Form:*

*PrinterVar\$* = XPRINT\$(ATTACH)

*PrinterVar\$* = XPRINT\$

**Remarks** XPRINT GET ATTACH returns the name of the attached host printer, which is the printer that would be used by XPRINT statements. If there is no attached host printer, an empty string is returned. XPRINT\$ is typically used to detect if an [XPRINT ATTACH](#) operation was successful.

See also [XPRINT ATTACH](#)

### XPRINT\$(PAPERS) function

## Keyword Template

Purpose

Syntax

Remarks

See also

Example

## XPRINT GET PAPERS statement IMPROVED

**Purpose** Retrieves a list of supported [paper types](#).

**Syntax** XPRINT GET PAPERS TO *PapersVar\$*

*Function Form:*

*PapersVar\$* = XPRINT\$(PAPERS)

**Remarks** XPRINT GET PAPERS retrieves a

which contains a list of all of the paper types supported by the [attached](#) host printer.

This string is assigned to the string variable specified by *PapersVar\$*.

The string contains a comma-delimited list of *papertype*, *papername*... repeated as many times as necessary. For example:

```
"1,Letter,5,Legal,7,Executive,20,Envelope #10"
```

You can use [PARSECOUNT](#) to determine the number of delimited fields in the string, and [PARSE\\$\(\)](#) to easily extract the type numbers and names. The following equates are predefined in the compiler, and represent the most common paper styles:

|                    |   |   |           |      |   |      |        |
|--------------------|---|---|-----------|------|---|------|--------|
| %DMPAPER_LETTER    | = | 1 | Letter    | 8.5  | x | 11   | inches |
| %DMPAPER_TABLOID   | = | 3 | Tabloid   | 11   | x | 17   | inches |
| %DMPAPER_LEDGER    | = | 4 | Ledger    | 17   | x | 11   | inches |
| %DMPAPER_LEGAL     | = | 5 | Legal     | 8.5  | x | 14   | inches |
| %DMPAPER_STATEMENT | = | 6 | Statement | 5.5  | x | 8.5  | inches |
| %DMPAPER_EXECUTIVE | = | 7 | Executive | 7.25 | x | 10.5 | inches |
| %DMPAPER_A3        | = | 8 | A3        | 297  | x | 420  | mm     |
| %DMPAPER_A4        | = | 9 | A4        | 210  | x | 297  | mm     |

|                 |      |          |       |         |        |
|-----------------|------|----------|-------|---------|--------|
| %DMPAPER_A5     | = 11 | A5       | 148   | x 210   | mm     |
| %DMPAPER_B4     | = 12 | B4       | 250   | x 354   | mm     |
| %DMPAPER_B5     | = 13 | B5       | 182   | x 257   | mm     |
| %DMPAPER_FOLIO  | = 14 | Folio    | 8.5   | x 13    | inches |
| %DMPAPER_QUARTO | = 15 | Quarto   | 215   | x 275   | mm     |
| %DMPAPER_10X14  | = 16 | 10x14    | 10    | x 14    | inches |
| %DMPAPER_11X17  | = 17 | 11x17    | 11    | x 17    | inches |
| %DMPAPER_NOTE   | = 18 | Note     | 8.5   | x 11    | inches |
| %DMPAPER_ENV_9  | = 19 | 9 Envlp  | 3.875 | x 8.875 | inches |
| %DMPAPER_ENV_10 | = 20 | 10 Envlp | 4.125 | x 9.5   | inches |

Other paper style codes may be defined by Windows or printer suppliers. If executed without a host printer attached, [error 57](#) is generated.

See also [XPRINT ATTACH](#), [XPRINT GET PAPERS](#), [XPRINT SET PAPER](#)

## XPRINT\$(TRAYS) function

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## XPRINT GET TRAYS statement

IMPROVED

**Purpose** Retrieves a list of supported [paper trays](#).

**Syntax** XPRINT GET TRAYS TO *TrayVar\$*

*Function Form:*

*TrayVar\$* = XPRINT\$(TRAYS)

**Remarks** XPRINT GET TRAYS retrieves a

which contains a list of all of the paper trays supported by the [attached](#) host printer.

This string is assigned to the string variable specified by *TrayVar\$*.

The string contains a comma-delimited list of traytype, trayname... repeated as many times as necessary. For example:

"1,Upper,2,Lower,5,Envelope"

You can use [PARSECOUNT](#) to determine the number of delimited fields in the string, and [PARSE\\$\( \)](#) to easily extract the tray numbers and names. The following equates are predefined in the compiler, and represent the most common trays:

|                      |      |
|----------------------|------|
| %DMBIN_UPPER         | = 1  |
| %DMBIN_LOWER         | = 2  |
| %DMBIN_MIDDLE        | = 3  |
| %DMBIN_MANUAL        | = 4  |
| %DMBIN_ENVELOPE      | = 5  |
| %DMBIN_ENVMANUAL     | = 6  |
| %DMBIN_AUTO          | = 7  |
| %DMBIN_TRACTOR       | = 8  |
| %DMBIN_SMALLFMT      | = 9  |
| %DMBIN_LARGEFORMT    | = 10 |
| %DMBIN_LARGECAPACITY | = 11 |
| %DMBIN_CASSETTE      | = 14 |
| %DMBIN_FORMSOURCE    | = 15 |

Other paper style codes may be defined by Windows or printer suppliers. If executed without a host printer attached, [error 57](#) is generated.

See also [XPRINT ATTACH](#), [XPRINT GET TRAY](#), [XPRINT SET TRAY](#)

## XPRINT ARC statement

# XPRINT ARC statement

**Purpose** Draw an arc on a [host printer](#) page.

**Syntax** `XPRINT ARC (x1!, y1!) - (x2!, y2!), arcStart!, arcEnd! [, rgbColor&]`

**Remarks** An arc is a section of a circle or an ellipse. To specify a particular arc, you would first define the full circle or ellipse of which it is a part, and then specify the points on the ellipse where the arc starts and stops.

The full circle or ellipse is defined by its bounding rectangle, which is the smallest rectangle which can be drawn around the circle or ellipse. For example, if the circle is centered at position (400,400), with a radius of 100 pixels, the upper left corner (x1,y1) of the bounding rectangle is (300,300), and the lower right corner (x2,y2) is (500,500).

The start point and end point of the arc are specified by their angle, which must be given in radians. A complete circle or ellipse is  $2\pi$  radians. On a 12-hour clock-face, the values 0 and  $2\pi$  both refer to the position of 3 o'clock, while the value  $1\pi$  refers to the position of 9 o'clock. Other positions are specified by a radian value relative to these. In PowerBASIC, arcs are always drawn counter-clockwise from the starting point to the ending point.

Prior to any

operations, a host printer must first be selected with [XPRINT ATTACH](#). The coordinate points are specified in pixels (or world coordinates, if those were chosen with [XPRINT SCALE](#)). Line width can be set using [XPRINT WIDTH](#). If line width is set to 1 (the default), the line style can be set with [XPRINT STYLE](#). Because of the nature of an arc, XPRINT ARC neither uses, nor updates, (last point referenced). If executed without a host printer attached, [error 57](#) is generated.

*x1!, y1!* The upper left corner of the bounding rectangle of the full circle or ellipse.

*x2!, y2!* The lower right corner of the bounding rectangle of the full circle or ellipse.

*ArcStart!* The starting angle of the arc, in radians, from 0 to  $2\pi$ .

*ArcEnd!* The ending angle of the arc, in radians, from 0 to  $2\pi$  radians. Note that arcs are always drawn counter-clockwise from *arcStart!* to *arcEnd!*. Compared with a 12-hour clock-face, 0 or  $2\pi$  radians is at 3 o'clock, and  $1\pi$  radians is at 9 o'clock.

*rgbColor&* Optional [RGB](#) color for the arc. If omitted (or -1), the current foreground [color](#) for the host printer page is used.

See also [Built In RGB Color Equates](#), [XPRINT ATTACH](#), [XPRINT COLOR](#), [XPRINT ELLIPSE](#), [XPRINT PIE](#), [XPRINT STYLE](#), [XPRINT WIDTH](#)

**Example**

```
' Draw two arcs that combine into a circle.
' The upper half uses the default foreground color.
' The lower half is drawn in red.
LOCAL Pi AS DOUBLE
Pi = 4 * ATN(1) ' Calculate Pi
XPRINT ARC (5, 5) - (105, 105), 0, Pi ' Upper half
XPRINT ARC (5, 5) - (105, 105), Pi, 0, %RED ' Lower half
```

## XPRINT ATTACH statement

# XPRINT ATTACH statement IMPROVED

|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |              |                                    |                   |                                    |                  |                                                                            |                         |                                  |                        |                                       |             |                              |                         |                                    |                                |                                      |                             |                                   |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|------------------------------------|-------------------|------------------------------------|------------------|----------------------------------------------------------------------------|-------------------------|----------------------------------|------------------------|---------------------------------------|-------------|------------------------------|-------------------------|------------------------------------|--------------------------------|--------------------------------------|-----------------------------|-----------------------------------|
| <b>Purpose</b>                 | Connect a <a href="#">host-based (GDI) printer</a> for use with code.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |              |                                    |                   |                                    |                  |                                                                            |                         |                                  |                        |                                       |             |                              |                         |                                    |                                |                                      |                             |                                   |
| <b>Syntax</b>                  | <code>XPRINT ATTACH {DEFAULT   <i>PrinterName\$</i>} [,<i>JobName\$</i>]<br/>XPRINT ATTACH CHOOSE [<i>USING Flags&amp;</i>] [,<i>JobName\$</i>]</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |              |                                    |                   |                                    |                  |                                                                            |                         |                                  |                        |                                       |             |                              |                         |                                    |                                |                                      |                             |                                   |
| <b>Remarks</b>                 | <p>XPRINT ATTACH connects to a host-based (Windows-only or GDI-based) printer for use with subsequent XPRINT operations. Host-based printing is device-independent and performed through the Windows printing system and printer driver. Device independence can be achieved because the printer driver handles the task of converting text into the manufacturers proprietary binary format used by the printer.</p> <p>To send device-dependent print data (such as plain text) to a line printer device, use the <a href="#">LPRINT ATTACH</a> statement instead.</p> <p>XPRINT ATTACH allows you to change the printer device used by XPRINT operation. When executed, the current connection (if any) is closed and the new connection is established.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |              |                                    |                   |                                    |                  |                                                                            |                         |                                  |                        |                                       |             |                              |                         |                                    |                                |                                      |                             |                                   |
| DEFAULT                        | <p>If DEFAULT is specified, the default printer (as set in the Printers applet in Control Panel) is used. For example:</p> <pre style="margin-left: 40px;">XPRINT ATTACH DEFAULT</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |              |                                    |                   |                                    |                  |                                                                            |                         |                                  |                        |                                       |             |                              |                         |                                    |                                |                                      |                             |                                   |
| CHOOSE                         | <p>If CHOOSE is specified, the Choose Printer common dialog is opened, allowing the user to select from the list of installed printers. For example:</p> <pre style="margin-left: 40px;">XPRINT ATTACH CHOOSE</pre> <p>With CHOOSE, you may elect to include an optional numeric expression called <i>Flags&amp;</i>. This value consists of one or more of the following equates to control the execution of the Printer Dialog:</p> <table border="0" style="margin-left: 40px;"> <tr> <td style="padding-right: 20px;">%PD_ALLPAGES</td> <td>"All Pages" button is the default.</td> </tr> <tr> <td>%<br/>PD_SELECTION</td> <td>"Selection" button is the default.</td> </tr> <tr> <td>%<br/>PD_PAGENUMS</td> <td>"Numbered Pages" button is the default. (Only one of the above is allowed)</td> </tr> <tr> <td>%<br/>PD_NOSELECTI<br/>ON</td> <td>Disables the "Selection" button.</td> </tr> <tr> <td>%<br/>PD_NOPAGENU<br/>MS</td> <td>Disables the "Numbered Pages" button.</td> </tr> <tr> <td>%PD_COLLATE</td> <td>"Collate" option is checked.</td> </tr> <tr> <td>%<br/>PD_PRINTTOFIL<br/>E</td> <td>"Print To File" option is checked.</td> </tr> <tr> <td>%<br/>PD_DISABLEPRI<br/>NTTOFILE</td> <td>Disables the "Print To File" option.</td> </tr> <tr> <td>%<br/>PD_HIDEPRINTT<br/>OFILE</td> <td>Hides the "Print To File" option.</td> </tr> </table> | %PD_ALLPAGES | "All Pages" button is the default. | %<br>PD_SELECTION | "Selection" button is the default. | %<br>PD_PAGENUMS | "Numbered Pages" button is the default. (Only one of the above is allowed) | %<br>PD_NOSELECTI<br>ON | Disables the "Selection" button. | %<br>PD_NOPAGENU<br>MS | Disables the "Numbered Pages" button. | %PD_COLLATE | "Collate" option is checked. | %<br>PD_PRINTTOFIL<br>E | "Print To File" option is checked. | %<br>PD_DISABLEPRI<br>NTTOFILE | Disables the "Print To File" option. | %<br>PD_HIDEPRINTT<br>OFILE | Hides the "Print To File" option. |
| %PD_ALLPAGES                   | "All Pages" button is the default.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |              |                                    |                   |                                    |                  |                                                                            |                         |                                  |                        |                                       |             |                              |                         |                                    |                                |                                      |                             |                                   |
| %<br>PD_SELECTION              | "Selection" button is the default.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |              |                                    |                   |                                    |                  |                                                                            |                         |                                  |                        |                                       |             |                              |                         |                                    |                                |                                      |                             |                                   |
| %<br>PD_PAGENUMS               | "Numbered Pages" button is the default. (Only one of the above is allowed)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |              |                                    |                   |                                    |                  |                                                                            |                         |                                  |                        |                                       |             |                              |                         |                                    |                                |                                      |                             |                                   |
| %<br>PD_NOSELECTI<br>ON        | Disables the "Selection" button.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |              |                                    |                   |                                    |                  |                                                                            |                         |                                  |                        |                                       |             |                              |                         |                                    |                                |                                      |                             |                                   |
| %<br>PD_NOPAGENU<br>MS         | Disables the "Numbered Pages" button.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |              |                                    |                   |                                    |                  |                                                                            |                         |                                  |                        |                                       |             |                              |                         |                                    |                                |                                      |                             |                                   |
| %PD_COLLATE                    | "Collate" option is checked.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |              |                                    |                   |                                    |                  |                                                                            |                         |                                  |                        |                                       |             |                              |                         |                                    |                                |                                      |                             |                                   |
| %<br>PD_PRINTTOFIL<br>E        | "Print To File" option is checked.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |              |                                    |                   |                                    |                  |                                                                            |                         |                                  |                        |                                       |             |                              |                         |                                    |                                |                                      |                             |                                   |
| %<br>PD_DISABLEPRI<br>NTTOFILE | Disables the "Print To File" option.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |              |                                    |                   |                                    |                  |                                                                            |                         |                                  |                        |                                       |             |                              |                         |                                    |                                |                                      |                             |                                   |
| %<br>PD_HIDEPRINTT<br>OFILE    | Hides the "Print To File" option.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |              |                                    |                   |                                    |                  |                                                                            |                         |                                  |                        |                                       |             |                              |                         |                                    |                                |                                      |                             |                                   |
| <i>PrinterName\$</i>           | The name of the printer to attach (as shown in the Printers applet in Control Panel, or returned by the <a href="#">PRINTERS\$</a> function). <i>printername\$</i> must be a valid device name and cannot exceed 259 characters in length. For example:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |              |                                    |                   |                                    |                  |                                                                            |                         |                                  |                        |                                       |             |                              |                         |                                    |                                |                                      |                             |                                   |
|                                | <pre>XPRINT ATTACH "HP LaserJet 5MP"</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |              |                                    |                   |                                    |                  |                                                                            |                         |                                  |                        |                                       |             |                              |                         |                                    |                                |                                      |                             |                                   |
| <i>JobName\$</i>               | The name of the print job. This will be shown in the print spooler. If you do not supply a name, "Printjob" is used by default.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |              |                                    |                   |                                    |                  |                                                                            |                         |                                  |                        |                                       |             |                              |                         |                                    |                                |                                      |                             |                                   |

If XPRINT ATTACH is not successful, [XPRINT\\$](#) returns an empty

. [Error 68](#) ("device unavailable") is generated if an invalid printer was specified. No error is generated if the user cancels the Choose Printer dialog (with XPRINT ATTACH CHOOSE). Therefore, for host-based printing, applications should always use XPRINT ATTACH to explicitly select the intended host-based printer, then test for a successful selection with the XPRINT\$ and [ERR](#) functions to ensure the host-based printer selection was successful.

Unlike direct printing (LPRINT ATTACH), host-based printing is handled by a printer driver and the operating system's spooler subsystem. Therefore, spooler settings such as "work offline" in the Printer Properties dialog will not impede the creation of a spooled print job. Once all the data has been sent to the printer, detach the printer so other applications can use it., with the [XPRINT CLOSE](#) statement.

Host-based printers use proprietary control protocols, unlike line printers, so it is usually not possible to send them printer-dependent control codes. To attach a line printer, use LPRINT ATTACH instead of XPRINT ATTACH.

Note: You can enumerate the available printers with the [PRINTERCOUNT](#) and PRINTER\$ functions.

**See also** [LPRINT ATTACH](#), [PRINTER\\$](#), [XPRINT CANCEL](#), [XPRINT CLOSE](#), [XPRINT GET ATTACH](#), [XPRINT GET PAGES](#), [XPRINT GET SELECTION](#)

#### Example

```
ERRCLEAR
XPRINT ATTACH "HP DeskJet 960c"
IF ERR = 0 AND LEN(XPRINT$) > 0 THEN
 XPRINT COLOR RGB(0,0,255) ' Blue
 XPRINT "This is your printer talking"
 XPRINT FORMFEED ' Issue a formfeed
 XPRINT CLOSE ' Deselect the printer
END IF
```

## XPRINT BOX statement

# XPRINT BOX statement

**Purpose** Draw a box with square or rounded corners on a [host printer](#) page.

**Syntax** XPRINT BOX (*x1!*, *y1!*) - (*x2!*, *y2!*) [, [*corner&*] [, [*rgbColor&*] [, [*fillcolor&*] [, [*fillstyle&*]]]]]

**Remarks** Prior to any

operations, a host printer must first be selected with [XPRINT ATTACH](#). The coordinate points are specified in pixels (or world coordinates, if those were chosen with [XPRINT SCALE](#)). Line width can be set using [XPRINT WIDTH](#). If line width is set to 1 (the default), the line style can be set with [XPRINT STYLE](#). Because of the nature of a box, XPRINT BOX neither uses, nor updates, (last point referenced). If executed without a host printer attached, [error 57](#) is generated.

Windows graphic conventions consider the bottom and right coordinates of a BOX to be exclusive. The pixels at the bottom and right edges are not drawn unless OVERLAP MODE is enabled. See [XPRINT SET OVERLAP](#) for details.

*x1!*, *y1!* The upper left corner of the box.

*x2!*, *y2!* The lower right corner of the box.

*corner&* The percentage of roundness of the corners, in the range of 0 to 100. A value of zero creates square corners, while 100 creates a circle/oval. A value of 20 being most common for a pleasant, rounded appearance. If *corner&* is omitted, the default is 0, which creates a rectangle with square corners.

|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-----------------|---|------------------|---|----------------|---|-----------------------|---|-------------------------|---|---------------|---|------------------------|
| <i>rgbColor&amp;</i>  | Optional <a href="#">RGB</a> color of the box edge. If omitted (or -1), the edge <a href="#">color</a> defaults to the current foreground color for the host printer page.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
| <i>fillcolor&amp;</i> | Optional RGB color of the box interior. If <i>fillcolor&amp;</i> is omitted (or -2), the interior of the box is not filled, allowing the background to show through. If <i>fillcolor&amp;</i> is -1, the interior is painted with the same color as the edge. Otherwise, <i>fillcolor&amp;</i> specifies the RGB color to be used.                                                                                                                                                                                                                                                                                                                                                                                          |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
| <i>fillstyle&amp;</i> | Optional fill style (pattern) to be used. If <i>fillstyle&amp;</i> is omitted, the default fill style is solid (0). If a hatch pattern is chosen (1 to 6), the foreground color is specified by the <i>fillcolor&amp;</i> , while the background is specified by the default background color for the host printer page. The optional <i>fillstyle&amp;</i> may be: <table> <tr><td>0</td><td>Solid (default)</td></tr> <tr><td>1</td><td>Horizontal Lines</td></tr> <tr><td>2</td><td>Vertical Lines</td></tr> <tr><td>3</td><td>Upward Diagonal Lines</td></tr> <tr><td>4</td><td>Downward Diagonal Lines</td></tr> <tr><td>5</td><td>Crossed Lines</td></tr> <tr><td>6</td><td>Diagonal Crossed Lines</td></tr> </table> | 0 | Solid (default) | 1 | Horizontal Lines | 2 | Vertical Lines | 3 | Upward Diagonal Lines | 4 | Downward Diagonal Lines | 5 | Crossed Lines | 6 | Diagonal Crossed Lines |
| 0                     | Solid (default)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
| 1                     | Horizontal Lines                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
| 2                     | Vertical Lines                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
| 3                     | Upward Diagonal Lines                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
| 4                     | Downward Diagonal Lines                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
| 5                     | Crossed Lines                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
| 6                     | Diagonal Crossed Lines                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |

**See also** [Built In RGB Color Equates](#), [XPRINT ATTACH](#), [XPRINT COLOR](#), [XPRINT LINE](#), [XPRINT SET OVERLAP](#), [XPRINT STYLE](#), [XPRINT WIDTH](#)

**Example**

```
' Draw rectangle with square corners and default colors.
XPRINT BOX (10, 10) - (100, 80)

' Draw a blue rectangle with 20% rounded corners,
' filled with a light-gray, diagonal cross pattern
XPRINT BOX (15, 15) - (95, 75), 20, %BLUE, RGB(191,191,191), 6
```

## XPRINT CANCEL statement

# XPRINT CANCEL statement

|                 |                                                                                                                                                                                                                                |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Cancel a print job on the <a href="#">host printer</a> .                                                                                                                                                                       |
| <b>Syntax</b>   | <code>XPRINT CANCEL</code>                                                                                                                                                                                                     |
| <b>Remarks</b>  | XPRINT CANCEL deletes the current print job and detaches the host printer, as long as <a href="#">XPRINT CLOSE</a> has not yet been executed. This function is generally used to abort the print process when an error occurs. |
| <b>See also</b> | <a href="#">XPRINT ATTACH</a> , <a href="#">XPRINT CLOSE</a>                                                                                                                                                                   |

## XPRINT CELL statement

# Keyword Template

|                 |
|-----------------|
| <b>Purpose</b>  |
| <b>Syntax</b>   |
| <b>Remarks</b>  |
| <b>See also</b> |
| <b>Example</b>  |

# XPRINT CELL statement New!

|                |                                                                                                                                                  |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Sets or retrieves the next print position (LPR - Last Point Referenced), based upon the row and column position of a <a href="#">text cell</a> . |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------|

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>   | <pre>XPRINT CELL = RowValue&amp;, ColValue&amp; XPRINT CELL TO RowVar&amp;, ColVar&amp; XPRINT COL TO ColVar&amp; XPRINT ROW TO RowVar&amp;  Function Form: ColVar&amp; = XPRINT(COL) RowVar&amp; = XPRINT(ROW)</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Remarks</b>  | <p>XPRINT CELL is used to set or retrieve the print position, based upon the row and column position of a Text Cell. That is the row and column position where the next printed text will be displayed. <i>RowValue&amp;</i> specifies the horizontal screen row (starting at 1) at which to position the cursor. <i>ColValue&amp;</i> specifies the vertical screen column (starting at 1) at which to position the cursor. Since row and column numbers start at one (1), the upper left corner of the page is considered to be cell 1,1.</p> <p>The first form of XPRINT CELL moves the print position to the desired row and column. If a value given is zero (0), that parameter is ignored and that position is not changed. The second form of XPRINT CELL retrieves the current print position, and assigns the values to the variables specified by <i>RowVar&amp;</i> and <i>ColVar&amp;</i>.</p> <p>The remaining forms allow you to retrieve just a single value, either row or column, and are supported in both statement and function form.</p> |
| <b>See also</b> | <a href="#">XPRINT CELL SIZE</a> , <a href="#">XPRINT SET FONT</a> , <a href="#">XPRINT SET WORDWRAP</a> , <a href="#">XPRINT SET WRAP</a> , <a href="#">XPRINT SPLIT</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

## XPRINT CELL SIZE statement

# Keyword Template

Purpose  
Syntax  
Remarks  
See also  
Example

## XPRINT CELL SIZE statement New!

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Retrieve the character <a href="#">cell</a> size including external leading.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Syntax</b>  | <pre>XPRINT CELL SIZE TO WidthVar, HeightVar!  Function Form: WidthVar! = XPRINT(Cell.Size.X) HeightVar! = XPRINT(Cell.Size.Y)</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Remarks</b> | <p>XPRINT CELL SIZE retrieves the size of one character cell, for the current <a href="#">font</a>, on the <a href="#">attached printer</a>. The returned cell size is specified in <a href="#">PAGE UNITS</a>, and allows you to calculate the number of text lines which will fit in a particular space. The height value is the size of the displayed character, including external leading (if any) for this particular font.</p> <p>If the font is a fixed-width font, like Courier New or Lucida Console, the sizes returned are as exact as possible, given the fractional rounding approximations necessary for some scaled units. If the font is proportional, like Arial or Times New Roman, the width will be the average size for the entire font.</p> <p>External leading is the vertical distance from the bottom of one character to the top of the character below it. This value is specified by the font in use. It may vary from zero to a large value, depending upon the font and point size. To retrieve the exact height of</p> |

characters without external leading, use [XPRINT CHR SIZE](#).

See also [XPRINT CELL](#), [XPRINT CHR SIZE](#), [XPRINT SET FONT](#), [XPRINT TEXT SIZE](#)

## XPRINT CHR SIZE statement

# XPRINT CHR SIZE statement IMPROVED

**Purpose** Retrieve the character size for the [current font](#) on a [host printer](#) page.

**Syntax** `XPRINT CHR SIZE TO WidthVar!, HeightVar!`

*Function Form:*

`WidthVar! = XPRINT(Chr.Size.X)`

`HeightVar! = XPRINT(Chr.Size.Y)`

**Remarks** The character size is specified in the same terms ([pixels](#) or [scaled units](#)) as originally stated. The height value retrieved is the actual size of the printed character without including any external leading for this particular font.

If the font is a fixed-width font, like Courier New or Lucida Console, the sizes returned are as exact as possible, given the fractional rounding approximations possible when converting from pixels to other coordinates. If the font is proportional, like Arial or Times New Roman, the width will be the average size for the entire font.

External leading is the vertical distance from the bottom of one character to the top of the character below it. This value is specified by the font in use. It may vary from zero to a larger value, depending upon the font and point size. To retrieve the total row height including external leading, use `XPRINT CELL SIZE`.

See also [XPRINT](#), [XPRINT ATTACH](#), [XPRINT CELL SIZE](#), [XPRINT SET FONT](#), [XPRINT TEXT SIZE](#)

## XPRINT CLOSE statement

# XPRINT CLOSE statement

**Purpose** Detach a [host printer](#) so printing may begin.

**Syntax** `XPRINT CLOSE`

**Remarks** `XPRINT CLOSE` detaches the printer from the current process, and allows printing to a HOST printer to begin. If `XPRINT CLOSE` is not executed, printed data may be lost.

See also [XPRINT ATTACH](#), [XPRINT CANCEL](#)

## XPRINT COLOR statement

# XPRINT COLOR statement IMPROVED

**Purpose** Set the foreground [color](#) (and, optionally, the background color) for various statements.

**Syntax** `XPRINT COLOR foreground& [, background&]`

**Remarks** Colors are expressed as [RGB](#) values, or use -1 for the default color. If the background parameter is -2, the background is made transparent. If either parameter is -3, the existing color is not changed. A host printer must first be connected with [XPRINT ATTACH](#). If a host printer is not attached, [error 57](#) is generated.

See also [Built In RGB Color Equates](#), [XPRINT](#), [XPRINT ATTACH](#)

**Example** `' Set colors to red foreground and blue background.`

```
XPRINT COLOR %RED, RGB(0,0,191)
```

## XPRINT COPY statement

# XPRINT COPY statement

|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------------------|------------------|---------------------------------------------|-----------------|----------------------------------------------------------------------------------------------|-----------------|----------------------------------------|-----------------|----------------------------------------------------------------------------------------------|----------|------------------------------------------|-------------|---------------------------------------------------------------------------------------|-----------------|--------------------------------------------|--------------|-------------------------------------------------------------------------------|----------------|-------------------------------------------|----------|--------------------------|------------------|--------------------------------------------------------------------------------|--------------|--------------------------------------|------------------|--------------------------------------------------------------------------------|---------------|-----------------------------------------------------------------|----------------|----------------------------|
| <b>Purpose</b>   | Copy a<br>to a <a href="#">host printer</a> page.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
| <b>Syntax</b>    | <pre>XPRINT COPY <i>hbmSource???</i>, <i>id</i>&amp; [, <i>style</i>&amp;] XPRINT COPY <i>hbmSource???</i>, <i>id</i>&amp; TO (<i>x!</i>, <i>y!</i>) [, <i>style</i>&amp;] XPRINT COPY <i>hbmSource???</i>, <i>id</i>&amp;, (<i>x1!</i>, <i>y1!</i>)-(<i>x2!</i>, <i>y2!</i>) TO (<i>x!</i>, <i>y!</i>) [, <i>style</i> %]</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
| <b>Remarks</b>   | <p>You can copy a complete bitmap, or a portion of it, to the host printer page. The expression <i>hbmSource???</i> specifies the handle of the source bitmap or window. The expression <i>id</i>&amp; is the unique control <a href="#">identifier</a> in the range 1 to 65535, as assigned with the <a href="#">CONTROL ADD GRAPHIC</a> statement. <i>id</i>&amp; must be 0 for a <a href="#">GRAPHIC WINDOW</a> or a . The destination of the copy operation is the host printer page. You must use care that your parameters are valid for the specified bitmaps, or results of the operation are undefined.</p> <p>The first form of the XPRINT COPY statement copies the complete bitmap, positioning it at (0,0), which is the upper left corner of the destination.</p> <p>The second form of XPRINT COPY also copies the complete bitmap, but positions it at the point specified by the parameter (<i>x!</i>, <i>y!</i>).</p> <p>The third form copies a portion of the bitmap, positioning it at the point specified by the parameter (<i>x!</i>, <i>y!</i>). If <i>style</i>&amp; is included, it is one of the following values:</p> <table border="0"> <tr> <td>%mix_Blackness</td> <td>Pixel is always 0 (black).</td> </tr> <tr> <td>%mix_NotMergeSrc</td> <td>Pixel is the inverse of the MergeSrc color.</td> </tr> <tr> <td>%mix_MaskNotSrc</td> <td>Pixel is a combination of the colors common to both the pixel and the inverse of the source.</td> </tr> <tr> <td>%mix_NotCopySrc</td> <td>Pixel is the inverse of the pen color.</td> </tr> <tr> <td>%mix_MaskSrcNot</td> <td>Pixel is a combination of the colors common to both the source and the inverse of the pixel.</td> </tr> <tr> <td>%mix_Not</td> <td>Pixel is the inverse of the pixel color.</td> </tr> <tr> <td>%mix_XorSrc</td> <td>Pixel is a combination of the colors in the source and in the pixel, but not in both.</td> </tr> <tr> <td>%mix_NotMaskSrc</td> <td>Pixel is the inverse of the MaskSrc color.</td> </tr> <tr> <td>%mix_MaskSrc</td> <td>Pixel is a combination of the colors common to both the source and the pixel.</td> </tr> <tr> <td>%mix_NotXorSrc</td> <td>Pixel is the inverse of the XorSrc color.</td> </tr> <tr> <td>%mix_Nop</td> <td>Pixel remains unchanged.</td> </tr> <tr> <td>%mix_MergeNotSrc</td> <td>Pixel is a combination of the source color and the inverse of the pixel color.</td> </tr> <tr> <td>%mix_CopySrc</td> <td>Pixel is the source color (default).</td> </tr> <tr> <td>%mix_MergeSrcNot</td> <td>Pixel is a combination of the source color and the inverse of the pixel color.</td> </tr> <tr> <td>%mix_MergeSrc</td> <td>Pixel is a combination of the source color and the pixel color.</td> </tr> <tr> <td>%mix_Whiteness</td> <td>Pixel is always 1 (white).</td> </tr> </table> <p>A host printer must first be connected with <a href="#">XPRINT ATTACH</a>. If a host printer is not attached, <a href="#">error 57</a> is generated.</p> | %mix_Blackness | Pixel is always 0 (black). | %mix_NotMergeSrc | Pixel is the inverse of the MergeSrc color. | %mix_MaskNotSrc | Pixel is a combination of the colors common to both the pixel and the inverse of the source. | %mix_NotCopySrc | Pixel is the inverse of the pen color. | %mix_MaskSrcNot | Pixel is a combination of the colors common to both the source and the inverse of the pixel. | %mix_Not | Pixel is the inverse of the pixel color. | %mix_XorSrc | Pixel is a combination of the colors in the source and in the pixel, but not in both. | %mix_NotMaskSrc | Pixel is the inverse of the MaskSrc color. | %mix_MaskSrc | Pixel is a combination of the colors common to both the source and the pixel. | %mix_NotXorSrc | Pixel is the inverse of the XorSrc color. | %mix_Nop | Pixel remains unchanged. | %mix_MergeNotSrc | Pixel is a combination of the source color and the inverse of the pixel color. | %mix_CopySrc | Pixel is the source color (default). | %mix_MergeSrcNot | Pixel is a combination of the source color and the inverse of the pixel color. | %mix_MergeSrc | Pixel is a combination of the source color and the pixel color. | %mix_Whiteness | Pixel is always 1 (white). |
| %mix_Blackness   | Pixel is always 0 (black).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
| %mix_NotMergeSrc | Pixel is the inverse of the MergeSrc color.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
| %mix_MaskNotSrc  | Pixel is a combination of the colors common to both the pixel and the inverse of the source.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
| %mix_NotCopySrc  | Pixel is the inverse of the pen color.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
| %mix_MaskSrcNot  | Pixel is a combination of the colors common to both the source and the inverse of the pixel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
| %mix_Not         | Pixel is the inverse of the pixel color.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
| %mix_XorSrc      | Pixel is a combination of the colors in the source and in the pixel, but not in both.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
| %mix_NotMaskSrc  | Pixel is the inverse of the MaskSrc color.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
| %mix_MaskSrc     | Pixel is a combination of the colors common to both the source and the pixel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
| %mix_NotXorSrc   | Pixel is the inverse of the XorSrc color.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
| %mix_Nop         | Pixel remains unchanged.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
| %mix_MergeNotSrc | Pixel is a combination of the source color and the inverse of the pixel color.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
| %mix_CopySrc     | Pixel is the source color (default).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
| %mix_MergeSrcNot | Pixel is a combination of the source color and the inverse of the pixel color.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
| %mix_MergeSrc    | Pixel is a combination of the source color and the pixel color.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
| %mix_Whiteness   | Pixel is always 1 (white).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
| <b>See also</b>  | <a href="#">XPRINT ATTACH</a> , <a href="#">XPRINT RENDER</a> , <a href="#">XPRINT STRETCH</a> , <a href="#">XPRINT SET STRETCHMODE</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |

## XPRINT ELLIPSE statement

# XPRINT ELLIPSE statement

|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-----------------|---|------------------|---|----------------|---|-----------------------|---|-------------------------|---|---------------|---|------------------------|
| <b>Purpose</b>        | Draw an ellipse or a circle on a <a href="#">host printer</a> page.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
| <b>Syntax</b>         | <code>XPRINT ELLIPSE (x1!, y1!) - (x2!, y2!) [, [rgbColor&amp;] [, [fillcolor&amp;] [, [fillstyle&amp;]]]</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
| <b>Remarks</b>        | <p>A host printer must first be connected with <a href="#">XPRINT ATTACH</a>. The coordinate points are specified in pixels (or world coordinates, if those were defined with an <a href="#">XPRINT SCALE</a> statement). Line width can be set using <a href="#">XPRINT WIDTH</a>. If line width is set to 1 (the default), the line style can be set with <a href="#">XPRINT STYLE</a>. Because of the nature of an ellipse, which has no obvious beginning or end, <a href="#">XPRINT ELLIPSE</a> neither uses, nor updates, the last point referenced (POS). If executed without a host printer attached, <a href="#">error 57</a> is generated.</p> <p>The coordinate pair define an invisible bounding rectangle which would enclose the ellipse to be drawn. It tells both the size and the proportions of the ellipse. Windows graphic conventions consider the bottom and right coordinates of it to be exclusive. The pixels at the bottom and right edges are ignored, unless Overlap Mode is enabled. See <a href="#">XPRINT SET OVERLAP</a> for details.</p> |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
| <i>x1!, y1!</i>       | The upper left corner of the bounding rectangle.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
| <i>x2!, y2!</i>       | The lower right corner of the bounding rectangle.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
| <i>rgbColor&amp;</i>  | Optional <a href="#">RGB</a> color of the ellipse edge. If omitted (or -1), the edge <a href="#">color</a> defaults to the current foreground color for the host printer page.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
| <i>fillcolor&amp;</i> | Optional RGB color of the ellipse interior. If <i>fillcolor&amp;</i> is omitted (or -2), the interior of the ellipse is not filled, allowing the background to show through. If <i>fillcolor&amp;</i> is -1, the interior is painted with the same color as the edge. Otherwise, <i>fillcolor&amp;</i> specifies the RGB color to be used.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
| <i>fillstyle&amp;</i> | Optional fill style (pattern) to be used. If <i>fillstyle&amp;</i> is omitted, the default fill style is solid (0). If a hatch pattern is chosen (1 to 6), the foreground color is specified by the <i>fillcolor&amp;</i> , while the background is specified by the default background color for the host printer page. The optional <i>fillstyle&amp;</i> may be:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
|                       | <table> <tr><td>0</td><td>Solid (default)</td></tr> <tr><td>1</td><td>Horizontal Lines</td></tr> <tr><td>2</td><td>Vertical Lines</td></tr> <tr><td>3</td><td>Upward Diagonal Lines</td></tr> <tr><td>4</td><td>Downward Diagonal Lines</td></tr> <tr><td>5</td><td>Crossed Lines</td></tr> <tr><td>6</td><td>Diagonal Crossed Lines</td></tr> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 0 | Solid (default) | 1 | Horizontal Lines | 2 | Vertical Lines | 3 | Upward Diagonal Lines | 4 | Downward Diagonal Lines | 5 | Crossed Lines | 6 | Diagonal Crossed Lines |
| 0                     | Solid (default)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
| 1                     | Horizontal Lines                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
| 2                     | Vertical Lines                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
| 3                     | Upward Diagonal Lines                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
| 4                     | Downward Diagonal Lines                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
| 5                     | Crossed Lines                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
| 6                     | Diagonal Crossed Lines                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
| <b>See also</b>       | <a href="#">Built In RGB Color Equates</a> , <a href="#">XPRINT ARC</a> , <a href="#">XPRINT ATTACH</a> , <a href="#">XPRINT COLOR</a> , <a href="#">XPRINT LINE</a> , <a href="#">XPRINT PIE</a> , <a href="#">XPRINT SET OVERLAP</a> , <a href="#">RINT STYLE</a> , <a href="#">XPRINT WIDTH</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
| <b>Example</b>        | <pre>' Draw a circle, using default colors. XPRINT ELLIPSE (10, 10) - (100, 100) ' Draw a blue ellipse filled with a light-gray, diagonal cross pattern. XPRINT ELLIPSE (15, 25) - (95, 50), %BLUE, RGB(191,191,191), 6</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |

## XPRINT FORMFEED statement

# XPRINT FORMFEED statement

|                |                                                                                                                                                                |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Start a new page for the <a href="#">host printer</a> .                                                                                                        |
| <b>Syntax</b>  | <code>XPRINT FORMFEED</code>                                                                                                                                   |
| <b>Remarks</b> | XPRINT FORMFEED causes the current print page to be ejected, and a new page started. If XPRINT FORMFEED is unsuccessful, an error is generated. Note that some |

printers do not eject a page if it is blank.

See also [XPRINT ATTACH](#), [XPRINT CLOSE](#)

## XPRINT GET ATTACH statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## XPRINT GET ATTACH statement **New!**

**Purpose** Retrieve the name of the [attached](#) host printer.

**Syntax** XPRINT GET ATTACH TO *PrinterVar\$*

*Function Form:*

*PrinterVar\$* = XPRINT\$(ATTACH)

*PrinterVar\$* = XPRINT\$

**Remarks** XPRINT GET ATTACH returns the name of the attached host printer, which is the printer that would be used by XPRINT statements. If there is no attached host printer, an empty string is returned. XPRINT\$ is typically used to detect if an [XPRINT ATTACH](#) operation was successful.

See also [XPRINT ATTACH](#)

## XPRINT GET CANVAS statement

# XPRINT GET CANVAS statement **New!**

**Purpose** Retrieves the writable size of the [attached](#) host printer.

**Syntax** XPRINT GET CANVAS TO *WidthVar!*, *HeightVar!*

*Function Form:*

*WidthVar!* = XPRINT(CANVAS.X)

*HeightVar!* = XPRINT(CANVAS.Y)

**Remarks** XPRINT GET CANVAS retrieves the logical size of the client area (printable area) for the attached host printer. This is the size of the page, minus the unprintable margins, without any reductions for a [CLIP](#) area. The size is specified in [Page Units](#), so it could return scaled values if they were applied with [XPRINT SCALE](#). This is very similar to [XPRINT GET CLIENT](#), with the single exception that scaled values (set by XPRINT SCALE) are returned if they have been utilized. If executed without a host printer attached, [error 57](#) is generated.

See also [XPRINT GET CLIENT](#), [XPRINT GET CLIP](#), [XPRINT GET SIZE](#), [XPRINT GET SCALE](#), [XPRINT SCALE](#)

## XPRINT GET CLIENT statement

## XPRINT GET CLIENT statement IMPROVED

- Purpose** Retrieves the size of the client area (printable area) on the host printer page.
- Syntax** `XPRINT GET CLIENT To WidthVar!, HeightVar!`
- Function Form:*  
`WidthVar! = XPRINT(Client.X)`  
`HeightVar! = XPRINT(Client.Y)`
- Remarks** XPRINT GET CLIENT retrieves the physical size of the client area (printable area) for the [attached](#) host printer. The size is always specified in [Pixels](#) (points). This is very similar to [XPRINT GET CANVAS](#), with the single exception that scaled values (set by [XPRINT SCALE](#)) are not utilized. If executed without a host printer attached, [error 57](#) is generated.
- See also** [XPRINT ATTACH](#), [XPRINT GET CANVAS](#), [XPRINT GET CLIP](#), [XPRINT GET MARGIN](#), [XPRINT GET PPI](#), [XPRINT GET SIZE](#)

### XPRINT GET CLIP statement

## Keyword Template

- Purpose**
- Syntax**
- Remarks**
- See also**
- Example**

## XPRINT GET CLIP statement New!

- Purpose** Retrieves the size of the clip area on the selected printer.
- Syntax** `XPRINT GET CLIP TO WidthVar!, HeightVar!`
- Function Form:*  
`WidthVar! = XPRINT(Clip.X)`  
`HeightVar! = XPRINT(Clip.Y)`
- Remarks** The clip area of the printer is that space where print operations can be written. That is, the clip area is that portion of the [client area](#) which is not protected (clipped) by the [XPRINT SET CLIP](#) statement.
- XPRINT GET CLIP retrieves the size of the clip area, and assigns these values to the variables specified by *WidthVar!* and *HeightVar!*. The size is specified in [PAGE UNITS](#) ([pixels](#)/points or [scaled](#) units). If no printer is selected, the values 0,0 are returned.
- See also** [XPRINT GET CANVAS](#), [XPRINT GET CLIENT](#), [XPRINT SET CLIP](#)

### XPRINT GET COLLATE statement

## Keyword Template

- Purpose**
- Syntax**
- Remarks**
- See also**

## Example

## XPRINT GET COLLATE statement

IMPROVED

**Purpose** Retrieves the XPRINT [collate status](#).**Syntax** XPRINT GET COLLATE TO *CollateVar&**Function Form:**CollateVar&* = XPRINT(COLLATE)**Remarks** XPRINT allows you to set the collate status, if the printer driver supports both multiple copies and collate capability. XPRINT GET COLLATE retrieves the collate status, assigning the value to the [long](#) integer variable specified by *CollateVar&*. The following equates are predefined in the compiler to symbolically represent the possible collate status:

%DMCOLLATE\_FALSE = 0

%DMCOLLATE\_TRUE = 1

If this statement is executed without a host printer [attached](#), [error 57](#) is generated.**See also** [XPRINT ATTACH](#), [XPRINT SET COLLATE](#)

## XPRINT GET COLORMODE statement

### Keyword Template

**Purpose****Syntax****Remarks****See also****Example**

## XPRINT GET COLORMODE statement

IMPROVED

**Purpose** Retrieves the XPRINT [colormode status](#).**Syntax** XPRINT GET COLORMODE TO *ColorVar&**Function Form:**ColorVar&* = XPRINT(COLORMODE)**Remarks** XPRINT allows you to set the color or monochrome print mode if the printer driver supports it. XPRINT GET COLORMODE retrieves the colormode status, assigning the value to the [long](#) integer variable specified by *ColorVar&*. The value zero may be returned if colormode is not supported by the printer driver. The following equates are predefined in the compiler to symbolically represent the possible status:

%DMCOLOR\_MONOCHROME = 1

%DMCOLOR\_COLOR = 2

If this statement is executed without a host printer [attached](#), [error 57](#) is generated.**See also** [XPRINT ATTACH](#), [XPRINT SET COLORMODE](#)

## XPRINT GET COPIES statement

### Keyword Template

**Purpose**  
**Syntax**  
**Remarks**  
**See also**  
**Example**

## XPRINT GET COPIES statement IMPROVED

**Purpose** Retrieves the XPRINT [copy count](#).

**Syntax** XPRINT GET COPIES TO *CopyVar&*  
*Function Form:*  
*CopyVar&* = XPRINT(COPIES)

**Remarks** XPRINT allows you to set the number of copies to be automatically printed, if it is supported by the printer driver. XPRINT GET COPIES retrieves the copy count, assigning the value to the long integer variable specified by *CopyVar&*. The default value is one (1). If this statement is executed without a host printer attached, [error 57](#) is generated.

**See also** [XPRINT ATTACH](#), [XPRINT SET COPIES](#)

### XPRINT GET DC statement

## XPRINT GET DC statement IMPROVED

**Purpose** Retrieve the handle of the device context (DC) for the [host printer](#) page.

**Syntax** XPRINT GET DC TO *hDC*  
*Function Form:*  
*hDC* = XPRINT(DC)

**Remarks** If no host printer is currently [attached](#), zero is returned. The DC handle may be used with various Windows API functions to perform specialized operations on the host printer page.

**See also** [XPRINT ATTACH](#)

### XPRINT GET DUPLEX statement

## Keyword Template

**Purpose**  
**Syntax**  
**Remarks**  
**See also**  
**Example**

## XPRINT GET DUPLEX statement IMPROVED

**Purpose** Retrieve the XPRINT [duplex status](#).

**Syntax** XPRINT GET DUPLEX TO *DuplexVar&*  
*Function Form:*  
*DuplexVar&* = XPRINT(DUPLEX)

**Remarks** XPRINT allows you to get/set the duplex status, if the printer supports printing on both sides of a page. XPRINT GET DUPLEX retrieves the duplex status, assigning the value to the [long integer](#) variable specified by *DuplexVar&*. The following equates are predefined in the compiler to symbolically represent the possible duplex status:

```
%DMDUP_SIMPLEX = 1 (single sided printing)
%DMDUP_VERTICAL = 2 (page flipped on the vertical edge)
%DMDUP_HORIZONTAL = 3 (page flipped on the horizontal edge)
```

If the printer does not support duplex printing, the value zero (0) is returned. If this statement is executed without a host printer [attached](#), [error 57](#) is generated.

**See also** [XPRINT ATTACH](#), [XPRINT SET DUPLEX](#)

## XPRINT GET LINES statement

# XPRINT GET LINES statement

IMPROVED

**Purpose** Retrieve the number of lines that can be printed.

**Syntax** XPRINT GET LINES To *LineVar&*

*Function Form:*

```
LineVar& = XPRINT(LINES)
```

**Remarks** XPRINT GET LINES retrieves the number of lines of text which can be printed on the [host printer](#) page, given the current selected [font](#). Since

statements do not generate an automatic formfeed when text is printed on the last line, this statement can be used to determine when your program should execute an [XPRINT FORMFEED](#) to move to the next printed page on a host printer. If executed without a host printer attached, [error 57](#) is generated.

**See also** [XPRINT](#), [XPRINT ATTACH](#), [XPRINT SET FONT](#), [XPRINT FORMFEED](#)

## XPRINT GET MARGIN statement

# XPRINT GET MARGIN statement

**Purpose** Retrieve the margin sizes for the [host printer](#).

**Syntax** XPRINT GET MARGIN TO *nLeft!*, *nTop!*, *nRight!*, *nBottom!*

**Remarks** XPRINT GET MARGIN retrieves the size of the margins (the non-printable area) of the printer page. This is important because some printers do not provide equal margins on each side of the page. This is more common on the vertical coordinate, but could be found in either or both directions. The size of the four margins are specified in pixels (or world coordinates, if those were defined with an [XPRINT SCALE](#) statement). If executed without a host printer attached, [error 57](#) is generated.

**See also** [XPRINT ATTACH](#), [XPRINT GET CLIENT](#), [XPRINT GET PPI](#), [XPRINT GET SIZE](#)

## XPRINT GET MIX statement

# XPRINT GET MIX statement

IMPROVED

**Purpose** Retrieve the color mix mode for a [host printer](#) page.

**Syntax** XPRINT GET MIX To *MixVar&*

*Function Form:*

```
MixVar& = XPRINT(MIX)
```

|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------------------|------------------|---------------------------------------------|-----------------|----------------------------------------------------------------------------------------------|-----------------|----------------------------------------|-----------------|----------------------------------------------------------------------------------------------|----------|------------------------------------------|-------------|---------------------------------------------------------------------------------------|-----------------|--------------------------------------------|--------------|-------------------------------------------------------------------------------|----------------|-------------------------------------------|----------|--------------------------|------------------|--------------------------------------------------------------------------------|--------------|--------------------------------------|------------------|--------------------------------------------------------------------------------|---------------|-----------------------------------------------------------------|----------------|----------------------------|
| <b>Remarks</b>   | Prior to any operations, a host printer must first be selected with <a href="#">XPRINT ATTACH</a> . There are 16 mix modes available to use for mixing the drawing color with the color that already exists at the drawing location. The mix mode equates are predefined in PowerBASIC. If executed without a host printer attached, <a href="#">error 57</a> is generated.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
|                  | <table> <tr> <td>%MIX_BLACKNESS</td> <td>Pixel is always 0 (black).</td> </tr> <tr> <td>%MIX_NOTMERGESRC</td> <td>Pixel is the inverse of the MergeSrc color.</td> </tr> <tr> <td>%MIX_MASKNOTSRC</td> <td>Pixel is a combination of the colors common to both the pixel and the inverse of the source.</td> </tr> <tr> <td>%MIX_NOTCOPYSRC</td> <td>Pixel is the inverse of the pen color.</td> </tr> <tr> <td>%MIX_MASKSRCNOT</td> <td>Pixel is a combination of the colors common to both the source and the inverse of the pixel.</td> </tr> <tr> <td>%MIX_NOT</td> <td>Pixel is the inverse of the pixel color.</td> </tr> <tr> <td>%MIX_XORSRC</td> <td>Pixel is a combination of the colors in the source and in the pixel, but not in both.</td> </tr> <tr> <td>%MIX_NOTMASKSRC</td> <td>Pixel is the inverse of the MaskSrc color.</td> </tr> <tr> <td>%MIX_MASKSRC</td> <td>Pixel is a combination of the colors common to both the source and the pixel.</td> </tr> <tr> <td>%MIX_NOTXORSRC</td> <td>Pixel is the inverse of the XorSrc color.</td> </tr> <tr> <td>%MIX_NOP</td> <td>Pixel remains unchanged.</td> </tr> <tr> <td>%MIX_MERGENOTSRC</td> <td>Pixel is a combination of the source color and the inverse of the pixel color.</td> </tr> <tr> <td>%MIX_COPYSRC</td> <td>Pixel is the source color (default).</td> </tr> <tr> <td>%MIX_MERGESRCNOT</td> <td>Pixel is a combination of the source color and the inverse of the pixel color.</td> </tr> <tr> <td>%MIX_MERGESRC</td> <td>Pixel is a combination of the source color and the pixel color.</td> </tr> <tr> <td>%MIX_WHITENESS</td> <td>Pixel is always 1 (white).</td> </tr> </table> | %MIX_BLACKNESS | Pixel is always 0 (black). | %MIX_NOTMERGESRC | Pixel is the inverse of the MergeSrc color. | %MIX_MASKNOTSRC | Pixel is a combination of the colors common to both the pixel and the inverse of the source. | %MIX_NOTCOPYSRC | Pixel is the inverse of the pen color. | %MIX_MASKSRCNOT | Pixel is a combination of the colors common to both the source and the inverse of the pixel. | %MIX_NOT | Pixel is the inverse of the pixel color. | %MIX_XORSRC | Pixel is a combination of the colors in the source and in the pixel, but not in both. | %MIX_NOTMASKSRC | Pixel is the inverse of the MaskSrc color. | %MIX_MASKSRC | Pixel is a combination of the colors common to both the source and the pixel. | %MIX_NOTXORSRC | Pixel is the inverse of the XorSrc color. | %MIX_NOP | Pixel remains unchanged. | %MIX_MERGENOTSRC | Pixel is a combination of the source color and the inverse of the pixel color. | %MIX_COPYSRC | Pixel is the source color (default). | %MIX_MERGESRCNOT | Pixel is a combination of the source color and the inverse of the pixel color. | %MIX_MERGESRC | Pixel is a combination of the source color and the pixel color. | %MIX_WHITENESS | Pixel is always 1 (white). |
| %MIX_BLACKNESS   | Pixel is always 0 (black).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
| %MIX_NOTMERGESRC | Pixel is the inverse of the MergeSrc color.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
| %MIX_MASKNOTSRC  | Pixel is a combination of the colors common to both the pixel and the inverse of the source.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
| %MIX_NOTCOPYSRC  | Pixel is the inverse of the pen color.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
| %MIX_MASKSRCNOT  | Pixel is a combination of the colors common to both the source and the inverse of the pixel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
| %MIX_NOT         | Pixel is the inverse of the pixel color.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
| %MIX_XORSRC      | Pixel is a combination of the colors in the source and in the pixel, but not in both.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
| %MIX_NOTMASKSRC  | Pixel is the inverse of the MaskSrc color.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
| %MIX_MASKSRC     | Pixel is a combination of the colors common to both the source and the pixel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
| %MIX_NOTXORSRC   | Pixel is the inverse of the XorSrc color.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
| %MIX_NOP         | Pixel remains unchanged.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
| %MIX_MERGENOTSRC | Pixel is a combination of the source color and the inverse of the pixel color.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
| %MIX_COPYSRC     | Pixel is the source color (default).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
| %MIX_MERGESRCNOT | Pixel is a combination of the source color and the inverse of the pixel color.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
| %MIX_MERGESRC    | Pixel is a combination of the source color and the pixel color.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
| %MIX_WHITENESS   | Pixel is always 1 (white).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |
| <b>See also</b>  | <a href="#">XPRINT ATTACH</a> , <a href="#">XPRINT SET MIX</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                |                            |                  |                                             |                 |                                                                                              |                 |                                        |                 |                                                                                              |          |                                          |             |                                                                                       |                 |                                            |              |                                                                               |                |                                           |          |                          |                  |                                                                                |              |                                      |                  |                                                                                |               |                                                                 |                |                            |

## XPRINT GET ORIENTATION statement

# XPRINT GET ORIENTATION statement

IMPROVED

|                 |                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Retrieve the paper <a href="#">orientation</a> for a <a href="#">host printer</a> page.                                                                                                                                                                                                                                                                                                                    |
| <b>Syntax</b>   | <pre>XPRINT GET ORIENTATION To <i>OrentVar&amp;</i> Function Form: <i>OrentVar&amp;</i> = XPRINT(ORIENTATION)</pre>                                                                                                                                                                                                                                                                                        |
| <b>Remarks</b>  | XPRINT GET ORIENTATION retrieves the orientation of the paper in the host printer, assigning the value to the <a href="#">long integer</a> variable specified by <i>OrentVar&amp;</i> . The value 1 indicates portrait mode, while 2 indicates landscape mode. If the printer does not support paper orientation, 0 is returned. If a host printer is not attached, <a href="#">error 57</a> is generated. |
| <b>See also</b> | <a href="#">XPRINT ATTACH</a> , <a href="#">XPRINT SET ORIENTATION</a>                                                                                                                                                                                                                                                                                                                                     |

## XPRINT GET OVERLAP statement

# XPRINT GET OVERLAP statement

New!

|                |                                                                                                                 |
|----------------|-----------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Retrieves the status of XPrint <a href="#">Overlap Mode</a> .                                                   |
| <b>Syntax</b>  | <pre>XPRINT GET OVERLAP To <i>OverlapVar&amp;</i> Function Form: <i>OverlapVar&amp;</i> = XPRINT(OVERLAP)</pre> |

**Remarks** XPRINT GET OVERLAP retrieves the status of overlap mode and assigns it to the variable specified by *OverlapVar&*. If Overlap Mode is enabled, the value [true](#) (non-zero) is assigned. If it's disabled, the value [false](#) (zero) is assigned instead. The value returned reflects the status of the host printer which is currently [attached](#) to the [XPrint stream](#).

With Overlap Mode, you can control how PowerBASIC treats XPrint operations which involve a bounding rectangle (RECT structure) in their definition. Windows maintains unique conventions for a RECT. The bottom and right coordinates of a RECT are exclusive. In other words, the [pixels](#) at the bottom and right edges lie immediately outside the rectangle. They are ignored. For example:

```
XPRINT BOX (0,0) - (50,50)
```

In this case, a box is drawn from 0,0 to 49,49. The final pixels at the bottom and right edge are simply not drawn. However, if Overlap Mode is enabled with [XPRINT SET OVERLAP](#), the box is drawn from 0,0 to 50,50.

The Overlap Mode affects all XPRINT functions which take a bounding rectangle as a parameter. This includes [XPRINT SCALE](#), [XPRINT BOX](#), [XPRINT ELLIPSE](#), [XPRINT LINE](#), [XPRINT POLYLINE](#), etc.

**See also** [XPRINT SET OVERLAP](#)

## XPRINT GET PAGES statement

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## XPRINT GET PAGES statement New!

**Purpose** Retrieves the XPRINT [page number limits](#) for this [print job](#).

**Syntax** XPRINT GET PAGES TO *FromPage&*, *ToPage&*

**Remarks** You may elect to limit a particular print job to a subset of the total number of pages. This can be accomplished under program control by executing [XPRINT SET PAGES](#), or the user can make the appropriate choice in the Print Dialog which is displayed when [XPRINT ATTACH](#) is executed with the CHOOSE option. When the pages are limited in this way, PowerBASIC handles all the details of print suppression for you.

Normally, XPRINT pages are numbered from one. The parameter *FromPage&* specifies the first page of the full report which will be printed, while *ToPage&* specifies the last page.

If XPRINT GET PAGES is executed without a host printer attached, an [error 57](#) is generated.

**See also** [XPRINT PREVIEW](#), [XPRINT GET SELECTION](#), [XPRINT SET PAGES](#)

## XPRINT GET PAPER statement

# Keyword Template

**Purpose**

Syntax  
 Remarks  
 See also  
 Example

## XPRINT GET PAPER statement IMPROVED

**Purpose** Retrieves the [current paper size/type](#).

**Syntax** XPRINT GET PAPER TO *PaperVar&*

*Function Form:*

*PaperVar&* = XPRINT(PAPER)

**Remarks** XPRINT GET PAPER retrieves the paper style for which the [host printer](#) is currently configured. The paper style is identified by an value which is assigned to the [long integer](#) variable specified by *PaperVar&*. The following equates are predefined in the compiler, and represent the most common paper styles:

|                    |      |           |       |   |       |        |
|--------------------|------|-----------|-------|---|-------|--------|
| %DMPAPER_LETTER    | = 1  | Letter    | 8.5   | x | 11    | inches |
| %DMPAPER_TABLOID   | = 3  | Tabloid   | 11    | x | 17    | inches |
| %DMPAPER_LEDGER    | = 4  | Ledger    | 17    | x | 11    | inches |
| %DMPAPER_LEGAL     | = 5  | Legal     | 8.5   | x | 14    | inches |
| %DMPAPER_STATEMENT | = 6  | Statement | 5.5   | x | 8.5   | inches |
| %DMPAPER_EXECUTIVE | = 7  | Executive | 7.25  | x | 10.5  | inches |
| %DMPAPER_A3        | = 8  | A3        | 297   | x | 420   | mm     |
| %DMPAPER_A4        | = 9  | A4        | 210   | x | 297   | mm     |
| %DMPAPER_A5        | = 11 | A5        | 148   | x | 210   | mm     |
| %DMPAPER_B4        | = 12 | B4        | 250   | x | 354   | mm     |
| %DMPAPER_B5        | = 13 | B5        | 182   | x | 257   | mm     |
| %DMPAPER_FOLIO     | = 14 | Folio     | 8.5   | x | 13    | inches |
| %DMPAPER_QUARTO    | = 15 | Quarto    | 215   | x | 275   | mm     |
| %DMPAPER_10X14     | = 16 | 10x14     | 10    | x | 14    | inches |
| %DMPAPER_11X17     | = 17 | 11x17     | 11    | x | 17    | inches |
| %DMPAPER_NOTE      | = 18 | Note      | 8.5   | x | 11    | inches |
| %DMPAPER_ENV_9     | = 19 | 9 Envlp   | 3.875 | x | 8.875 | inches |
| %DMPAPER_ENV_10    | = 20 | 10 Envlp  | 4.125 | x | 9.5   | inches |

Other paper style codes may be defined by Windows or printer suppliers. You can use [XPRINT GET PAPERS](#) to obtain a list of all the paper styles supported by the [attached](#) host printer.

If the printer does not support paper style changes, the value zero is returned. If executed without a host printer attached, [error 57](#) is generated.

**See also** [XPRINT ATTACH](#), [XPRINT GET PAPERS](#), [XPRINT SET PAPER](#)

## XPRINT GET PAPERS statement

### Keyword Template

Purpose  
 Syntax  
 Remarks  
 See also  
 Example

# XPRINT GET PAPERS statement IMPROVED

**Purpose** Retrieves a list of supported [paper types](#).

**Syntax** XPRINT GET PAPERS TO *PapersVar\$*

*Function Form:*

*PapersVar\$* = XPRINT\$(PAPERS)

**Remarks** XPRINT GET PAPERS retrieves a

which contains a list of all of the paper types supported by the [attached](#) host printer. This string is assigned to the string variable specified by *PapersVar\$*.

The string contains a comma-delimited list of *papertype, papename...* repeated as many times as necessary. For example:

```
"1,Letter,5,Legal,7,Executive,20,Envelope #10"
```

You can use [PARSECOUNT](#) to determine the number of delimited fields in the string, and [PARSE\\$\(\)](#) to easily extract the type numbers and names. The following equates are predefined in the compiler, and represent the most common paper styles:

|                    |      |           |       |         |        |
|--------------------|------|-----------|-------|---------|--------|
| %DMPAPER_LETTER    | = 1  | Letter    | 8.5   | x 11    | inches |
| %DMPAPER_TABLOID   | = 3  | Tabloid   | 11    | x 17    | inches |
| %DMPAPER_LEDGER    | = 4  | Ledger    | 17    | x 11    | inches |
| %DMPAPER_LEGAL     | = 5  | Legal     | 8.5   | x 14    | inches |
| %DMPAPER_STATEMENT | = 6  | Statement | 5.5   | x 8.5   | inches |
| %DMPAPER_EXECUTIVE | = 7  | Executive | 7.25  | x 10.5  | inches |
| %DMPAPER_A3        | = 8  | A3        | 297   | x 420   | mm     |
| %DMPAPER_A4        | = 9  | A4        | 210   | x 297   | mm     |
| %DMPAPER_A5        | = 11 | A5        | 148   | x 210   | mm     |
| %DMPAPER_B4        | = 12 | B4        | 250   | x 354   | mm     |
| %DMPAPER_B5        | = 13 | B5        | 182   | x 257   | mm     |
| %DMPAPER_FOLIO     | = 14 | Folio     | 8.5   | x 13    | inches |
| %DMPAPER_QUARTO    | = 15 | Quarto    | 215   | x 275   | mm     |
| %DMPAPER_10X14     | = 16 | 10x14     | 10    | x 14    | inches |
| %DMPAPER_11X17     | = 17 | 11x17     | 11    | x 17    | inches |
| %DMPAPER_NOTE      | = 18 | Note      | 8.5   | x 11    | inches |
| %DMPAPER_ENV_9     | = 19 | 9 Envlp   | 3.875 | x 8.875 | inches |
| %DMPAPER_ENV_10    | = 20 | 10 Envlp  | 4.125 | x 9.5   | inches |

Other paper style codes may be defined by Windows or printer suppliers. If executed without a host printer attached, [error 57](#) is generated.

**See also** [XPRINT ATTACH](#), [XPRINT GET PAPERS](#), [XPRINT SET PAPER](#)

## XPRINT GET PIXEL statement

# XPRINT GET PIXEL statement IMPROVED

**Purpose** Retrieves the [color](#) of a [pixel](#) on a [host printer](#) page.

**Syntax** XPRINT GET PIXEL [STEP] (x!, y!) TO *PixelVar&*

*Function Form:*

*PixelVar&* = XPRINT(PIXEL [STEP], x!, y!)

**Remarks** Not all printer drivers support the ability to retrieve the color of a pixel. If this feature is not supported, or if the coordinates are outside the printer client area, an invalid color value of -1 is returned. If no host printer is attached, [error 57](#) is generated.

**See also** [Built In RGB Color Equates](#), [XPRINT ATTACH](#), [XPRINT COLOR](#), [XPRINT SET PIXEL](#)

## XPRINT GET POS statement

# XPRINT GET POS statement

**IMPROVED**

- Purpose** Retrieves the last point referenced (POS) by an statement.
- Syntax** `XPRINT GET POS TO XVar!, YVar!`  
*Function Form:*  
`XVar! = XPRINT(POS.X)`  
`YVar! = XPRINT(POS.Y)`
- Remarks** XPRINT GET POS allows you to retrieve the last point referenced (POS) by XPRINT statements. The coordinate points are specified in [Page Units](#). If executed without a host printer [attached](#), an [error 57](#) is generated, and the values 0,0 are returned.
- See also** [XPRINT ATTACH](#), [XPRINT SET POS](#)

## XPRINT GET PPI statement

# XPRINT GET PPI statement

**IMPROVED**

- Purpose** Retrieves the resolution of the [host printer](#) page.
- Syntax** `XPRINT GET PPI TO XVar&, YVar&`  
*Function Form:*  
`XVar& = XPRINT(PPI.X)`  
`YVar& = XPRINT(PPI.Y)`
- Remarks** XPRINT GET PPI retrieves the resolution (points per inch) of the host printer page. The resolution is always specified in pixels, regardless of any [XPRINT SCALE](#) option. If executed without a host printer attached, [error 57](#) is generated, and the values 0,0 are returned. This statement is particularly useful in drawing items such as rulers and graphs to a particular physical size. There are 25.4 millimeters per inch, so just divide by 25.4 to convert from pixels per inch to pixels per millimeter.
- See also** [XPRINT ATTACH](#), [XPRINT GET CLIENT](#), [XPRINT GET MARGIN](#), [XPRINT GET SIZE](#)

## XPRINT GET QUALITY statement

# XPRINT GET QUALITY statement

**IMPROVED**

- Purpose** Retrieves the [print quality](#) setting for the [host printer](#).
- Syntax** `XPRINT GET QUALITY TO QualVar&`  
*Function Form:*  
`QualVar& = XPRINT(QUALITY)`
- Remarks** XPRINT GET QUALITY retrieves the print quality setting for the host printer. The value 1 is draft mode, 2 is low resolution, 3 is medium resolution, and 4 is high resolution. If the printer does not support print quality settings, 0 is returned. If no host printer is attached, [error 57](#) is generated.
- See also** [XPRINT ATTACH](#), [XPRINT SET QUALITY](#)

## XPRINT GET SCALE statement

## Keyword Template

Purpose

Syntax

Remarks

See also

Example

## XPRINT GET SCALE statement

**Purpose** Retrieve the current [coordinate limits](#) for the [host printer](#) page.

**Syntax** XPRINT GET SCALE TO *x1!*, *y1!*, *x2!*, *y2!*

**Remarks** XPRINT SCALE allows you to define your own world coordinate system for subsequent statements. World coordinates may be values, with the only requirement that *x1!* not equal *x2!*, and *y1!* not equal *y2!*.

XPRINT GET SCALE retrieves the coordinate limits, which may be either custom world coordinates (if an [XPRINT SCALE](#) has been executed), or else default [pixel](#) coordinates. This allows you to save and restore a previous set of coordinates.

**See also** [XPRINT SCALE](#), [XPRINT SCALE PIXELS](#)

## XPRINT GET SELECTION statement

## Keyword Template

Purpose

Syntax

Remarks

See also

Example

## XPRINT GET SELECTION statement New!

**Purpose** Retrieves the status of the SELECTION flag.

**Syntax** XPRINT GET SELECTION TO *SelectVar&*

*Function Form:*

*SelectVar&* = XPRINT(SELECTION)

**Remarks** You may elect to limit a particular print job to just that part of the total which is selected/highlighted. If so, it is the programmer's responsibility to limit XPRINT output to just the selected region.

The selection flag can only be set by the user in the Print Dialog which is displayed when [XPRINT ATTACH](#) is executed with the CHOOSE option. It cannot be set under program control. This flag is maintained only to give the programmer information about the user's request. If you do not wish to honor this option, you should disable it in XPRINT ATTACH CHOOSE.

If XPRINT GET SELECTION is executed without a host printer attached, an [error 57](#) is generated.

**See also** [XPRINT ATTACH](#)

## XPRINT GET SIZE statement

# XPRINT GET SIZE statement

**IMPROVED**

- Purpose** Retrieve the total size of the [host printer](#) page.
- Syntax** XPRINT GET SIZE TO *WidthVar&*, *HeightVar&*
- Function Form:*  
*WidthVar&* = XPRINT(SIZE.X)  
*HeightVar&* = XPRINT(SIZE.Y)
- Remarks** XPRINT GET SIZE allows you to retrieve the full size of the host printer page, including both the printable [client area](#) and any unprintable margins. The sizes are specified in [pixels](#) (points). If no host printer is attached, [error 57](#) is generated, and the values 0,0 are returned.
- See also** [XPRINT ATTACH](#), [XPRINT GET CLIENT](#), [XPRINT GET MARGIN](#), [XPRINT GET MIX](#), [XPRINT GET PPI](#)

## XPRINT GET STRETCHMODE statement

# Keyword Template

- Purpose**
- Syntax**
- Remarks**
- See also**
- Example**

# XPRINT GET STRETCHMODE statement

**New!**

- Purpose** Retrieves the default bitmap stretching mode for the attached [DC](#).
- Syntax** XPRINT GET STRETCHMODE TO *ModeVar&*
- Function Form:*  
*ModeVar&* = XPRINT(STRETCHMODE)
- Remarks** There are several operations in PowerBASIC which involve stretching or condensing images on bitmaps, most notably [XPRINT STRETCH](#). As individual points must be added or removed, there is a good chance that the quality of the image will be degraded. However, if you describe the nature of the image by defining a StretchMode, you can substantially enhance the appearance.
- The default StretchMode is maintained individually for each DC. You can retrieve the default mode with this statement, or set it with [XPRINT SET STRETCHMODE](#). Of course, you can also override the default StretchMode when you execute one of the affected statements.
- The 4 stretch mode equates are predefined in PowerBASIC.
- |                               |   |                                                                                                                                                                                                                                             |
|-------------------------------|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| %<br><b>BLACKONWHIT<br/>E</b> | 1 | This is the default Windows stretch mode, and is most appropriate for monochrome bitmaps, or those with blocks of color. Performs a boolean OR of eliminated and existing pixels. It preserves black pixels at the expense of white pixels. |
| %                             | 2 | Performs a boolean OR of eliminated and existing pixels. It                                                                                                                                                                                 |

|               |   |                                                                                                                                                                         |
|---------------|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| WHITEONBLACK  |   | preserves white pixels at the expense of black pixels.                                                                                                                  |
| %COLORONCOLOR | 3 | Deletes eliminated lines of pixels without trying to preserve their information.                                                                                        |
| %HALFTONE     | 4 | This provides the highest quality for complex color bitmaps. The average color of the destination pixel block is kept approximately the same as the source pixel block. |

See also [XPRINT COPY](#), [XPRINT RENDER](#), [XPRINT STRETCH](#), [XPRINT SET STRETCHMODE](#)

## XPRINT GET TRAY statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## XPRINT GET TRAY statement IMPROVED

**Purpose** Retrieves the [active printer tray](#).

**Syntax** `XPRINT GET TRAY TO TrayVar&`

*Function Form:*

`TrayVar& = XPRINT(TRAY)`

**Remarks** XPRINT GET TRAY retrieves the paper tray which is active on the [host printer](#). A descriptive value is assigned to the long integer variable specified by *TrayVar&*. The following equates are predefined in the compiler, and represent the most common paper trays:

|                      |      |
|----------------------|------|
| %DMBIN_UPPER         | = 1  |
| %DMBIN_LOWER         | = 2  |
| %DMBIN_MIDDLE        | = 3  |
| %DMBIN_MANUAL        | = 4  |
| %DMBIN_ENVELOPE      | = 5  |
| %DMBIN_ENVMANUAL     | = 6  |
| %DMBIN_AUTO          | = 7  |
| %DMBIN_TRACTOR       | = 8  |
| %DMBIN_SMALLFMT      | = 9  |
| %DMBIN_LARGEFORMAT   | = 10 |
| %DMBIN_LARGECAPACITY | = 11 |
| %DMBIN_CASSETTE      | = 14 |
| %DMBIN_FORMSOURCE    | = 15 |

Other tray codes may be defined by Windows or printer suppliers, so your program should be written to consider that possibility. You can use [XPRINT GET TRAYS](#) to obtain a list of all the paper trays supported by the [attached](#) host printer.

If the printer does not support the tray change requested, [error 5](#) is generated. If executed without a host printer attached, [error 57](#) is generated.

See also [XPRINT ATTACH](#), [XPRINT GET TRAYS](#), [XPRINT SET TRAY](#)

## XPRINT GET TRAYS statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## XPRINT GET TRAYS statement IMPROVED

**Purpose** Retrieves a list of supported [paper trays](#).

**Syntax** XPRINT GET TRAYS TO *TrayVar\$*

*Function Form:*

*TrayVar\$* = XPRINT\$(TRAYS)

**Remarks** XPRINT GET TRAYS retrieves a

which contains a list of all of the paper trays supported by the [attached](#) host printer.

This string is assigned to the string variable specified by *TrayVar\$*.

The string contains a comma-delimited list of traytype, trayname... repeated as many times as necessary. For example:

```
"1,Upper,2,Lower,5,Envelope"
```

You can use [PARSECOUNT](#) to determine the number of delimited fields in the string, and [PARSE\\$\(\)](#) to easily extract the tray numbers and names. The following equates are predefined in the compiler, and represent the most common trays:

|                      |   |    |
|----------------------|---|----|
| %DMBIN_UPPER         | = | 1  |
| %DMBIN_LOWER         | = | 2  |
| %DMBIN_MIDDLE        | = | 3  |
| %DMBIN_MANUAL        | = | 4  |
| %DMBIN_ENVELOPE      | = | 5  |
| %DMBIN_ENVMANUAL     | = | 6  |
| %DMBIN_AUTO          | = | 7  |
| %DMBIN_TRACTOR       | = | 8  |
| %DMBIN_SMALLFMT      | = | 9  |
| %DMBIN_LARGEFORM     | = | 10 |
| %DMBIN_LARGECAPACITY | = | 11 |
| %DMBIN_CASSETTE      | = | 14 |
| %DMBIN_FORMSOURCE    | = | 15 |

Other paper style codes may be defined by Windows or printer suppliers. If executed without a host printer attached, [error 57](#) is generated.

**See also** [XPRINT ATTACH](#), [XPRINT GET TRAY](#), [XPRINT SET TRAY](#)

## XPRINT GET WORDWRAP statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## XPRINT GET WORDWRAP statement **New!**

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Retrieves the status of XPRINT <a href="#">WordWrap Mode</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Syntax</b>   | <code>XPRINT GET WORDWRAP TO <i>WrapVar&amp;</i></code><br><br><i>Function Form:</i><br><code><i>WrapVar&amp;</i> = XPRINT(WORDWRAP)</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Remarks</b>  | <p>XPRINT GET WORDWRAP retrieves the status of wordwrap mode and assigns it to the variable specified by <i>WrapVar&amp;</i>. If WordWrap Mode is enabled, the value <a href="#">true</a> (non-zero) is assigned. If it's disabled, the value <a href="#">false</a> (zero) is assigned instead. The value returned reflects the status of the <a href="#">attached</a> printer.</p> <p>With WordWrap Mode, you can control how PowerBASIC <a href="#">prints text</a> on an XPRINT page when it reaches the end of a line. Since XPRINT operates on a full page basis, the default is to ignore text which is printed past the end of the line. This can be modified under program control by using <a href="#">XPRINT SET WORDWRAP</a>.</p> <p>When WordWrap mode is enabled, it affects only <a href="#">XPRINT</a> print operations. If XPRINT print attempts to display a word beyond the end of a row, the entire word is automatically wrapped to the first column of the next row.</p> |
| <b>See also</b> | <a href="#">XPRINT CELL</a> , <a href="#">XPRINT GET WRAP</a> , <a href="#">XPRINT SET WORDWRAP</a> , <a href="#">XPRINT SET WRAP</a> , <a href="#">XPRINT SPLIT</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

## XPRINT GET WRAP statement

### Keyword Template

Purpose

Syntax

Remarks

See also

Example

## XPRINT GET WRAP statement **New!**

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Retrieves the status of XPRINT <a href="#">Wrap Mode</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Syntax</b>  | <code>XPRINT GET WRAP TO <i>WrapVar&amp;</i></code><br><br><i>Function Form:</i><br><code><i>WrapVar&amp;</i> = XPRINT(WRAP)</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Remarks</b> | <p>XPRINT GET WRAP retrieves the status of wrap mode and assigns it to the variable specified by <i>WrapVar&amp;</i>. If Wrap Mode is enabled, the value <a href="#">true</a> (non-zero) is assigned. If it's disabled, the value <a href="#">false</a> (zero) is assigned instead. The value returned reflects the status of the <a href="#">attached</a> printer.</p> <p>With Wrap Mode, you can control how PowerBASIC <a href="#">prints text</a> on an XPRINT page when it reaches the end of a line. Since XPRINT operates on a full page basis, the default is to ignore text which is printed past the end of the line. This can be modified under program control by using <a href="#">XPRINT SET WRAP</a>.</p> <p>When Wrap Mode is enabled, it affects only <a href="#">XPRINT</a> print operations. If XPRINT print attempts to display a character beyond the end of a row, it is automatically wrapped to</p> |

the first column of the next row.

**See also** [XPRINT CELL](#), [XPRINT GET WORDWRAP](#), [XPRINT SET WORDWRAP](#), [XPRINT SET WRAP](#), [XPRINT SPLIT](#)

## XPRINT IMAGELIST statement

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## XPRINT IMAGELIST statement

**Purpose** Prints an image from an [IMAGELIST](#)

**Syntax** `XPRINT IMAGELIST (x!,y!), hLst, index&, overlay&, style&`

**Remarks** One of the images stored in an IMAGELIST is printed on the [attached](#) host printer. The parameters *x!,y!* define the upper left corner of the position of the image. *hLst* is the [handle](#) of the IMAGELIST and *index&* is the selector of the image to be displayed (1=first, 2=second, etc.). If *overlay&* is non-zero, it specifies an overlay image to be added to the printed image from the image list. The parameter *style&* may be one of the following style bits:

|                               |                                                                                                                                                                                                                      |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>%ILD_NORMAL</code>      | Draws the image using the background color of the image list. If the background color is the default value <code>%CLR_NONE</code> (defined in the <code>Commctrl.inc</code> file), the image is drawn transparently. |
| <code>%ILD_TRANSPARENT</code> | Draws the image transparently if there is a mask.                                                                                                                                                                    |
| <code>%ILD_MASK</code>        | Draws the mask.                                                                                                                                                                                                      |
| <code>%ILD_BLEND25</code>     | If there is a mask, the image is drawn blending 25% with the system highlight color.                                                                                                                                 |
| <code>%ILD_BLEND50</code>     | If there is a mask, the image is drawn blending 50% with the system highlight color.                                                                                                                                 |

**See also** [XPRINT ATTACH](#), [IMAGELIST](#)

## XPRINT LINE statement

# XPRINT LINE statement

**Purpose** Draw a line on a [host printer](#) page.

**Syntax** `XPRINT LINE [STEP] [(x1!, y1!)] - [STEP] (x2!, y2!)[, rgbColor&]`

**Remarks** The line is drawn from the first point, up to, but not including the second point. Coordinate points are specified in pixels, unless optional world coordinates have been defined with an [XPRINT SCALE](#) statement. Line width can be set using [XPRINT WIDTH](#). If line width is set to 1 (the default), the line style can be set with [XPRINT STYLE](#). If executed without a host printer attached, [error 57](#) is generated.

Windows graphic conventions consider the final *x2* and *y2* coordinates to be exclusive. Therefore, by default, the final pixel is not drawn unless `Overlap Mode` is enabled. See

[XPRINT SET OVERLAP](#) for details.

*x1!, y1!* Optional values which define the starting point of the line. If this optional first point is omitted, the line begins at the last point referenced ( ) in a preceding statement. If the first STEP option is included, the *x1!* and *y1!* starting coordinates are relative to the last point referenced (POS) on the host printer page.

*x2!, y2!* The ending point of the line. If the second STEP option is included, the *x2!* and *y2!* ending coordinates are relative to the starting coordinates.

*rgbColor&* Optional [RGB](#) color value for the line. If *rgbColor&* is omitted (or -1), the line [color](#) defaults to the [current foreground color](#) for the host printer page.

**See also** [Built In RGB Color Equates](#), [XPRINT ARC](#), [XPRINT ATTACH](#), [XPRINT BOX](#), [XPRINT COLOR](#), [XPRINT ELLIPSE](#), [XPRINT PIE](#), [XPRINT POLYGON](#), [XPRINT POLYLINE](#), [XPRINT SET MIX](#), [XPRINT SET OVERLAP](#), [XPRINT STYLE](#), [XPRINT WIDTH](#)

**Example**

```
' Draw a triangle. Note that, since LINE draws up to,
' but not including the second point, one extra point
' must be added when STEP is used.
XPRINT LINE (10, 10) - (10, 100) ' left side
XPRINT LINE STEP - (101, 100) ' base line
XPRINT LINE STEP - (10, 10) ' back to top
```

## XPRINT PIE statement

# XPRINT PIE statement

**Purpose** Draw a pie section on a [host printer](#) page.

**Syntax** `XPRINT PIE (x1!, y1!) - (x2!, y2!), arcStart!, arcEnd! [, [rgbColor&] [, [fillcolor&] [, [fillstyle&]]]`

**Remarks** A pie section is an arc, with a line drawn from each end point to the center of the circle or ellipse. To specify a pie section, you would first define the full circle or ellipse of which it is a part, and then specify the points on the ellipse where the arc starts and stops.

The full circle or ellipse is defined by its bounding rectangle, which is defined as the smallest rectangle which can be drawn around the circle or ellipse. For example, if the circle is centered at position (400,400), with a radius of 100 pixels, the upper left corner (*x1,y1*) of the bounding rectangle is (300,300), and the lower right corner (*x2,y2*) is (500,500).

The start point and end point of the arc are specified by their angle, which must be given in radians. A complete circle or ellipse is  $2\pi$  radians. On a 12-hour clock-face, the values 0 and  $2\pi$  both refer to the position of 3 o'clock, while the value  $1\pi$  refers to the position of 9 o'clock. Other positions are specified by a radian value relative to these. In PowerBASIC, arcs are always drawn counter-clockwise from the starting point to the ending point.

Prior to any

operations, a host printer must first be selected with [XPRINT ATTACH](#). The coordinate points are specified in pixels (or world coordinates, if those were chosen with [XPRINT SCALE](#)). Line width can be set using [XPRINT WIDTH](#). If line width is set to 1 (the default), the line style can be set with [XPRINT STYLE](#). Because of the nature of a pie section, XPRINT PIE neither uses, nor updates, (last point referenced). If executed without a host printer attached, [error 57](#) is generated.

*x1!, y1!* The upper left corner of the bounding rectangle of the full circle or ellipse.

*x2!, y2!* The lower right corner of the bounding rectangle of the full circle or ellipse.

*ArcStart!* The starting angle of the arc, in radians, from 0 to  $2\pi$ .

|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-----------------|---|------------------|---|----------------|---|-----------------------|---|-------------------------|---|---------------|---|------------------------|
| <i>ArcEnd!</i>        | The ending angle of the arc, in radians, from 0 to $2\pi$ radians. Note that arcs are always drawn counter-clockwise from <i>arcStart!</i> to <i>arcEnd!</i> . Compared with a 12-hour clock-face, 0 or $2\pi$ radians is at 3 o'clock, and $1\pi$ radians is at 9 o'clock.                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
| <i>rgbColor&amp;</i>  | Optional <a href="#">RGB</a> color of the pie edge. If omitted (or -1), the edge <a href="#">color</a> defaults to the current foreground color for the host printer page.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
| <i>fillcolor&amp;</i> | Optional RGB color of the pie interior. If <i>fillcolor&amp;</i> is omitted (or -2), the interior of the pie is not filled, allowing the background to show through. If <i>fillcolor&amp;</i> is -1, the interior is painted with the same color as the edge. Otherwise, <i>fillcolor&amp;</i> specifies the RGB color to be used.                                                                                                                                                                                                                                                                                                                                                                                                                     |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
| <i>fillstyle&amp;</i> | Optional fill style (pattern) to be used. If <i>fillstyle&amp;</i> is omitted, the default fill style is solid (0). If a hatch pattern is chosen (1 to 6), the foreground color is specified by the <i>fillcolor&amp;</i> , while the background is specified by the default background color for the host printer page. The optional <i>fillstyle&amp;</i> may be: <table style="margin-left: 40px;"> <tr><td>0</td><td>Solid (default)</td></tr> <tr><td>1</td><td>Horizontal Lines</td></tr> <tr><td>2</td><td>Vertical Lines</td></tr> <tr><td>3</td><td>Upward Diagonal Lines</td></tr> <tr><td>4</td><td>Downward Diagonal Lines</td></tr> <tr><td>5</td><td>Crossed Lines</td></tr> <tr><td>6</td><td>Diagonal Crossed Lines</td></tr> </table> | 0 | Solid (default) | 1 | Horizontal Lines | 2 | Vertical Lines | 3 | Upward Diagonal Lines | 4 | Downward Diagonal Lines | 5 | Crossed Lines | 6 | Diagonal Crossed Lines |
| 0                     | Solid (default)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
| 1                     | Horizontal Lines                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
| 2                     | Vertical Lines                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
| 3                     | Upward Diagonal Lines                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
| 4                     | Downward Diagonal Lines                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
| 5                     | Crossed Lines                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |
| 6                     | Diagonal Crossed Lines                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |   |                 |   |                  |   |                |   |                       |   |                         |   |               |   |                        |

**See also** [Built In RGB Color Equates](#), [XPRINT ARC](#), [XPRINT ATTACH](#), [XPRINT BOX](#), [XPRINT COLOR](#), [XPRINT ELLIPSE](#), [XPRINT LINE](#), [XPRINT STYLE](#), [XPRINT WIDTH](#)

**Example**

```
' A full circle is 2*pi radians (100%).
' To show a 25% Pie, use the formula 0.25 * 2 * pi.
' The following divides a full circle into four 25% parts, each
' with its own colors, each slightly separated from the others.
' Note: 0 is at 3 o'clock, then it builds counter-clockwise.
LOCAL Pi2 AS DOUBLE
Pi2 = ATN(1)* 8 ' 2 * Pi can be useful here
XPRINT PIE (10, 9)-(110, 109), 0, Pi2 * 0.25, %BLUE, %LTGRAY, 3
XPRINT PIE (9, 9)-(109, 109), Pi2 * 0.25, Pi2 * 0.50, %RED, %LTGRAY, 4
XPRINT PIE (9, 10)-(109, 110), Pi2 * 0.5, Pi2 * 0.75, RGB(0,127,0), %
LTGRAY, 3
XPRINT PIE (10, 10)-(110, 110), Pi2 * 0.75, 0, %GRAY, %LTGRAY, 4
```

## XPRINT POLYGON statement

# XPRINT POLYGON statement

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Draw a polygon on a <a href="#">host printer</a> page.                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Syntax</b>  | <code>XPRINT POLYGON points [, [rgbColor&amp;] [, [fillcolor&amp;] [, [fillstyle&amp;] [, fillmode&amp;]]]</code>                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Remarks</b> | The coordinate points are specified in pixels, unless optional world coordinates have been defined with an <a href="#">XPRINT SCALE</a> statement. Line width can be set using <a href="#">XPRINT WIDTH</a> . If line width is set to 1 (the default), the line style can be set with <a href="#">XPRINT STYLE</a> . XPRINT POLYGON neither uses, nor updates, the last point referenced (<br>) . If executed without a host printer attached, <a href="#">error 57</a> is generated.                                            |
| <i>points</i>  | <a href="#">User-defined type</a> that defines the number of vertices and the location of each. There must be at least two, and no more than 1024 vertices. The first member is a <a href="#">long integer</a> point count, followed directly by the appropriate number of <a href="#">single precision floats</a> to specify the actual coordinates. Floating point coordinates are required, because of the possibility of their use as world coordinates with XPRINT SCALE. You can use a type with a scalar list, like this: |

```
TYPE PolyPoints
count as long
```

```

x1 as single
y1 as single
x2 as single
y2 as single
x3 as single
y3 as single

```

```
END TYPE
```

Or, you can create an array using point types, like this:

```

TYPE PolyPoint
 x as single
 y as single
END TYPE

```

```

TYPE PolyArray
 count as long
 xy(1 TO 3) as PolyPoint
END TYPE

```

- rgbColor&* Optional [RGB](#) color of the polygon edge. If omitted (or -1), the edge [color](#) defaults to the current foreground color for the host printer page.
- fillcolor&* Optional RGB color of the polygon interior. If *fillcolor&* is omitted (or -2), the interior of the ellipse is not filled, allowing the background to show through. If *fillcolor&* is -1, the interior is painted with the same color as the edge. Otherwise, *fillcolor&* specifies the RGB color to be used.
- fillstyle&* Optional fill style (pattern) to be used. If *fillstyle&* is omitted, the default fill style is solid (0). If a hatch pattern is chosen (1 to 6), the foreground color is specified by the *fillcolor&*, while the background is specified by the default background color for the host printer page. The optional *fillstyle&* may be:
- |   |                         |
|---|-------------------------|
| 0 | Solid (default)         |
| 1 | Horizontal Lines        |
| 2 | Vertical Lines          |
| 3 | Upward Diagonal Lines   |
| 4 | Downward Diagonal Lines |
| 5 | Crossed Lines           |
| 6 | Diagonal Crossed Lines  |
- fillmode&* If *fillmode&* is missing (or zero), the winding mode is selected. This fills any region with a non-zero winding value. If *fillmode&* is non-zero, the alternate mode is selected. This fills the area between odd-numbered and even-numbered polygon sides on each scan line. That is, it fills the area between the first side and the second side, between the third side and fourth side, etc.
- See also** [Built In RGB Color Equates](#), [XPRINT ARC](#), [XPRINT ATTACH](#), [XPRINT BOX](#), [XPRINT COLOR](#), [XPRINT ELLIPSE](#), [XPRINT LINE](#), [XPRINT POLYLINE](#)

## XPRINT POLYLINE statement

# XPRINT POLYLINE statement

- Purpose** Draw a series of connected lines on a [host printer](#) page.
- Syntax** `XPRINT POLYLINE points [, rgbColor&]`
- Remarks** The coordinate points are specified in pixels, unless optional world coordinates have been defined with an [XPRINT SCALE](#) statement. Line width can be set using [XPRINT WIDTH](#). If line width is set to 1 (the default), the line style can be set with [XPRINT STYLE](#). XPRINT POLYLINE neither uses, nor updates, the last point referenced ( ). If executed without a host printer attached, [error 57](#) is generated. Windows graphic conventions consider the final x2 and y2 coordinates to be exclusive. Therefore, by default, the final pixel is not drawn unless Overlap Mode is enabled. See

[XPRINT SET OVERLAP](#) for details.

*points*

[User-defined type](#) that defines the number of vertices and the location of each. There must be at least two, and no more than 1024 vertices. The first member is a [long integer](#) point count, followed directly by the appropriate number of [single precision floats](#) to specify the actual coordinates. Floating point coordinates are required, because of the possibility of their use as world coordinates with SCALE. You can use a type with a scalar list, like this:

```
TYPE PolyPoints
 count as long
 x1 as single
 y1 as single
 x2 as single
 y2 as single
 x3 as single
 y3 as single
END TYPE
```

Or, you can create an array using point types, like this:

```
TYPE PolyPoint
 x as single
 y as single
END TYPE
```

```
TYPE PolyArray
 count as long
 xy(1 TO 3) as PolyPoint
END TYPE
```

*rgbColor&*

Optional [RGB](#) color of the polygon edge. If omitted (or -1), the edge [color](#) defaults to the [current foreground color](#) for the host printer page.

**See also**

[Built In RGB Color Equates](#), [XPRINT ARC](#), [XPRINT ATTACH](#), [XPRINT BOX](#), [XPRINT COLOR](#), [XPRINT ELLIPSE](#), [XPRINT LINE](#), [XPRINT POLYGON](#), [XPRINT SET OVERLAP](#), [XPRINT STYLE](#), [XPRINT WIDTH](#)

## XPRINT PREVIEW statement

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## XPRINT PREVIEW statement New!

**Purpose** Display a replica of a printed document on the screen.

**Syntax**  
 XPRINT PREVIEW *hWin*, *ID* [, CALL *xxx*]  
 XPRINT PREVIEW CLOSE

**Remarks** Print Preview is a powerful concept which should be considered in most application programs which provide printed reports. Briefly, the idea involves displaying a printed report on the screen before it is committed to printing on paper.

XPRINT PREVIEW allows you to redirect output from statements to a graphic , [control](#), or [window](#) so that it may be displayed on the

screen. When XPRINT PREVIEW CLOSE is executed, XPRINT output reverts back to the host printer so that a repeat of the XPRINT code is now sent to the printer for completion of the printed report.

XPRINT PREVIEW selects the graphic target, and should be executed directly after the printer is selected with [XPRINT ATTACH](#). The target is identified by the [handle](#) and [ID](#) given when it was created. You can optionally specify a callback function which is called upon every execution of an [XPRINT FORMFEED](#) or XPRINT CLOSE.

**XPRINT PREVIEW must be executed immediately after XPRINT ATTACH or an [error 98](#) "XPrint Preview Error" will be generated at run time. No XPRINT statements (other than the XPRINT\$ function) may be executed between XPRINT ATTACH and XPRINT PREVIEW.**

If you include the Callback option, the callback procedure must be a simple [SUB](#) with no parameters and no return value. It is called automatically by the XPRINT engine at the completion of each preview page (upon execution of XPRINT FORMFEED or XPRINT PREVIEW CLOSE. This Sub can perform all sorts of housekeeping help, such as copying the preview bitmap for separate storage, counting pages in the report, or most anything else needed by your program. Copying the bitmap is important in multi-page reports as XPRINT FORMFEED erases the graphic target for preview of the next page.

See also [XPRINT ATTACH](#), [XPRINT CLOSE](#), [XPRINT FORMFEED](#)

## XPRINT PRINT statement

# XPRINT PRINT statement IMPROVED

**Purpose** Output text to be printed on the [selected](#) printer.

**Syntax** XPRINT PRINT [*EXPRLIST*] [POS(*n*)] [SPC(*n*)] [TAB(*n*)] [,] [;]...  
XPRINT [*EXPRLIST*] [POS(*n*)] [SPC(*n*)] [TAB(*n*)] [,] [;]...

**Remarks** Prior to any XPRINT operations, you should be certain that a printer has been selected with [XPRINT ATTACH](#). The text foreground and background color are set with [XPRINT COLOR](#). Text which extends beyond the bounds of the page is clipped. The size of the text to be printed can be determined in advance with [XPRINT TEXT SIZE](#), and formatted to fit a particular field with [XPRINT SPLIT](#). Drawing begins at the last point referenced by another statement, or the point specified by [XPRINT SET POS](#). The upper left corner of the text is positioned at the POS.

XPRINT PRINT has the following parts, which may occur in any order and quantity, within a single statement:

- |                 |                                                                                                                                                                                                                                                                                                                                             |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>EXPRLIST</i> | and/or expression(s) which are written to the page. A semicolon can be used as separator between multiple expressions in the same statement. Upon completion, the POS is moved to the left margin of the next line.                                                                                                                         |
| <i>IST</i>      |                                                                                                                                                                                                                                                                                                                                             |
| POS( <i>n</i> ) | An optional function used to set the POS to the horizontal page unit ( <a href="#">pixel</a> , <a href="#">scaled</a> unit, etc.) specified by the numeric argument. Multiple uses of the POS function is permitted in a single statement. The vertical position is unchanged.                                                              |
| SPC( <i>n</i> ) | An optional function used to insert <i>n</i> spaces into the printed output. Multiple uses of SPC is permitted in a single statement. Values of <i>n</i> less than 1 are ignored.                                                                                                                                                           |
| TAB( <i>n</i> ) | An optional function used to tab to the <i>n</i> th column before printing the next expression. Multiple use of TAB is permitted in a single statement. Since TAB references columns, rather than pixels, it can give unpredictable results when used with a variable width <a href="#">font</a> . It is best used with a fixed width font. |

[;:] Special characters that determine the position of the next text item printed. A semicolon (;) means the next text item is printed immediately; a comma (,) means the next text item is printed at the start of the next print zone. Print zones begin every 14 columns.

If the final argument is a semicolon or comma, the POS is maintained at the current location, rather than the default action of moving to the start of the next line. For example:

```
XPRINT PRINT "Hello";
XPRINT PRINT " world!";
```

...produces the contiguous result "Hello world!"

If you omit all arguments, XPRINT PRINT just moves the POS to the left margin of the next line. Any control codes, such as Carriage Return, Line-Feed, and Backspace are not interpreted. They will display as symbols in the current selected font.

USING\$ is a separate function, which may be included in the *ExprList*. See the [USING\\$\(\)](#) function for more information.

It is not possible to print a [User-Defined Type](#) (UDT), a [Variant](#), an [object](#) variable, or an entire [array](#). Individual member values must be extracted with the appropriate function before they can be displayed.

#### See also

[FONT NEW](#), [LPRINT](#), [XPRINT ATTACH](#), [XPRINT CELL](#), [XPRINT CHR SIZE](#), [XPRINT COLOR](#), [XPRINT CLOSE](#), [XPRINT SET FONT](#), [XPRINT GET POS](#), [XPRINT SET POS](#), [XPRINT SET WORDWRAP](#), [XPRINT SET WRAP](#), [XPRINT SPLIT](#), [XPRINT TEXT SIZE](#)

#### Example

```
' Typical XPRINT printing strategy
ERRCLEAR
XPRINT ATTACH DEFAULT ' Use default printer
IF ERR = 0 AND LEN(XPRINT$) > 0 THEN
 XPRINT "This is your printer talking"
 XPRINT FORMFEED ' Issue a formfeed
 XPRINT CLOSE ' detach the printer
END IF
```

## XPRINT RENDER statement

# XPRINT RENDER statement

#### Purpose

Render an image on a [host printer](#) page.

#### Syntax

```
XPRINT RENDER BmpName$, (x1!, y1!)-(x2!, y2!)
```

#### Remarks

Renders an image (bitmap or icon), loaded from a [resource](#) or a disk file, to a host printer page. The parameter *BmpName\$* contains the name of the image to be loaded. If *BmpName\$* contains a period, it is presumed to be the name of a disk file. Otherwise, an attempt is made to load it from the program's resource data; if not found, it is then presumed to be a disk file. The parameters *x1!,y1!* define the upper left corner of the destination rectangle, while *x2!,y2!* define the lower right corner of that rectangle. If the destination rectangle is larger or smaller than the original, the image is stretched or condensed to the requested size. If XPRINT RENDER is unsuccessful, an appropriate error is generated.

The following code will retrieve the natural size of an image in a bitmap file, in pixels:

```
nFile& = FREEFILE
OPEN "myimage.bmp" FOR BINARY AS nFile&
GET #nFile&, 19, nWidth&
GET #nFile&, 23, nHeight&
CLOSE nFile&
```

#### See also

[XPRINT ATTACH](#), [XPRINT COPY](#), [XPRINT STRETCH](#), [XPRINT SET STRETCHMODE](#)

## XPRINT SCALE statement

# XPRINT SCALE statement

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Define a custom world coordinate system for a <a href="#">host printer</a> page.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Syntax</b>   | <code>XPRINT SCALE (x1!, y1!)-(x2!, y2!)</code><br><code>XPRINT SCALE PIXELS</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Remarks</b>  | <p>XPRINT SCALE lets you define your own world coordinate system for all subsequent statements. World coordinates may be values, with the only requirement that <i>x1!</i> not equal <i>x2!</i>, and <i>y1!</i> not equal <i>y2!</i>. If either pair are equal, an <a href="#">error 5</a> is generated. The custom coordinates remain with the printer page until XPRINT SCALE is repeated, or the host printer is detached. If executed without a host printer attached, <a href="#">error 57</a> is generated.</p> <p>If <i>x2!</i> is greater than <i>x1!</i>, coordinates grow larger as they move to the right. Otherwise, they grow larger as they move to the left.</p> <p>If <i>y2!</i> is greater than <i>y1!</i>, coordinates grow larger as they move downward. Otherwise, they grow larger as they move upward.</p> <p>By default, the position <i>x2!/y2!</i> translates to the first pixel which is outside of the <a href="#">client area</a>, and therefore not drawn. However, if OVERLAP MODE is enabled by <a href="#">XPRINT SET OVERLAP</a>, <i>x2!/y2!</i> translates to the final pixel in the client area and is drawn.</p> <p>XPRINT SCALE PIXELS sets or resets the coordinate system to pixel coordinates.</p> |
| <b>See also</b> | <a href="#">XPRINT ATTACH</a> , <a href="#">XPRINT GET SCALE</a> , <a href="#">XPRINT SET OVERLAP statement</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Example</b>  | <pre>' Attach the default Windows printer XPRINT ATTACH DEFAULT  ' Retrieve the client size (printable area) of the printer page XPRINT GET CLIENT TO ncWidth!, ncHeight!  ' Retrieve the resolution (points per inch) of the attached printer XPRINT GET PPI TO x&amp;, y&amp;  ' Width in inches of the printable area ncWidth! = ncWidth!/x&amp;  ' Height in inches of the printable area ncHeight! = ncHeight!/y&amp;  ' Set the scale to inches, for American letter-size paper ' in portrait mode. This is the equivalent to 8.5x11 minus the margins. XPRINT SCALE (0,0)-(ncWidth!,ncHeight!)</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

## XPRINT SET CLIP statement

# XPRINT SET CLIP statement New!

|                |                                                                                                                                                                                                            |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Establishes margins around the outer edges of the print page.                                                                                                                                              |
| <b>Syntax</b>  | <code>XPRINT SET CLIP LeftMargin!, TopMargin!, RightMargin!, BottomMargin!</code>                                                                                                                          |
| <b>Remarks</b> | <p>This statement establishes margins on any or all sides of the <a href="#">selected printer</a>. All subsequent operations are "clipped" on these boundaries, so that no additional text or graphics</p> |

are written in these protected areas.

Each of the 4 parameters is specified in the [PAGE UNITS](#) currently in effect. However, as this changes the target space available to you, the page units are immediately set to pixels/points. The upper left corner of the clip area is now addressed as point (0,0), while the right and bottom limits are reduced by the size of the margins. If you would prefer to use new Scaled Page Units for this revised clip area, you must execute a new [XPRINT SCALE](#).

XPRINT SET CLIP is particularly useful for displaying text, where enclosing "white space" improves the appearance a good deal.

You can disable a clip area by executing GRAPHIC SET CLIP 0,0,0,0.

**See also** [XPRINT GET CANVAS](#), [XPRINT GET CLIENT](#), [XPRINT GET SCALE](#), [XPRINT SCALE](#)

## XPRINT SET COLLATE statement

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## XPRINT SET COLLATE statement

**Purpose** Change the XPRINT collate status.

**Syntax** `XPRINT SET COLLATE numexp`

**Remarks** XPRINT allows you to set the collate status, if the printer driver supports both multiple copies and collate capability. XPRINT SET COLLATE enables or disables collating, depending upon the value of the *numexp* (1=true 0=false). The following equates are predefined in the compiler to symbolically represent the possible status:

```
%DMCOLLATE_FALSE = 0
%DMCOLLATE_TRUE = 1
```

If the printer does not support collating, or other values are used, [error 5](#) is generated. If this statement is executed without a host printer [attached](#), [error 57](#) is generated.

**See also** [XPRINT ATTACH](#), [XPRINT GET COLLATE](#)

## XPRINT SET COLORMODE statement

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## XPRINT SET COLORMODE statement

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Changes the XPRINT colormode status.                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Syntax</b>   | <code>XPRINT SET COLORMODE <i>numrexp</i></code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Remarks</b>  | XPRINT allows you to set the <a href="#">color</a> or monochrome print mode if the printer driver supports it. XPRINT SET COLORMODE expects a<br>expression which evaluates to one of the following listed values. The following equates are predefined in the compiler to symbolically represent the possible status:<br><pre>%DMCOLOR_MONOCHROME    = 1 %DMCOLOR_COLOR          = 2</pre> If this statement is executed without a host printer <a href="#">attached</a> , <a href="#">error 57</a> is generated. |
| <b>See also</b> | <a href="#">XPRINT ATTACH</a> , <a href="#">XPRINT GET COLORMODE</a>                                                                                                                                                                                                                                                                                                                                                                                                                                               |

## XPRINT SET COPIES statement

### Keyword Template

|                 |
|-----------------|
| <b>Purpose</b>  |
| <b>Syntax</b>   |
| <b>Remarks</b>  |
| <b>See also</b> |
| <b>Example</b>  |

## XPRINT SET COPIES statement

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Change the XPRINT copy count.                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Syntax</b>   | <code>XPRINT SET COPIES <i>numrexp</i></code>                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Remarks</b>  | XPRINT SET COPIES allows you to set the number of copies to be automatically printed, if it is supported by the printer driver. The default value is one (1). If multiple copies are not supported by the printer driver, or the count requested is greater than that supported by the printer driver, <a href="#">error 5</a> is generated. If this statement is executed without a host printer <a href="#">attached</a> , <a href="#">error 57</a> is generated. |
| <b>See also</b> | <a href="#">XPRINT ATTACH</a> , <a href="#">XPRINT GET COPIES</a>                                                                                                                                                                                                                                                                                                                                                                                                   |

## XPRINT SET DUPLEX statement

### Keyword Template

|                 |
|-----------------|
| <b>Purpose</b>  |
| <b>Syntax</b>   |
| <b>Remarks</b>  |
| <b>See also</b> |
| <b>Example</b>  |

## XPRINT SET DUPLEX statement

|                |                                               |
|----------------|-----------------------------------------------|
| <b>Purpose</b> | Change the XPRINT duplex status.              |
| <b>Syntax</b>  | <code>XPRINT SET DUPLEX <i>numrexp</i></code> |

**Remarks** XPRINT allows you to set the duplex status, if the printer supports printing on both sides of a page. XPRINT SET DUPLEX changes the mode to that specified by the *numrexp*. The following equates are predefined in the compiler to symbolically represent the possible duplex status:

```
%DMDUP_SIMPLEX = 1 (single sided printing)
%DMDUP_VERTICAL = 2 (page flipped on the vertical edge)
%DMDUP_HORIZONTAL = 3 (page flipped on the horizontal edge)
```

If the printer does not support duplex printing, [error 5](#) is generated. If this statement is executed without a host printer [attached](#), [error 57](#) is generated.

**See also** [XPRINT ATTACH](#), [XPRINT GET DUPLEX](#)

## XPRINT SET FONT statement

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## XPRINT SET FONT statement IMPROVED

**Purpose** Select a [font](#) for the [XPRINT](#) statement.

**Syntax** XPRINT SET FONT *FontHndl&*

*fonthdl&* The numeric [handle](#) returned by the [FONT NEW](#) statement.

**Remarks** The font specified by *FontHndl&* is selected to be used by statements. This is the most efficient way to change fonts and their general appearance (size, style, etc.). If you specify a *FontHndl&* of zero, the font is changed back to the original default font chosen by PowerBASIC. You can predefine virtually any number of fonts and attributes by executing FONT NEW statements for each of them. That makes them ready for immediate use when selected by XPRINT SET FONT.

Prior to any XPRINT operations, a specific printer must first be selected with [XPRINT ATTACH](#). If no specific font is selected, the default font is Courier New with no style attributes.

**See also** [FONT NEW](#), [XPRINT](#), [XPRINT ATTACH](#), [XPRINT CHR SIZE](#), [XPRINT TEXT SIZE](#)

## XPRINT SET MIX statement

# XPRINT SET MIX statement

**Purpose** Set the [color](#) mix mode for a [host printer](#) page.

**Syntax** XPRINT SET MIX *mode&*

**Remarks** Prior to any graphical operations, a host printer must first be selected with [XPRINT ATTACH](#). There are 16 mix modes available to use for mixing the drawing color with the color that already exists at the drawing location. The default mix mode is 13, %mix\_CopySrc. The mix mode equates are predefined in PowerBASIC.

|                  |                                                                                              |
|------------------|----------------------------------------------------------------------------------------------|
| %MIX_BLACKNESS   | Pixel is always 0 (black).                                                                   |
| %MIX_NOTMERGESRC | Pixel is the inverse of the MergeSrc color.                                                  |
| %MIX_MASKNOTSRC  | Pixel is a combination of the colors common to both the pixel and the inverse of the source. |
| %MIX_NOTCOPYSRC  | Pixel is the inverse of the pen color.                                                       |
| %MIX_MASKSRCNOT  | Pixel is a combination of the colors common to both the source and the inverse of the pixel. |
| %MIX_NOT         | Pixel is the inverse of the pixel color.                                                     |
| %MIX_XORSRC      | Pixel is a combination of the colors in the source and in the pixel, but not in both.        |
| %MIX_NOTMASKSRC  | Pixel is the inverse of the MaskSrc color.                                                   |
| %MIX_MASKSRC     | Pixel is a combination of the colors common to both the source and the pixel.                |
| %MIX_NOTXORSRC   | Pixel is the inverse of the XorSrc color.                                                    |
| %MIX_NOP         | Pixel remains unchanged.                                                                     |
| %MIX_MERGENOTSRC | Pixel is a combination of the source color and the inverse of the pixel color.               |
| %MIX_COPYSRC     | Pixel is the source color (default).                                                         |
| %MIX_MERGESRCNOT | Pixel is a combination of the source color and the inverse of the pixel color.               |
| %MIX_MERGESRC    | Pixel is a combination of the source color and the pixel color.                              |
| %MIX_WHITENESS   | Pixel is always 1 (white).                                                                   |

See also [XPRINT ATTACH](#), [XPRINT GET MIX](#)

## XPRINT SET ORIENTATION statement

# XPRINT SET ORIENTATION statement

|                 |                                                                                                                                                                                                                                                                             |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Set the paper orientation for a <a href="#">host printer</a> page.                                                                                                                                                                                                          |
| <b>Syntax</b>   | <code>XPRINT SET ORIENTATION <i>orient</i>&amp;</code>                                                                                                                                                                                                                      |
| <b>Remarks</b>  | XPRINT SET ORIENTATION sets the orientation of the paper in the host printer. The value 1 indicates portrait mode, while 2 indicates landscape mode. If a host printer is not attached, or does not support setting the orientation, <a href="#">error 57</a> is generated. |
| <b>See also</b> | <a href="#">FONT NEW</a> , <a href="#">XPRINT ATTACH</a> , <a href="#">XPRINT GET ORIENTATION</a> , <a href="#">XPRINT SET FONT</a>                                                                                                                                         |

## XPRINT SET OVERLAP statement

# Keyword Template

|                 |
|-----------------|
| <b>Purpose</b>  |
| <b>Syntax</b>   |
| <b>Remarks</b>  |
| <b>See also</b> |
| <b>Example</b>  |

# XPRINT SET OVERLAP statement New!

|                |                                                        |
|----------------|--------------------------------------------------------|
| <b>Purpose</b> | Enables or disables XPRINT Overlap Mode.               |
| <b>Syntax</b>  | <code>XPRINT SET OVERLAP [<i>NumrExpr</i>&amp;]</code> |

**Remarks** XPRINT SET OVERLAP enables or disables overlap mode for the [host printer](#) which is currently attached to the XPRINT [stream](#). It has no effect on any other XPRINT target. If *NumrExpr&* is [true](#) (non-zero), overlap mode is enabled. If [false](#) (zero), overlap mode is disabled. If *NumrExpr&* is missing, the default is to enable Overlap Mode.

With Overlap Mode, you can control how PowerBASIC treats XPRINT operations which involve a bounding rectangle (RECT structure) in their definition. Windows maintains unique conventions for a RECT. The bottom and right coordinates of a RECT are exclusive. In other words, the pixels at the bottom and right edges lie immediately outside the rectangle. They are ignored. For example:

```
XPRINT BOX (0,0) - (50,50)
```

In this case, a box is drawn from 0,0 to 49,49. The final pixels at the bottom and right edge are simply not drawn. However, if Overlap Mode is enabled, the box is drawn from 0,0 to 50,50.

The Overlap Mode affects all XPRINT functions which take a bounding rectangle as a parameter. This includes [XPRINT SCALE](#), [XPRINT BOX](#), [XPRINT ELLIPSE](#), [XPRINT LINE](#), [XPRINT POLYLINE](#), etc.

**See also** [XPRINT BOX](#), [XPRINT ELLIPSE](#), [XPRINT GET OVERLAP](#), [XPRINT LINE](#), [XPRINT POLYLINE](#), [XPRINT SCALE](#)

## XPRINT SET PAGES statement

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

## XPRINT SET PAGES statement New!

**Purpose** Sets the XPRINT page number limits for this [print job](#).

**Syntax** XPRINT SET PAGES *FromPage&*, *ToPage&*

**Remarks** You may elect to limit a particular print job to a subset of the total number of pages. This can be accomplished under program control by executing XPRINT SET PAGES, or the user can make the appropriate choice in the Print Dialog which is displayed when [XPRINT ATTACH](#) is executed with the CHOOSE option. When the pages are limited in this way, PowerBASIC handles all the details of print suppression for you.

Normally, XPRINT pages are numbered from one. The parameter *FromPage&* specifies the first page of the full report which will be printed, while *ToPage&* specifies the last page.

If XPRINT SET PAGES is executed without a host printer attached, an [error 57](#) is generated.

**See also** [XPRINT ATTACH](#), [XPRINT GET PAGES](#), [XPRINT SET COPIES](#)

## XPRINT SET PAPER statement

# Keyword Template

**Purpose**  
**Syntax**  
**Remarks**  
**See also**  
**Example**

## XPRINT SET PAPER statement

**Purpose** Sets a new [paper size/type](#).  
**Syntax** XPRINT SET PAPER *papertype&*  
**Remarks** XPRINT SET PAPER changes the paper style for the [host printer](#) to that designated by *papertype&*. The paper style is identified by an value given in the expression *papertype&*. The following equates are predefined in the compiler, and represent the most common paper styles:

|                    |      |           |       |   |       |        |
|--------------------|------|-----------|-------|---|-------|--------|
| %DMPAPER_LETTER    | = 1  | Letter    | 8.5   | x | 11    | inches |
| %DMPAPER_TABLOID   | = 3  | Tabloid   | 11    | x | 17    | inches |
| %DMPAPER_LEDGER    | = 4  | Ledger    | 17    | x | 11    | inches |
| %DMPAPER_LEGAL     | = 5  | Legal     | 8.5   | x | 14    | inches |
| %DMPAPER_STATEMENT | = 6  | Statement | 5.5   | x | 8.5   | inches |
| %DMPAPER_EXECUTIVE | = 7  | Executive | 7.25  | x | 10.5  | inches |
| %DMPAPER_A3        | = 8  | A3        | 297   | x | 420   | mm     |
| %DMPAPER_A4        | = 9  | A4        | 210   | x | 297   | mm     |
| %DMPAPER_A5        | = 11 | A5        | 148   | x | 210   | mm     |
| %DMPAPER_B4        | = 12 | B4        | 250   | x | 354   | mm     |
| %DMPAPER_B5        | = 13 | B5        | 182   | x | 257   | mm     |
| %DMPAPER_FOLIO     | = 14 | Folio     | 8.5   | x | 13    | inches |
| %DMPAPER_QUARTO    | = 15 | Quarto    | 215   | x | 275   | mm     |
| %DMPAPER_10X14     | = 16 | 10x14     | 10    | x | 14    | inches |
| %DMPAPER_11X17     | = 17 | 11x17     | 11    | x | 17    | inches |
| %DMPAPER_NOTE      | = 18 | Note      | 8.5   | x | 11    | inches |
| %DMPAPER_ENV_9     | = 19 | 9 Envlp   | 3.875 | x | 8.875 | inches |
| %DMPAPER_ENV_10    | = 20 | 10 Envlp  | 4.125 | x | 9.5   | inches |

Other paper style codes may be defined by Windows or printer suppliers. You can use [XPRINT GET PAPERS](#) to obtain a list of all the paper styles supported by the attached host printer.

If the printer does not support the paper style specified, [error 5](#) is generated. If executed without a host printer attached, [error 57](#) is generated.

**See also** [XPRINT ATTACH](#), [XPRINT GET PAPER](#), [XPRINT GET PAPERS](#)

## XPRINT SET PIXEL statement

## XPRINT SET PIXEL statement

**Purpose** Set the [color](#) of a pixel on a [host printer](#) page.  
**Syntax** XPRINT SET PIXEL [STEP] (*x!*, *y!*) [, *rgbColor&*]  
**Remarks** XPRINT SET PIXEL draws a single pixel on the host printer page. The optional color parameter is an [RGB](#) value; if not included, the [color](#) defaults to the [current foreground color](#) for the host printer. If the STEP option is included, the *x!* and *y!* coordinates are relative to the last point referenced ( ). The coordinate points are specified in pixels, unless world coordinates were set with an [XPRINT SCALE](#) statement. If no host printer is attached, [error 57](#) is

generated.

See also [Built In RGB Color Equates](#), [XPRINT ATTACH](#), [XPRINT COLOR](#), [XPRINT GET PIXEL](#)

## XPRINT SET POS statement

# XPRINT SET POS statement

**Purpose** Set the last point referenced (POS) by an statement.

**Syntax** XPRINT SET POS [STEP] (*x!*, *y!*)

**Remarks** XPRINT SET POS allows you to set the last point referenced (POS) by XPRINT statements. If the STEP option is included, the *x!* and *y!* coordinates are relative to the prior POS. The coordinate points are specified in pixels (or world coordinates, if those were defined with an [XPRINT SCALE](#) statement). If executed without a host printer attached, [error 57](#) is generated.

See also [XPRINT ATTACH](#), [XPRINT GET POS](#)

## XPRINT SET QUALITY statement

# XPRINT SET QUALITY statement

**Purpose** Set the print quality for a [host printer](#).

**Syntax** XPRINT SET QUALITY *qual&*

**Remarks** XPRINT SET QUALITY sets the print quality setting for the host printer. The value 1 is draft mode, 2 is low resolution, 3 is medium resolution, and 4 is high resolution. It should be noted that some printers only allow higher resolutions to be set from the printer dialog (in [XPRINT ATTACH CHOOSE](#)). If no host printer is attached, or the printer does not support print quality settings, [error 57](#) is generated.

See also [XPRINT ATTACH](#), [XPRINT GET QUALITY](#)

## XPRINT SET STRETCHMODE statement

# Keyword Template

**Purpose**

**Syntax**

**Remarks**

**See also**

**Example**

# XPRINT SET STRETCHMODE statement New!

**Purpose** Sets the default bitmap stretching mode for the current [DC](#).

**Syntax** XPRINT SET STRETCHMODE *ModeExpr*

**Remarks** There are several operations in PowerBASIC which involve stretching or condensing images on bitmaps, most notably [XPRINT STRETCH](#). As individual pixels must be added or removed, there is a good chance that the quality of the image will be degraded. However, if you describe the nature of the image by defining a StretchMode, you can

substantially enhance the appearance.

The default StretchMode is maintained individually for each DC. You can set the default mode with this statement, or retrieve it with [XPRINT GET STRETCHMODE](#). Of course, you can also override the default StretchMode when you execute one of the affected statements.

The 4 stretch mode equates are predefined in PowerBASIC.

|                               |   |                                                                                                                                                                                                                                             |
|-------------------------------|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| %<br><b>BLACKONWHIT<br/>E</b> | 1 | This is the default Windows stretch mode, and is most appropriate for monochrome bitmaps, or those with blocks of color. Performs a boolean OR of eliminated and existing pixels. It preserves black pixels at the expense of white pixels. |
| %<br>WHITEONBLAC<br>K         | 2 | Performs a boolean OR of eliminated and existing pixels. It preserves white pixels at the expense of black pixels.                                                                                                                          |
| %<br>COLORONCOL<br>OR         | 3 | Deletes eliminated lines of pixels without trying to preserve their information.                                                                                                                                                            |
| %HALFTONE                     | 4 | This provides the highest quality for complex color bitmaps. The average color of the destination pixel block is kept approximately the same as the source pixel block.                                                                     |

See also [XPRINT COPY](#), [XPRINT GET STRETCHMODE](#), [XPRINT RENDER](#), [XPRINT STRETCH](#)

## XPRINT SET TRAY statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## XPRINT SET TRAY statement

**Purpose** Sets a new active [printer tray](#).

**Syntax** `XPRINT SET TRAY numexp`

**Remarks** XPRINT SET TRAY changes the active paper tray on the [host printer](#) to that specified by *numexp*. The following equates are predefined in the compiler, and represent the most common paper trays:

|                      |   |    |
|----------------------|---|----|
| %DMBIN_UPPER         | = | 1  |
| %DMBIN_LOWER         | = | 2  |
| %DMBIN_MIDDLE        | = | 3  |
| %DMBIN_MANUAL        | = | 4  |
| %DMBIN_ENVELOPE      | = | 5  |
| %DMBIN_ENVMANUAL     | = | 6  |
| %DMBIN_AUTO          | = | 7  |
| %DMBIN_TRACTOR       | = | 8  |
| %DMBIN_SMALLFMT      | = | 9  |
| %DMBIN_LARGEfmt      | = | 10 |
| %DMBIN_LARGECAPACITY | = | 11 |
| %DMBIN_CASSETTE      | = | 14 |

`%DMBIN_FORMSOURCE = 15`

Other tray codes may be defined by Windows or printer suppliers, so your program should be written to consider that possibility. You can use [XPRINT GET TRAYS](#) to obtain a list of all the paper trays supported by the [attached](#) host printer.

If the printer does not support the tray change requested, [error 5](#) is generated. If executed without a host printer attached, [error 57](#) is generated.

See also [XPRINT ATTACH](#), [XPRINT GET TRAY](#), [XPRINT GET TRAYS](#)

## XPRINT SET WORDWRAP statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## XPRINT SET WORDWRAP statement **New!**

**Purpose** Enables or disables XPRINT WordWrap Mode.

**Syntax** `XPRINT SET WORDWRAP [NumrExpr&]`

**Remarks** XPRINT SET WORDWRAP enables or disables WordWrap mode for the host printer which is currently [attached](#) to the XPRINT [stream](#). It has no effect on any other printer. If *NumrExpr&* is [true](#) (non-zero), WordWrap mode is enabled. If [false](#) (zero), WordWrap mode is disabled. If *NumrExpr&* is missing, the default is to enable WordWrap Mode.

With WordWrap Mode, you can control how PowerBASIC [prints text](#) on an XPRINT page when it reaches the end of a line. Since a host printer operates on a full page basis, the default is to ignore text which is printed past the end of the line.

When WordWrap mode is enabled, it affects only [XPRINT PRINT](#) operations. If [XPRINT PRINT](#) attempts to display a word beyond the end of a row, the entire word is automatically wrapped to the first column of the next row.

See also [XPRINT CELL](#), [XPRINT GET WORDWRAP](#), [XPRINT PRINT](#), [XPRINT SET WRAP](#), [XPRINT SPLIT](#)

## XPRINT SET WRAP statement

# XPRINT SET WRAP statement **New!**

**Purpose** Enables or disables XPrint Wrap Mode.

**Syntax** `XPRINT SET WRAP [NumrExpr&]`

**Remarks** XPRINT SET WRAP enables or disables wrap mode for the host printer which is currently [attached](#) to the XPrint [stream](#). It has no effect on any other printer. If *NumrExpr&* is [true](#) (non-zero), wrap mode is enabled. If [false](#) (zero), wrap mode is disabled. If *NumrExpr&* is missing, the default is to enable Wrap Mode.

With Wrap Mode, you can control how PowerBASIC [prints text](#) on an XPRINT PAGE when it reaches the end of a line. Since a host printer operates on a full page basis, the default is to ignore text which is printed past the end of the line.

When Wrap Mode is enabled, it affects only [XPRINT PRINT](#) operations. If XPRINT PRINT attempts to display a character beyond the end of a row, it is automatically wrapped to the first column of the next row.

See also [XPRINT CELL](#), [XPRINT GET WRAP](#), [XPRINT PRINT](#), [XPRINT SET WORDWRAP](#), [XPRINT SPLIT](#)

## XPRINT SPLIT statement

# Keyword Template

Purpose

Syntax

Remarks

See also

Example

## XPRINT SPLIT statement New!

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>  | Splits a<br>into two parts for <a href="#">printing</a> with XPRINT.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Syntax</b>   | <code>XPRINT SPLIT [WORD] MainStr, Part1Len TO Part1Var, Part2Var</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Remarks</b>  | <p>Generally speaking, XPRINT SPLIT allows you to determine how much text will fit on a line (or a line section), so you don't overrun the end. This is critical with variable-width <a href="#">fonts</a>. Since these text characters have different widths, you cannot rely on a simple character count.</p> <p>XPRINT SPLIT separates the <i>MainStr</i> string expression into two parts, which are then assigned to the two string variables specified by <i>Part1Var</i> and <i>Part2Var</i>. The expression <i>Part1Len</i> specifies the maximum width of the print field, using page units (<a href="#">pixels</a>/points, <a href="#">scaled</a> units). After completion of XPRINT SPLIT, the <i>Part1Var</i> will contain those characters which can be safely printed in the print field. The <i>Part2Var</i> will contain the remaining characters, which might be printed on following lines.</p> <p>Since this operation creates a "line break" not contemplated in the original text, you may have to modify the results in order to obtain the best appearance. For example, it's usually best to remove any leading spaces from <i>Part2Var</i> before printing it.</p> |
| WORD            | If the WORD option is included, PowerBASIC guarantees that <i>Part1</i> will not end on a partial word. This may require that <i>Part1Len</i> is adjusted to a smaller value. In that case, <i>Part2Var</i> would be assigned these characters to compensate.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>See also</b> | <a href="#">XPRINT CELL</a> , <a href="#">XPRINT SET FONT</a> , <a href="#">XPRINT SET WORDWRAP</a> , <a href="#">XPRINT SET WRAP</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

## XPRINT STRETCH statement

# XPRINT STRETCH statement IMPROVED

|                |                                                                                                                                                                                                                                                                                     |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | Copy and resize a<br>to the XPRINT page.                                                                                                                                                                                                                                            |
| <b>Syntax</b>  | <code>XPRINT STRETCH hBmp, ID, (x1,y1)-(x2,y2) TO (x3,y3)-(x4,y4) [,Mix, Stretch]</code><br><code>XPRINT STRETCH PAGE hBmp, ID [, Mix, Stretch]</code>                                                                                                                              |
| <b>Remarks</b> | You can copy a complete bitmap, or a portion of it, to the XPRINT page, while resizing it to a larger or smaller size. The parameter <i>hBmp</i> specifies the handle of the source bitmap or <a href="#">window</a> . The parameter <i>ID</i> is the <a href="#">control ident</a> |

with [CONTROL ADD GRAPHIC](#). *ID* must be zero (0) for a [GRAPHIC WINDOW](#) or a

. The destination of the stretch operation is always the [attached](#) XPRINT page. The bitmap is automatically stretched to fit the destination parameters. You must use care that your parameters are valid for the specified bitmaps, or the operation will be undefined.

The second form, XPRINT STRETCH PAGE, is a shortcut for copying a complete bitmap to the [clip](#) or [clipboard](#) page. The image is automatically stretched or condensed to fit the target appropriately.

#### Mix

If the Mix parameter is included, it is one of the values in the following table. If not specified, a default of 0 is presumed. There are 16 mix modes available to use for mixing drawing colors with the colors which already exist at the drawing location. The mix mode equates are predefined in PowerBASIC.

|                     |                                                                                                       |
|---------------------|-------------------------------------------------------------------------------------------------------|
| %mix_Blackness      | Pixel is always 0 (black).                                                                            |
| %mix_NotMergeSrc    | Pixel is the inverse of the MergeSrc color.                                                           |
| %mix_MaskNotSrc     | Pixel is a combination of the colors common to both the pixel and the inverse of the MergeSrc color.  |
| %mix_NotCopySrc     | Pixel is the inverse of the pen color.                                                                |
| %mix_MaskSrcNot     | Pixel is a combination of the colors common to both the source and the inverse of the MergeSrc color. |
| %mix_Not            | Pixel is the inverse of the pixel color.                                                              |
| %mix_XorSrc         | Pixel is a combination of the colors in the source and in the pixel, but not in both.                 |
| %mix_NotMaskSrc     | Pixel is the inverse of the MaskSrc color.                                                            |
| %mix_MaskSrc        | Pixel is a combination of the colors common to both the source and the pixel.                         |
| %mix_NotXorSrc      | Pixel is the inverse of the XorSrc color.                                                             |
| %mix_Nop            | Pixel remains unchanged.                                                                              |
| %mix_MergeNotSrc    | Pixel is a combination of the source color and the inverse of the pixel color.                        |
| <b>%mix_CopySrc</b> | Pixel is the source color (default).                                                                  |
| %mix_MergeSrcNot    | Pixel is a combination of the source color and the inverse of the pixel color.                        |
| %mix_MergeSrc       | Pixel is a combination of the source color and the pixel color.                                       |
| %mix_Whiteness      | Pixel is always 1 (white).                                                                            |

#### Stretch

If the Stretch parameter is included, it is one of the values in the following table. If not included, or it is 0, the stretch mode is unchanged. An appropriate choice of stretch mode can substantially enhance the quality of bitmaps. The stretch mode equates are predefined in PowerBASIC.

|                      |   |                                                                                                                                                                                                                                                        |
|----------------------|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>%BLACKONWHITE</b> | 1 | This is the default Windows stretch mode, and is most appropriate for bitmaps with large areas of white or those with blocks of color. Performs a boolean OR of eliminated and existing pixels. Preserves black pixels at the expense of white pixels. |
| %WHITEONBLACK        | 2 | Performs a boolean OR of eliminated and existing pixels. It preserves white pixels at the expense of black pixels.                                                                                                                                     |
| %COLORONCOLOR        | 3 | Deletes eliminated lines of pixels without trying to preserve their information.                                                                                                                                                                       |
| %HALFTONE            | 4 | This provides the highest quality for complex color bitmaps. The average color of the destination pixel block is kept approximately the same as the source.                                                                                            |

#### See also

[XPRINT COPY](#), [XPRINT RENDER](#), [XPRINT SET MIX](#), [XPRINT SET STRETCHMODE](#)

## XPRINT STRETCH PAGE statement

# XPRINT STRETCH statement

IMPROVED

#### Purpose

Copy and resize a bitmap to the XPRINT page.

#### Syntax

```
XPRINT STRETCH hBmp, ID, (x1,y1)-(x2,y2) TO (x3,y3)-(x4,y4) [,Mix, Stretch]
XPRINT STRETCH PAGE hBmp, ID [, Mix, Stretch]
```

#### Remarks

You can copy a complete bitmap, or a portion of it, to the XPRINT page, while resizing it to a larger or smaller size. The variable *hBmp* specifies the handle of the source bitmap or [window](#). The parameter *ID* is the [control identifier](#) with [CONTROL ADD GRAPHIC](#). *ID* must be zero (0) for a [GRAPHIC WINDOW](#) or a

. The destination of the stretch operation is always the [attached](#) XPRINT page. The bitmap is automatically stretched to fit the destination parameters.

destination parameters. You must use care that your parameters are valid for the specified bitmaps, or undefined.

The second form, XPRINT STRETCH PAGE, is a shortcut for copying a complete bitmap to the [clip](#) or [clip page](#). The image is automatically stretched or condensed to fit the target appropriately.

#### Mix

If the Mix parameter is included, it is one of the values in the following table. If not specified, a default of 0 is presumed. There are 16 mix modes available to use for mixing drawing colors with the colors which already exist at the drawing location. The mix mode equates are predefined in PowerBASIC.

|                     |                                                                                                       |
|---------------------|-------------------------------------------------------------------------------------------------------|
| %mix_Blackness      | Pixel is always 0 (black).                                                                            |
| %mix_NotMergeSrc    | Pixel is the inverse of the MergeSrc color.                                                           |
| %mix_MaskNotSrc     | Pixel is a combination of the colors common to both the pixel and the inverse of the MergeSrc color.  |
| %mix_NotCopySrc     | Pixel is the inverse of the pen color.                                                                |
| %mix_MaskSrcNot     | Pixel is a combination of the colors common to both the source and the inverse of the MergeSrc color. |
| %mix_Not            | Pixel is the inverse of the pixel color.                                                              |
| %mix_XorSrc         | Pixel is a combination of the colors in the source and in the pixel, but not in both.                 |
| %mix_NotMaskSrc     | Pixel is the inverse of the MaskSrc color.                                                            |
| %mix_MaskSrc        | Pixel is a combination of the colors common to both the source and the inverse of the MergeSrc color. |
| %mix_NotXorSrc      | Pixel is the inverse of the XorSrc color.                                                             |
| %mix_Nop            | Pixel remains unchanged.                                                                              |
| %mix_MergeNotSrc    | Pixel is a combination of the source color and the inverse of the pixel color.                        |
| <b>%mix_CopySrc</b> | Pixel is the source color (default).                                                                  |
| %mix_MergeSrcNot    | Pixel is a combination of the source color and the inverse of the pixel color.                        |
| %mix_MergeSrc       | Pixel is a combination of the source color and the pixel color.                                       |
| %mix_Whiteness      | Pixel is always 1 (white).                                                                            |

#### Stretch

If the Stretch parameter is included, it is one of the values in the following table. If not included, or it is the value 0, the stretch mode is unchanged. An appropriate choice of stretch mode can substantially enhance the quality of bitmaps drawn at a size. The stretch mode equates are predefined in PowerBASIC.

|                      |   |                                                                                                                                                                                                                                                      |
|----------------------|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>%BLACKONWHITE</b> | 1 | This is the default Windows stretch mode, and is most appropriate for bitmaps with simple patterns or those with blocks of color. Performs a boolean OR of eliminated and existing pixels. It preserves black pixels at the expense of white pixels. |
| %WHITEONBLACK        | 2 | Performs a boolean OR of eliminated and existing pixels. It preserves white pixels at the expense of black pixels.                                                                                                                                   |
| %COLORONCOLOR        | 3 | Deletes eliminated lines of pixels without trying to preserve their information.                                                                                                                                                                     |
| %HALFTONE            | 4 | This provides the highest quality for complex color bitmaps. The average color of the destination pixel block is kept approximately the same as the source.                                                                                          |

#### See also

[XPRINT COPY](#), [XPRINT RENDER](#), [XPRINT SET MIX](#), [XPRINT SET STRETCHMODE](#)

## XPRINT STYLE statement

# XPRINT STYLE statement

**Purpose** Set the line style to be used by various XPRINT statements.

**Syntax** XPRINT STYLE *linestyle*&

**Remarks** XPRINT STYLE determines the line style which will be used when drawing various graphical objects, while the width value is set to 1. When the width value is greater than one, Windows always interprets the style as 0 (solid).

Available line styles are:

|   |                 |
|---|-----------------|
| 0 | Solid (default) |
| 1 | Dash            |
| 2 | Dot             |
| 3 | DashDot         |

## 4 DashDotDot

**See also** [XPRINT ARC](#), [XPRINT ATTACH](#), [XPRINT BOX](#), [XPRINT ELLIPSE](#), [XPRINT LINE](#), [XPRINT PIE](#), [XPRINT WIDTH](#)

**Example**

```
' Draw a square box with blue, dotted lines
XPRINT WIDTH 1
XPRINT STYLE 2
XPRINT BOX (10, 10) - (110, 110), 0, %BLUE
```

## XPRINT TEXT SIZE statement

# XPRINT TEXT SIZE statement IMPROVED

**Purpose** Calculate the size of text to be printed on a [host printer](#).

**Syntax** XPRINT TEXT SIZE *txt\$* To *nWidth!*, *nHeight!*

*Function Form:*

*WidthVar!* = XPRINT(TEXT.SIZE.X, *txt\$*)

*HeightVar!* = XPRINT(TEXT.SIZE.Y, *txt\$*)

**Remarks** This statement calculates the total size of the printed text, based upon the current [font](#) for the host printer. The sizes returned are specified in [Page Units](#).

This allows you to easily calculate the appropriate print position, particularly when using a proportional font. If this statement is executed without a host printer [attached](#), [error 57](#) is generated.

**See also** [XPRINT CELL SIZE](#), [XPRINT CHR SIZE](#), [XPRINT SET FONT](#)

**Example**

```
FUNCTION PBMAIN
 ' The following example draws the text both horizontally
 ' and vertically centered on the host printer page

 LOCAL x, y, w, h, w2, h2 AS LONG
 LOCAL sText AS STRING
 sText = "PowerBASIC"

 XPRINT ATTACH "Lexmark C750"
 XPRINT COLOR %BLUE, -2 ' blue text, clear background
 XPRINT FONT "Times New Roman", 18, 3 ' 18p, bold, italic

 XPRINT GET CLIENT TO w, h ' get client size
 XPRINT TEXT SIZE sText TO w2, h2 ' get text size
 x = (w-w2) / 2 ' centered x-pos
 y = (h-h2) / 2 ' centered y-pos

 XPRINT SET POS (x, y) ' set position
 XPRINT sText ' draw the text
 XPRINT CLOSE
END FUNCTION
```

## XPRINT WIDTH statement

# XPRINT WIDTH statement

**Purpose** Set the graphic line width to be used by various statements..

**Syntax** XPRINT WIDTH *ncPixels&*

**Remarks** XPRINT WIDTH determines the line width which will be used when drawing various

graphical objects. The default width is 1 pixel. The width is always specified in pixels, regardless of any [XPRINT SCALE](#) option. When the width is set to a value greater than 1, [XPRINT STYLE](#) parameters are always interpreted as 0 (solid).

**See also** [XPRINT ARC](#), [XPRINT ATTACH](#), [XPRINT BOX](#), [XPRINT ELLIPSE](#), [XPRINT LINE](#), [XPRINT PIE](#), [XPRINT STYLE](#)

**Example**

```
FUNCTION PBMAIN
 XPRINT ATTACH "Lexmark C750"
 ' Draw a square box with thick, red lines
 XPRINT WIDTH 10
 XPRINT BOX (10, 10) - (110, 110), 0, %RED
 XPRINT CLOSE
END FUNCTION
```

## Support

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### Technical Support

# Technical Support

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