



<Autosax>

This instrument is an automated and computer controlled acoustical saxophone. It is one of the very first automated instruments we designed and its building history, starting off in 1989, went through four very distinct phases, each realizing a different approach to the problems posed by properly automating a saxophone. In the very first version, the sound production relied on computer controlled acoustical feedback in the bore of the instrument. This version was dropped for the response was sluggish and the pitch produced quite unreliable. The second version used a compression driver driven by a frequency synthesizer. This version was evaluated as very reliable, but soundwise, far away from anything like a realistic and convincing saxophone sound. The third version (2007) used a quite sophisticated automated reed mechanism. The sound was indeed very good and it was also capable of producing a wealth of multiphonics, slaptongues and other special effects. The sound production was realized through an acoustical but computer controlled two-phase reed mechanism using a compressor for the wind supply and a fast regulating conical valve for expression control. This version was dropped in 2009 mainly because the ambitus was limited to the lowest octave. The range below the 'normal' range actually sounded best and hence we extended it in the Midi support down to midi note 0. However, we never got the instrument to overblow properly and reliably... The new sounds the mechanism could produce were a bonus, but quite unrelated to the saxophone itself. For this reason, we decided to save the sound production mechanism for a future project and a novel robotic instrument. The fourth version took off shortly after our quite successful realizations of brass instruments (<Korn> the cornet, <So> the sousaphone, <Heli> the helicon and <Bono> the trombone) as well as <Ob> the [automated oboe](#), making use of acoustical impedance converters driven by a compression driver and a capillary conduct. For this version we carried out many experiments using acoustic impedance converters. In a first design we made the acoustic impedance converter such as to mimic as well as possible the behavior of the original mouthpiece with reed. Thus, instead of using a circular capillary channel driving the saxophone, we used a small slit. The whole construction was made from massive staff brass material on the lathe, the slit filed out manually. A quite inexplicable side effect of applying this construction to the saxophone, was that it lowered the whole tuning of the instrument by a minor third. Thus the C-melody saxophone came to behave like an A instrument. In the last and most successful experiment so far, we used a regular capillary again, but with a much reduced trajectory as compared to the first version. The saxophone now behaves again as a C instrument...

The lightbulbs -clearly visible on the picture- are not just a visual feature but serve as voltage dependent resistors in series with the solenoid valves controlling the keys, thus preventing overheating of the coils when many keys are opened and stay opened for a long time. Different and non standard fingerings can be applied, leading eventually to multiphonics, particularly if the feedback mechanism is in use.

The instrument uses 3 PIC microcontrollers, one is a DS type used for the reed control, the tuning and the intonation, one taking care of the keys and one for the volume and feedback levels.

The normal note range is 45 to 72, but due to the possibilities of the reed mechanism, we provided in an extended range in the low end, descending down to even below midi note 33. Of course users should not expect a realistic C-melody saxophone sound from this range. The sounds produced in this extended range are far too interesting -although not as good as those produced in the third version of the robot- to leave them out of the range of possibilities. High notes are implemented up to midi note 93, but again, in this range users should not expect any realism.

The development of this robot took us some 20 years and <Autosax> has known 4 different working realizations in its history. At the time of this writing, 2010, we are at version 4, and version 5 may be coming...