# Synton Syntovox 221

## *SYNTOVOX 221*

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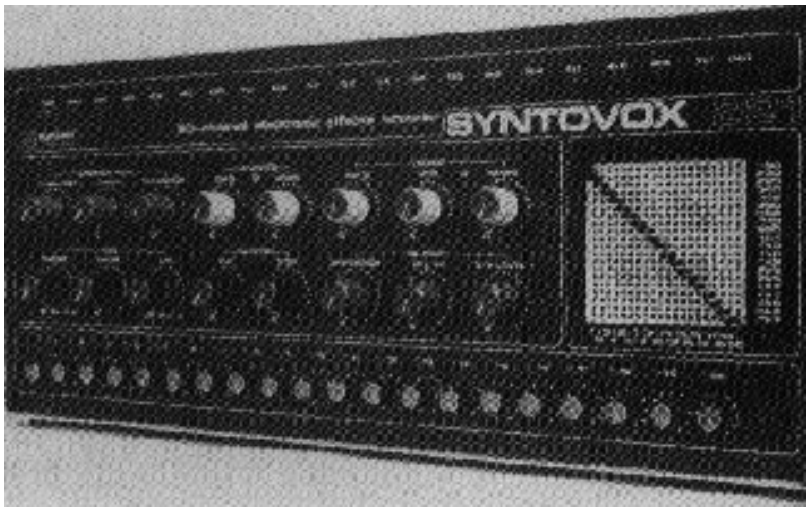
General Description by Synton Holland, date/year ?




ANALYZER Syntovox 221 basically consists of a 20-channel audio analyzer, synthesizer, and a control system. The analyzer section contains 20 specially designed filters, accurately tuned and trimmed for center frequency, bandwidth, gain and flatness. Center frequencies have approximately 1/4 octave spacing, the filter at the low end of the audio range being a low pass filter, and the filter at the high end being a high pass filter. Filters in between are bandpass filters. This design provides a precise analysis of the audio spectrum between approximately 30 Hz and 16 kHz. Within a dynamic range of 60 dB, frequencies in a complex audio signal can be detected and converted into control voltages, which are fed to a row of 20 LEDs, displaying the energy in each frequency band. The analyzer is located in the upper part of Syntovox 221, constructed on a separate printed circuit board. The 20 control voltage outputs of the analyzer are directed to a 20x20 matrix system and to the multiway connector at the back panel of Syntovox 221. These outputs have a range of 0.. .5V and can be used to control external devices. For computer applications a 20 channel multiplexed AD converter should be used to be able to store audio analyses.
SYNTHESIZER The 20-channel synthesizer is also composed of one low pass and one high pass filter and 18 band pass filters, identical to the analyzer. The synthesis filter bank has one audio input and one audio output. Each of the 20 filters is followed by a modulator with a control voltage input whose sensitivity can be ad'iusted by means of the potentiometers in the bottom row of Syntovox 221. These attenuators are numbered 1. .20 and are routed to the corresponding matrix columns and the control voltage inputs at the back panel multiway connector. The amount of control voltage fed to the synthesizer modulators can be monitored by means of the LEDs near the control knobs.

MATRIX The control connections between analyzer and synthesizer are made via the 20 x 20 matrix system. Any control voltage output can be patched to any control voltage input. Timbre can be changed easily by shifting all analysis information up ~r down the synthesis filter bank. In the normal mode all analyzer control outputs are connected to corresponding synthesizer control inputs with the matrix pins in the diagonal position from the upper left corner to the bottom right corner. A signal applied to the audio input of the synthesizer will be shaped according to the signal which is being examined in the analyzer section. It is very important to understand that in this respect the vocoder acts as a modulator which imposes the characteristics of one audio signal upon another audio signal. So, if speech is applied to the analyzer input, the intelligibility characteristics are imposed upon any other signal, fed into the synthesizer, provided that signal does contain a reasonable amount of harmonics - it will not work on a sine wave!
CONTROL SYSTEM Since speech is a composite of voiced sounds (A,E,I,O,U, etc.), and unvoiced sounds (sibilants, K,P,T, etc.), a detection system to discriminate these phenomena is necessary. When Syntovox 221 is used for speech synthesis this voiced/unvoiced detector feeds noise to the synthesis filter bank when a sibilant is detected, and simultaneously the replacement sound at the synthesizer input is cut off. Voiced and unvoiced decisions can be used for triggering external devices, and it is also possible to control the operation of the voiced/unvoiced detector externally. In that case the INHIBIT control should be used to block the internal circuit which normally drives the detector. Control inputs and outputs are available at the multiway connector at the back panel.
INTERNAL PULSE GENERATOR Syntovox 221 is equipped with a pulse generator for effective speech synthesis. This pulse generator is trol led andcan be modulated externally, or with the frequency control oscillator and random generator. The low frequency control oscillator can be used to vibrato whose speed and depth can be controlled. The random generator has two outputs to control quency. One of the outputs generates a stepl ike quency each time a short interval in the speech ted; (STEP). A very low frequency random signal create a continuously changing pitch; (VLF).
EXTERNAL SOUND SOURCES External sound sources can be modulated by the analyzer input signal as well. Both UNVOICED and VOICED paths in Syntovox 221 have a separate input (B and C respectively) for applying sound material to the synthesis filter bank, other than the internally generated pulse and noise.
FILL-IN CONTROL The FILL-IN control was designed for special speech synthesis purposes. When a replacement sound is to be modulated with speech, for instance, a signal only will appear at the output of Syntovox 221 when there is information from the analysis filter bank. The FILL-IN control is meant to fill the gaps between spoken words by automatically fading-in the replacement sound, so that the origin and character of the replacement sound will not be obscured. Immediately this replacement sound will be faded out when speech is applied to the analyzer. The amount of FILL-IN can be controlled with a potentiometer.
CLEANFEED Next to the analyzer input attenuator two controls labelled SYNTH and CLEANFEED are situated. The CLEANFEED control is a direct feed from (speech) input to output, and the SYNTH control feeds the input signal directly to the synthesis filter bank. This facility offers very interesting possibilities when instead of speech the signal of a music synthesizer is processed via the analyzer input. By exclusively feeding noise to both voiced and unvoiced sections, the sound of the music synthesiser will be enriched with additional harmonics, selectively filtered out of pink noise.
APPLICATIONS: Analyzing Speech; Synthesizing speech; Phonetic research; Formant shifting; Imposing speech upon sounds of mechanical devices, wind, sea, cries of animals, etc.; Imposing speech upon sounds of musical instruments, choirs, orchestras etc.; Imposing speech upon other human voices; Alternating timbre of

instruments; Imposing characteristics of one instrument upon another one; Adding harmonics and non-harmonic overtones to instruments; Generating speech (computer interface optional); Spoken instructions to computers (interface optional); Controlling synthesisers and other voltage controlled units.