

E430 Morphing SVF

www.synthtech.com/eurorack/E430



What is the E430?

The E430 Morphing SVF (State Variable Filter) is a specific "class" of VCF (Voltage-Controlled Filter). A SVF uses a fixed architecture: 2 series-connected integrators with feedback. The reason it's called SVF is left as an exercise for the reader (warning, calculus involved). The E430 is based on the filter found in the Oberheim SEM (Synthesizer Expansion Module), which was designed in conjunction with ARP's Dennis Colin to expand the ARP2600 and Odyssey. SynthTech then added a special voltage-controlled cross-fader invented by Juergen Haible called an Interpolating Scanner. This allows a single CV to fade, with equal power, across multiple audio channels (in this case 3, although Juergen built some with as many as 12). The original circuitry was designed for the MOTM synthesizer in 2005, but never went to production.

The SEM filter has several distinct characteristics which the E430 duplicates:

- Low frequency self-resonance begins at 2Hz, which is an astonishing low frequency
- The E430 does not try to "improve" anything about the original schematic, uses vintage parts
- There is no self-resonance, but using external patch feedback it can (HP to IN for example)
- The resonance is not affected by nominal signal strength
- The filter does not track 1V/OCT as well as other VCFs
- It has lower maximum self-oscillation frequency: -14.7KHz max which is still pretty high

Connecting to the power supply

The E430 uses a standard 16-pin to 10-pin Euro power cable. The -12V is the Red Stripe (Pin 1), and this is indicated on the pc board. Reverse-supply diodes will prevent the module from being damaged if the cable is reversed.

OVERVIEW

The E430 has 2 audio inputs **IN1** and **IN2**, which accept standard by pk-pk Euro audio levels. Attenuators are set so that if 2 inputs are used, each at 12:00 position will not overdrive the filter. This filter can be over-driven, note that it has more of a tendency to 'clip' the positive top of the waveform rather than 'round off' like say a E490 Moog ladder VCF. When over-driven the resonance peaks will shift in frequency which is a unique SVF characteristic. Some users may enjoy this effect.

There are 3 CV inputs: **1V/OCT** tracking (which has a rear trimmer to adjust), **FM1 IN** which has a reversing attenuator, and **FM2 IN**, which is controlled by a dedicated attenuator.

The main panel controls are:

FREQUENCY: sets the filter's corner frequency from 2Hz to the upper limit of the RANGE trimmer. Applying +5V to 1V/OCT will drive the filter to ~15KHz which is the maximum range. This setpoint can be adjusted by the rear trimmer.

RESONANCE: sets the feedback amount. Note that this panel control is **dual-purpose**:

- a) With no RES CV patched, the panel control adjust the full resonance range
- b) With a CV plugged in, this panel control becomes an attenuator for the CV.

FILTER MORPH: sets the filter response of the **MORPH OUT**. Note that this panel control is **dual-purpose**:

- a) With no **M.CV** patched, the panel control sets the **MORPH OUT** response
- b) With a CV plugged in, this panel control becomes an attenuator for the CV.

The Interpolating Scanner Section (Filter Morphing)

The Scanner will cross-fade 3 different filter responses, based on the status of the pushbutton **MORPH**. When the button is unlit, the scanner goes through LP <> Bandpass <> HP. When the button is lit, the scanner goes through LP <> Notch <> HP. Clicking the button will toggle between these modes. The mode is recalled during power cycles.

Note that there are 3 "regions" of the panel control **FILTER MORPH**. This divides the scale into thirds. So straight up 12:00 is NOT the middle response 100%.

The CV input for the scanner is on the jack **M.CV** and this has been designed to be a 0-5V signal. If you feed in a bipolar signal (such as an LFO), there is a full-wave rectifier that will convert -5V to 0V signal portion to +5V to 0V internally, with some DC offset to make the sweeping non-symmetrical (Juergen thought this was "really cool" so I left it in).

Changing the button LED color

If you hold the button down while lit for 1 second, the colors will cycle through the alternate selections. When you find one you prefer, release the button and wait 5 seconds. The color will then 'lock' into the recovery memory. You can change it as many times as you want. The selections are fixed using current drivers (not PWM) in order to reduce noise.

General Info

CV Inputs: -5V to +5V, DC to 8KHz.

Audio Input: +-5V pk-pk per input.

Self-resonance range: 2Hz to 14KHz.

Power supply range: +-11V to +-13V

Power supply current (typical): -12V @30ma +12V @40ma 10-pin male shrouded connector

Size: 16HP wide, 40.5mm depth behind panel (power cable inserted)

1V/OCT trimmer:

There is a trimmer to adjust the VCO scaling to 1V/OCT as needed. Use 100Hz - 400Hz (2 octave jumps) to set for best tracking over the audio range.

RANGE trimmer: sets the maximum frequency of self-resonance. Be aware this setting will determine the dynamic range of any FM inputs added to the panel setting.