
YOG-SOTHOTH
Filter Freq
Resonance
CV attn
Drive
Vactrol Env
Exp In
VCA Offset
Audio In
VCF In
VCA In
Out

Yog-Sothoth

Yog-Sothoth knows the gate. Yog-Sothoth is the gate. Yog-Sothoth is the key and guardian of the gate. Past, present, future, all are one in Yog-Sothoth…

– Howard Philips Lovecraft

Yog-Sothoth is an emulation of the low pass gates from early modular synthesizers such as the Buchla 100 series. The design incorporates a simulation of a vactrol—an early method for voltage control still valued for "organic" envelope shapes it produces—and models of the signal flow of a discrete, Sallen-Key filter. It also incorporates a voltage-controlled amplifier (**VCA**) that can be used in conjunction with the filter.

When modeling an analog design, it is necessary to isolate which elements are aesthetically relevant. This is not always apparent from simply looking at a schematic, or even by punching in values into circuit modeling software. Often, the important aspects of an analog design can only be understood through extended use of these systems. We have extensive experience using the San Francisco Tape Music Center prototype Buchla system at Mills College, and have incorporated some of our favorite aspects of the design into the Madness suite. With Yog-Sothoth, we incorporated the mild post-filter saturation that is characteristic of early analog filters, and made sure that saturation/drive circuits produced the same harmonics in self oscillation as these early designs.

I/O:

Yog-Sothoth has six inputs and one output. **Audio In** is where you send the signal you want to process and **Out** is where the fully processed signal comes out.

The rest of the available inputs are for control voltage, although it is also possible to send in audio-rate signal to frequency modulate the filter, or to amplitude modulate the incoming signal via the **VCA**. **VCA CV** and **VCF CV** are both linear inputs and have individual attenuators, as well as a master attenuator for all CV inputs. **Exp In** bends linear input voltages along an exponential curve, before sending the signal to both the VCF and the VCA.

The **VCF CV** input will take a trigger, gate, or any sufficiently short transient and turn it into an envelope. Mastering the use of this input will allow you to create truly unique sounds with envelopes not unlike those found in plucked acoustic instruments. You will hear this sound on Morton Sobotnik's Silver Apples of the Moon, and Suzanne Cianni's early recordings (among many others). This section uses a simulated vactrol to produce its envelopes. For more on vactrols, see below.

In addition to these standard controls, Yog-Sothoth also allows for voltage control of the resonance and overdrive of the filter. By externally controlling these inputs, vastly different timbres can be obtained.

Knobs

Yog-Sothoth has eight knobs that the user may adjust in real-time: **Filter Frequency**, **Resonance**, **Drive**, **VCA offset**, **Vactrol Envelope Response**, as well as attenuators for the **VCA**, **VCF** and **Exp** CV inputs.

Low-pass filters remove high frequencies, so the **Filter Frequency** knob sets the highest frequency that will pass through the filter when the input to the various CV inputs is 0 volts. You can also think of it as a frequency offset to the various CV ins. Similarly, **VCA** offset controls how much of the input signal is attenuated before the signal passes through the output--assuming that the CV coming into the **VCA** In is 0 volts.

Resonance controls how much the output of the filter is fed back into itself, creating resonant peaks as the filter frequency is swept, and producing wild self-oscillations depending on the amount of resonance and the amplitude of the input signal.

Drive is an addition to the standard LPG design that allows for even greater sound-sculpting capabilities. Typically the amount of overdrive or **Drive** is determined by the amplitude of the input signal. We have decoupled these controls in order to let the user determine the exact amount of drive that they want at differing amplitude levels. Since both the amplitude and the drive affect the resonance/feedback this gives you even more room to experiment.

Finally, **Vactrol Envelope** is a unique digital feature that allows the user to control the shape of vactrol response. The further the knob is turned clockwise, the shorter the envelope response is.

Signal Path:

Vactrols:

Vactrols are an early implementation of voltage control, also known as optocouplers. They consist of a photo-resistor and a light source, typically an LED, so that when you send voltage into the LED and increase the brightness, you control how much voltage can pass through the photo-resistor.

Some early synthesizers, most notably those made by Don Buchla, used vactrols, and this gave them some characteristic properties, most notably their ability to convert a trigger to an envelope that was great for percussive and plucked string sounds. The reason this happens is that photocells don’t change resistance immediately as the light hits them, there is a lag, and the attack is shorter than the decay, which is very similar to how most sounds occur in the real world.