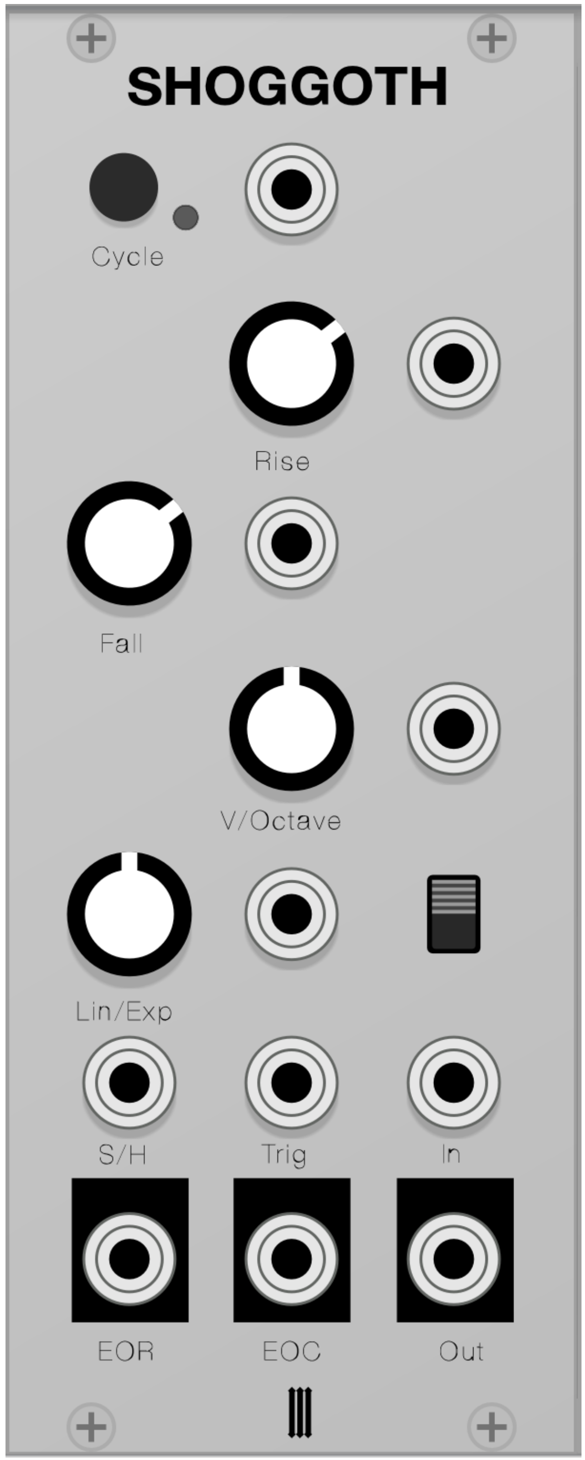

SHOGGOTH
Cycle
Rise
Fall
V/Octave
Lin/Exp
S/H
Trig
In
EOR
EOC
Out

Shoggoth

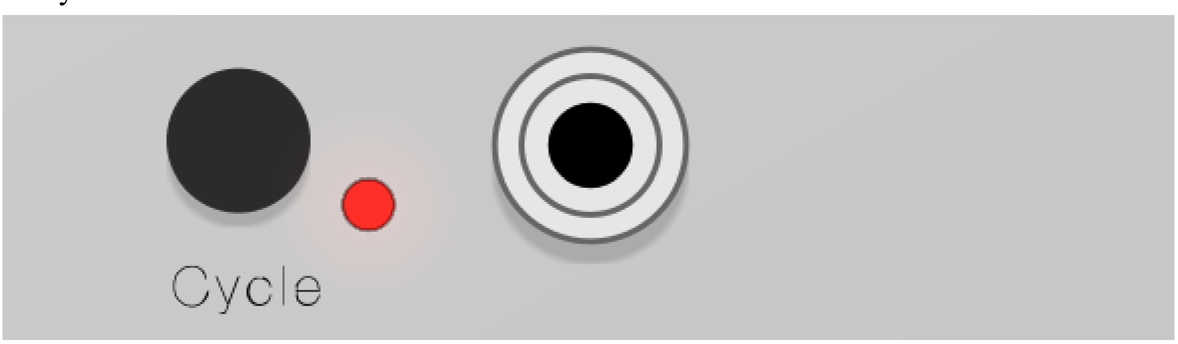
Formless protoplasm able to mock and reflect all forms and organs and processes - viscous agglutinations of bubbling cells - rubbery fifteen-foot spheroids infinitely plastic and ductile - slaves of suggestion, builders of cities - more and more sullen, more and more intelligent, more and more amphibious, more and more imitative! Great God! What madness made even those blasphemous Old Ones willing to use and carve such things?

- Howard Philips Lovecraft

Shoggoth is an amorphous mass that assumes the shape of the task at hand. It can operate as a filter, slew rate limiter, low frequency oscillator, audio-rate oscillator, logic gate, gate to trigger converter, sample rate limiter, random voltage generator, envelope generator, and many other uses. Given the patch-programmable nature of the device, it is best to describe each feature, rather than describing what it does, since it can do many things. The fish rots from the head down, so let's begin with the top of the module:

Cycle

With cycle enabled, the module functions as an oscillator. It can run up to audio rate. Next to the cycle button there is a gate input. When the gate is high, the module will oscillate, when it is low, the module will stop oscillating. This can be useful for timed bursts of triggers/gates or as a hard gate for chiptune-esque sounds when running at audio rate. Keep in mind that the gate input always overrides the manual button.

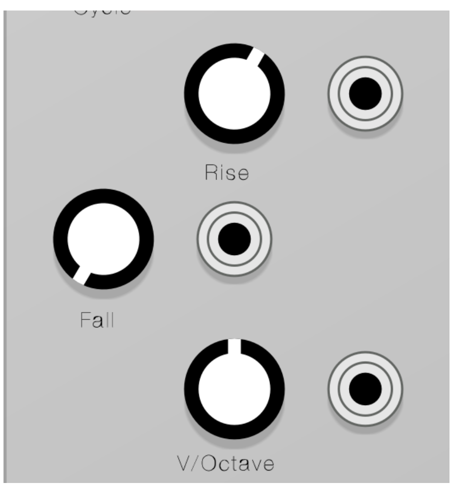


Rise, Fall, and Volt Per Octave

From here on out the functionality will change depending on what mode you are in and what you have patched in the module. In **cycle mode**, **rise** and **fall** control the shape of the waveform and also the rate of oscillation. Think of it this way: **rise** controls how long it takes the waveform to reach its peak, **fall** controls how long it takes the voltage to recede from that peak. If you reduce the time it takes to reach its peak, the faster it will oscillate, the same is true for the time it takes to fall from the peak. The frequency of the oscillator will always equal the time it takes to **rise** plus the time it takes to **fall**. The **volt-per octave knob** covers 10 octaves, meaning that the total **rise** and **fall** time will be increased or decreased by a total of ten octaves depending on the position of the knob. Because the primary use of the module occurs at control (aka sub-audio) rates, the lower octaves are prioritized; therefore any control voltage entering the V/Octave input is offset by -5 volts within the module. This may seem odd, but it allows for more precise control of the low frequencies on the module itself.

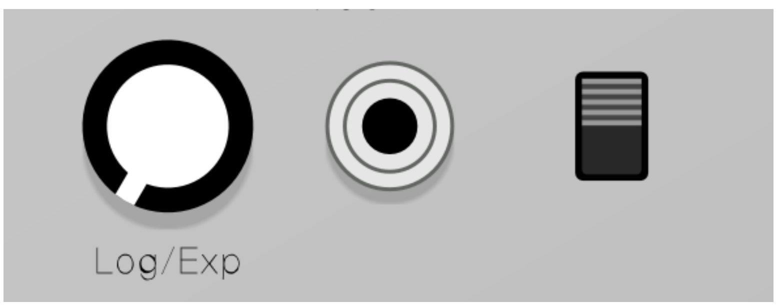
If sending an external signal into the module, Shoggoth will now act as a slew limiter. This means that **rise** and **fall** now control the rate at which voltage changes. For example, if you sent in a sequence of alternatively rising and falling notes and set the **rise** and **fall** knobs to the positions indicated in the image below, the rising notes would slowly glissando before immediately falling to the next note.

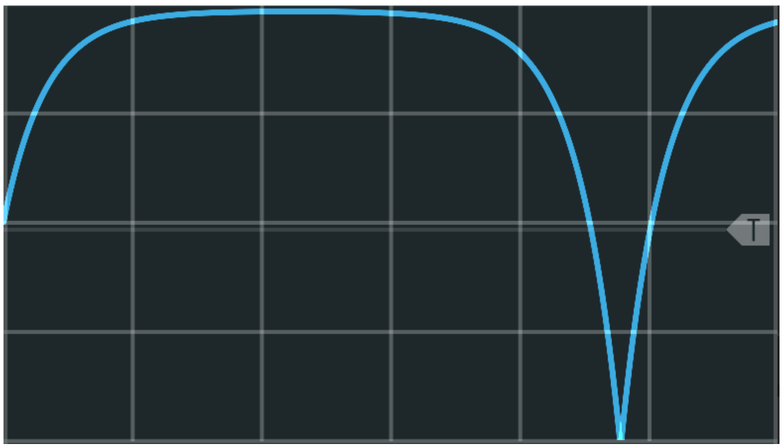
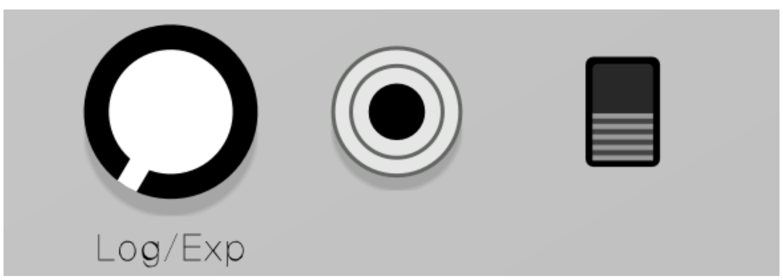
Since each of these can be externally controlled via the input to the right of the knob, it is possible to create continually modulating waveshapes or to sequence glissando on a per-note basis.

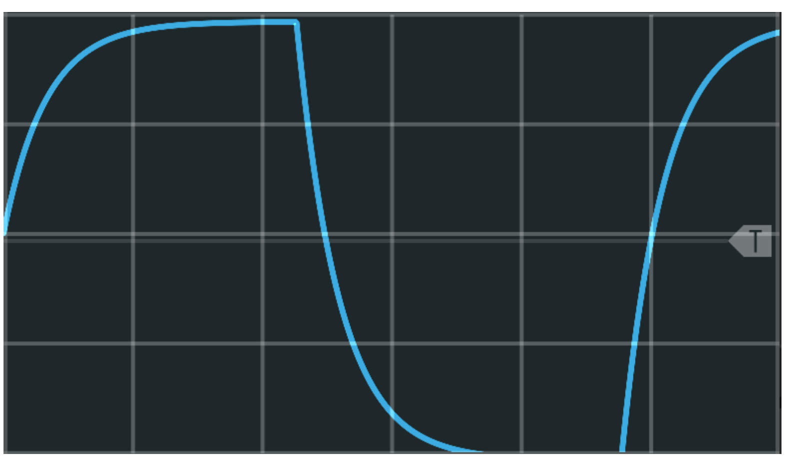


Logarithmic to Exponential Control

This control sets the curve of the oscillator/slew. To the extreme left, the oscillator will rise more slowly as it approaches its peak (aka a **logarithmic** curve). In the center position it will rise and fall linearly. To the extreme right, the oscillator will rise fast as it approaches its peak (aka an **exponential** curve). When the symmetry switch is switched up into the **ON** position, as it is in the figure below, the **logarithmic** and **exponential** curves will be applied to the **rise** and **fall** equally, if it is not engaged, the **fall** time will be exponential when the **rise** time is set to a **logarithmic** curve and will be **logarithmic** when the rise time is set to **exponential**.





Sample and Hold, Trigger In, Signal In

As with the previous sections the function of these inputs depends on whether or not cycle mode is engaged. If **cycle** mode is enabled, sending a gate into the sample and hold input will "hold" the instantaneous voltage of the oscillator as long as the gate is high. This produces “staircase” waveforms where a continuous voltage is broken up into a series of discrete steps.

If you sample at a higher rate than your oscillator, the S/H process will not be audible, but if it is lower than the rate of the oscillator you will hear aliasing. While it is not within the scope of this manual to explain the Nyquist-Shannon sampling theorem, the gist is that by sampling at a lower rate than twice the highest harmonic of the original waveform, you will introduce “aliases”--additional audible waveforms. These sounds are characteristic of many early synthesizers and samplers (samplers especially). When **cycle** is disengaged, the waveform entering the signal input will be sampled.

When **cycle** is engaged, The **trigger input** will reset the **rise** and **fall** cycle (this is referred to as “sync” on most audio-rate oscillators). When **cycle** is disengaged, a trigger into this input starts a single instance of the rise and fall process.

The **signal input** is bypassed when **cycle** is engaged. When **cycle** is disengaged, the signal processing described in the preceding sections will occur to whatever signal is received in this input.

End of Rise, End of Cycle, Signal Out

All things move toward their end, but like a multicursal labyrinth (or the human digestive system), there are multiple exits to Shoggoth. **End of Rise** outputs a gate from the time the voltage has completed its rise, to the time the voltage falls back to zero. **End of Fall** outputs a gate from the time the voltage has completed it’s fall until it rises to its peak voltage. Since these outputs effectively provide two clock pulses per clock cycle it can be used as a clock multiplier. Multiple Shoggoths can be chained together for additional multiplications.

Finally, signal out is your original signal, chopped and slewed, you may or may not recognize it.