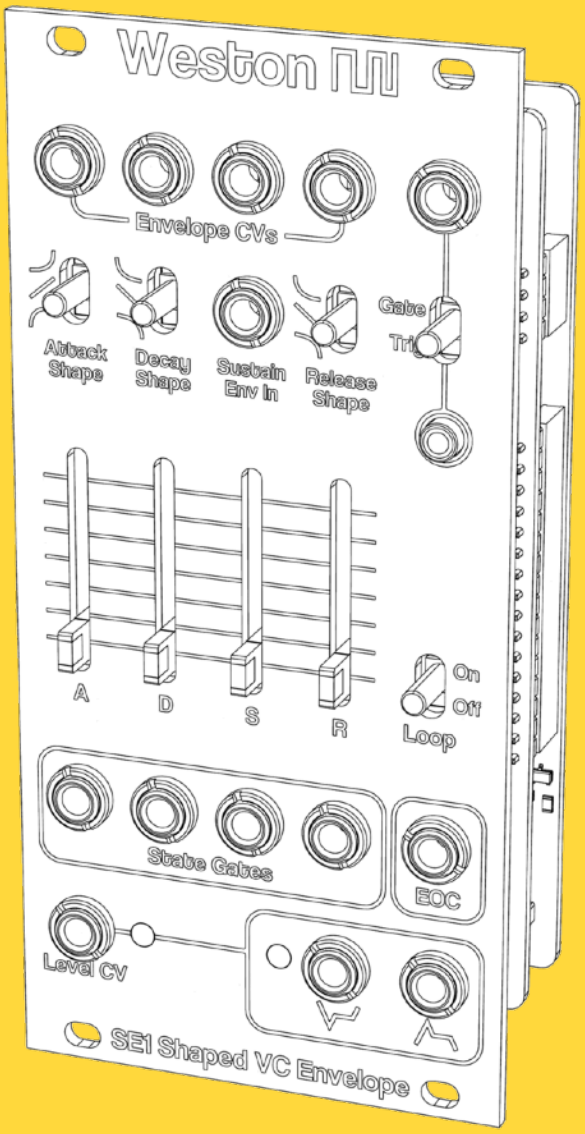
SE1

Shaped VC Envelope

Eurorack Module

User Manual



Weston Precision Audio

Designed In Portland, Oregon
Revision 01 - December 5, 2023

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SE1 Overview

Gate / Trig Input

Main control for starting/sustaining envelope

A, D, S, & R CV Control

CV inputs for envelope control

Shape Control Switch

Exponential, Linear, Or Logarithmic, for Attack, Decay, and Release

Sustain Env In

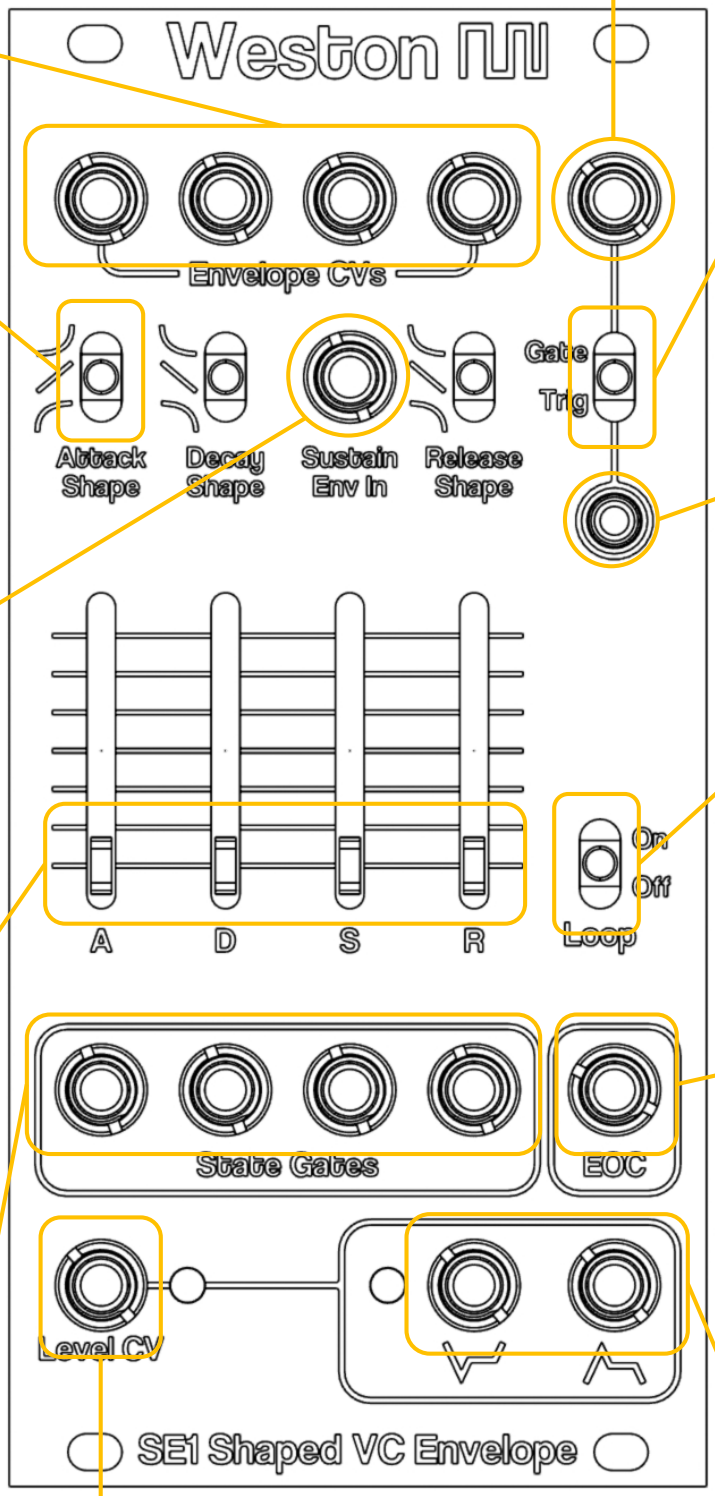
A VCA which shapes the "S" CV Input. See page 7 for details.

A, D, S, & R Control Sliders

Adjusts the parameters of the envelope. LEDs in slider light up in current state of envelope.

State Gate Outs

These go high when in that state of the envelope (i.e. when that slider's LED is lit.)



Gate / Trig Select Switch

See page 6 for details.

Manual Trigger Button

Does what "Gate/Trig" input does, but with your finger!

Loop On/Off Switch

See page 6 for details.

End Of Cycle Output

Goes high for a ~1ms pulse when an envelope has completed and returned to zero.

Main Output

Inverted and regular output of envelope. Selectable 5V or 8V (see Page X)

Level CV Input

Controls a VCA on the Main Output. 0V = 0% of envelope, 5V = 100%.

DESCRIPTION

SE1 is an analog ADSR envelope-generating module in Eurorack format. It generates a standard Attack/Decay/Sustain/Release type envelope with a simple gate signal. Unlike many ADSR modules, SE1 allows the time/voltage function of each stage A/D/R to be selected independently between Logarithmic, Linear, or Exponential, allowing unique envelope shapes.

Each parameter of the ADSR envelope is CV-controllable. Additionally, there is a VCA in front of the "S" sustain CV signal which can be controlled with the "Sustain Env In" input. This allows, for example, a second envelope to be triggered from another module which could shape an attack and decay of a sustain tremolo swell.

Each state of the envelope A/D/S/R has a gate output which goes high for the duration of that state. Additionally, there is an "EOC" (End Of Cycle) output which emits a ~1ms pulse when the current envelope has completed.

Finally, there is another VCA on the outputs (inverted and regular) of the envelope generator, allowing for CV control of the amplitude of the envelope signal.

Important or helpful bits will be in red.

SPECS

Module Size: 12HP
Depth: 25mm (To back PCB), 33mm (To end of power connector)

Envelope Attack/Release Times:
1ms - 15s (faster possible with negative CVs)

Audio Outputs:
<=1kOhm Output Impedance

Inputs:
>= 100kOhm Input impedance

Gate Input High:
>2V

Power input:
+12V & -12V via standard 10 pin Eurorack connector. Protected against reverse polarity internally and with shrouded connector.

Power consumption (+12V / -12V):
Typ: 60mA / 20mA
Max: 70mA / 35mA

Envelope Output Voltage:
Selectable to 5V or 8V peak

Level & Sustain Env CV Inputs:
0V = 0% Amplitude, 5V = 100%

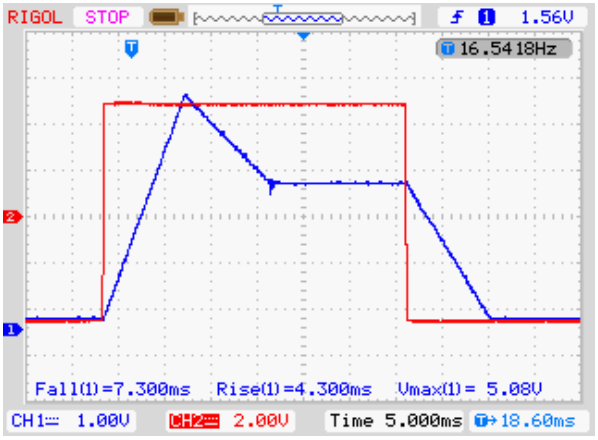
MAXIMUM LIMITS

Supply Voltage: +13.5V / -13.5V

All inputs: Up to power supply levels.

USING SE1: GETTING STARTED

After installing and powering up SE1 in your rack, getting an envelope out is as easy as applying a signal to the Gate/Trigger input in the upper right corner of the module. With the Gate/Trigger switch set to "Gate", the following is a typical output:

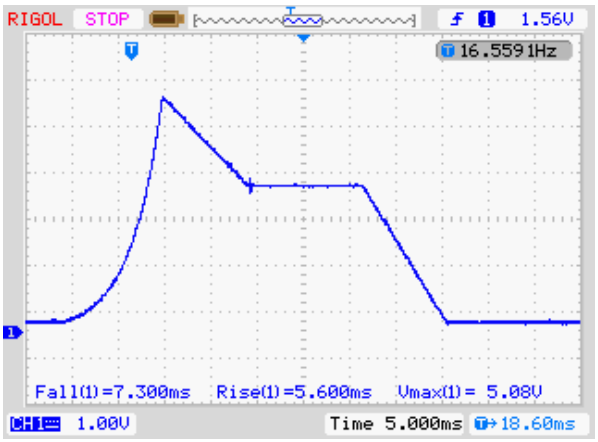


The red trace shows the signal sent to Gate/Trigger input, and the blue is the main output of SE1. Note that all shape controls are set to linear (center position). Also note, the button positioned directly below the Gate/Trigger input can be pressed to manually trigger SE1 without any signal.

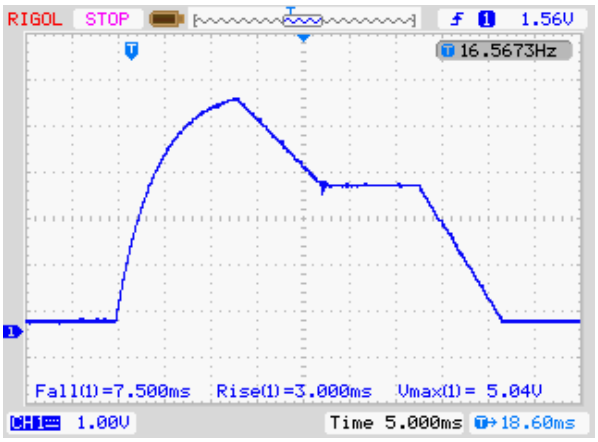
USING SE1: SHAPE CONTROLS

The Attack, Decay, and Release sections of the envelope can be independently selected via the switches labeled "Shape Control Switches" in the panel overview on page 3. The images below show some examples.

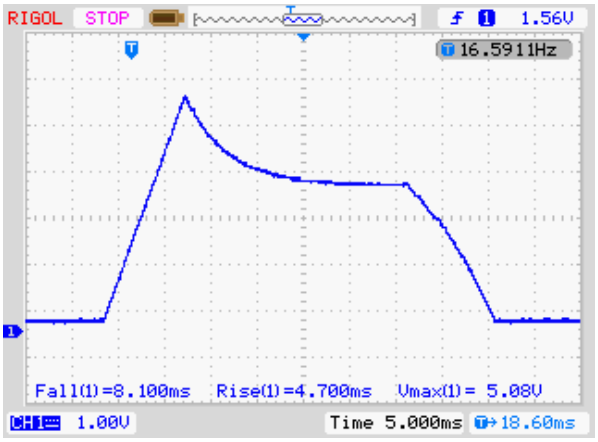
Exponential Attack:



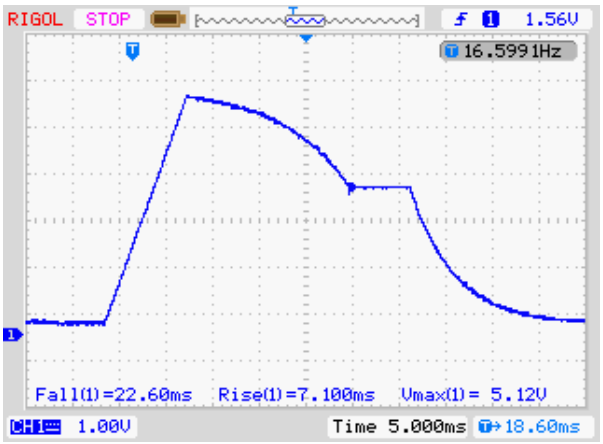
Logarithmic Attack:



Log Decay & Exponential Release:



Exponential Decay & Log Release:

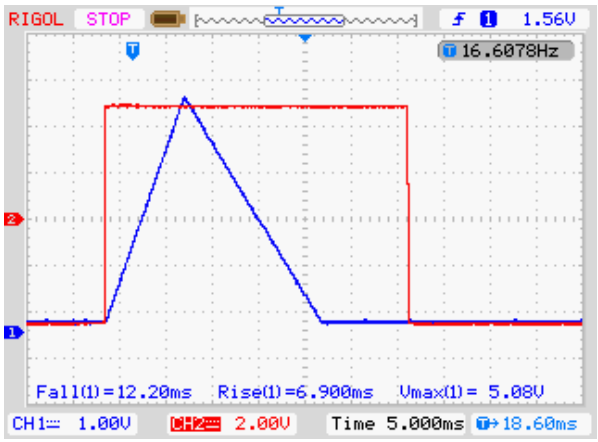


USING SE1: GATE VS. TRIGGER

The Gate/Trigger select switch works as follows:

- When GATE is selected, SE1 treats the incoming signal as a gate, and an ADSR type envelope is produced, whereby the Release part of the envelope starts when the gate signal goes low.
- When TRIGGER is selected, SE1 generates a trigger pulse from whatever gate or trigger signal is input to SE and thus a AD type envelope is triggered, whereby the envelope attacks until it hits peak voltage, and then decays on its own. The S and R portions of the envelope are thus never entered when in TRIGGER mode.

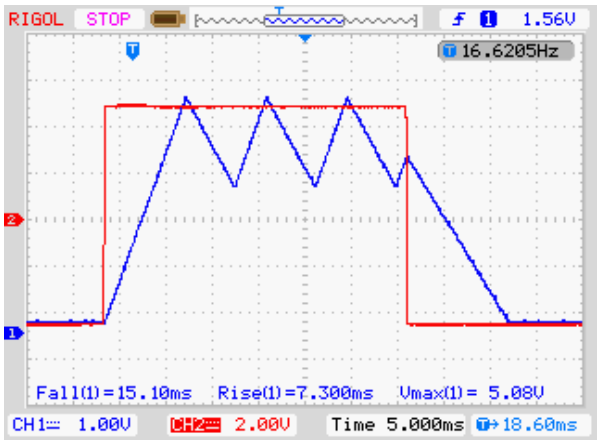
The following image shows the gate signal (blue) and the envelope output (red) when the Gate/Trigger switch is set to TRIGGER:



Note the above envelope would look exactly the same if the length of the gate was different than that shown.

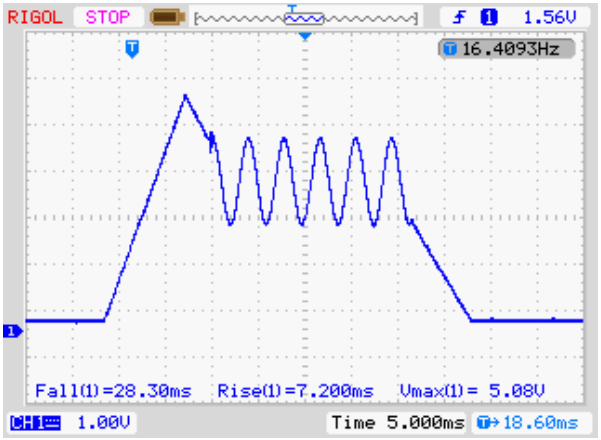
USING SE1: LOOP

SE1 allows the ADSR-type envelope to be “looped”. When the Loop switch is turned ON, SE1 will simply bounce between the ATTACK and DECAY states, with the limits being the peak envelope voltage and the SUSTAIN voltage level for as long as the gate signal is held high. Once the gate is released, SE1 will RELEASE as normal. Below is an example of SE1 looping with all shape controls set to linear:



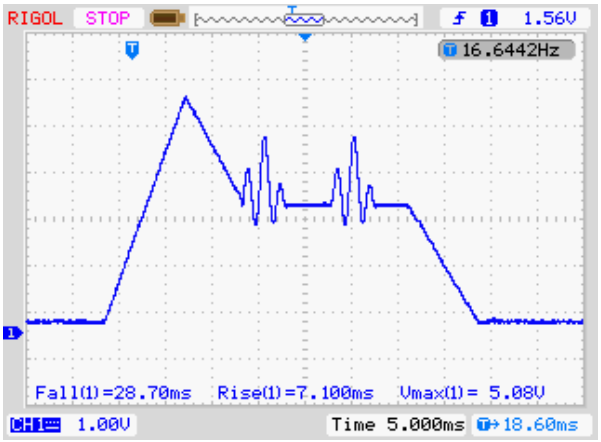
USING SE1: SUSTAIN CVs

SE1 is unlike many ADSR modules in that it *servos* to the sustain voltage while in the sustain state. Most ADSR modules stop decaying at whatever the current sustain voltage is, and sit there until another re-firing of the envelope. SE1 will stop decaying at the current sustain voltage, and then continue to *servo* the integrating capacitor to any new sustain voltage. This means any AC signal can be input to the SUSTAIN CV input to create something like this:



Note the signal input to SUSTAIN CV is summed (added) to the voltage from the SUSTAIN potentiometer.

Additionally, the signal which goes into SUSTAIN CV passes first through a VCA. The control voltage of this VCA is labelled SUSTAIN ENV IN. The following image shows a sinusoidal LFO patched to SUSTAIN ENV IN, and a higher frequency sine wave patched to SUSTAIN CV:

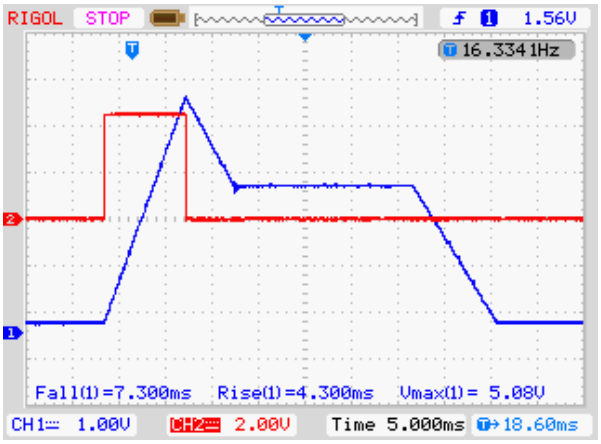


OTHER FEATURES: STATE GATES / EOC PULSE

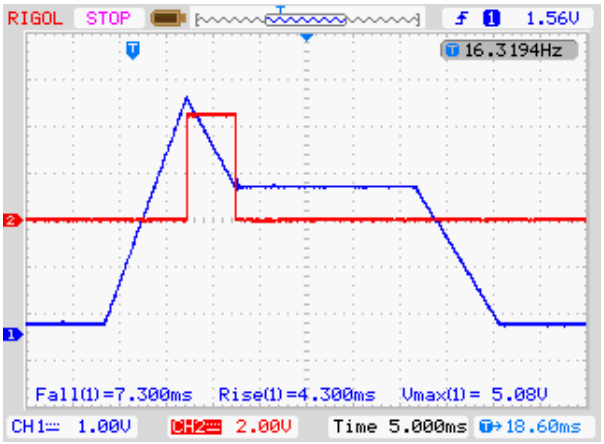
During any part of an actively occurring envelope, the corresponding State Gate for that section of the envelope will go high.

When an active envelope (ADSR or AD) finish and return to zero volts, SE1 will output a pulse to the EOC output. The following images show each signal during an envelope

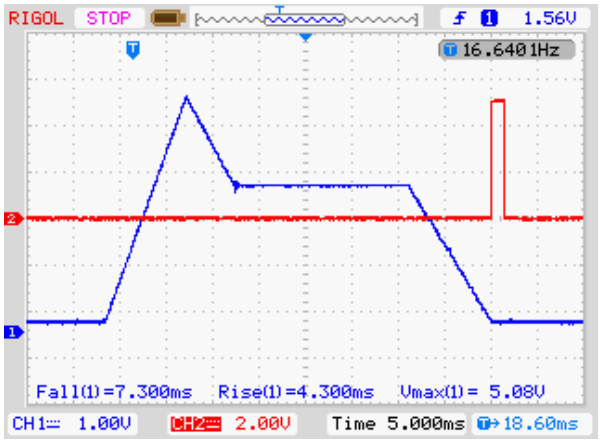
"A" State Gate:



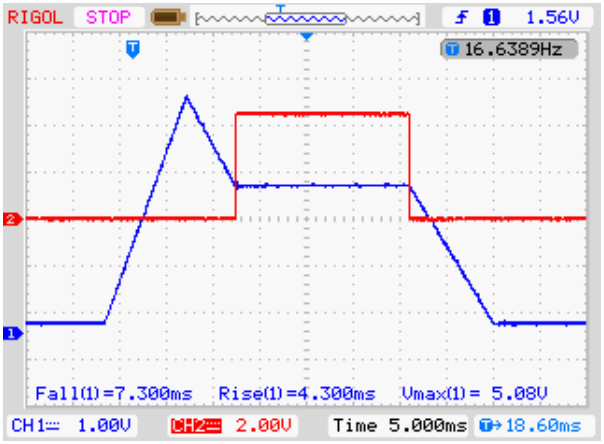
"D" State Gate:



EOC Pulse:



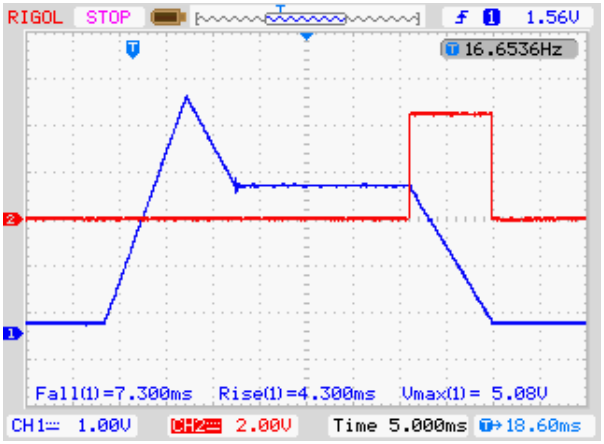
"S" State Gate:



OTHER FEATURES: LEVEL CV IN

The main envelope outputs of SE1 (inverted and regular) both pass through a VCA. The control voltage of this VCA is accessed through the LEVEL input. 5V at this input corresponds to 100% of the envelope amplitude, and 0V corresponds to 0% amplitude.

"R" State Gate:



APPENDIX: OUT LEVEL JUMPER

For flexibility, SE1 can be configured so that the main envelope output peak voltage is either 5V or 8V. To change the setting, remove the 3 screws from the back of the module and *carefully* pull off the rear PCB. There is a jumper on the lower right corner of this PCB labeled 5V and 8V. Note that, you must have this jumper installed in one of the 2 possible orientations. If the jumper is missing, SE1 will output nothing from the main outputs.

APPENDIX: TRIMMER ADJUSTMENTS

Normally, SE1 will require no adjustments and will be calibrated only upon initial construction. However, if the adjustments available will be described here:

Zero Volts Adjustment (Accessed from LEFT side of module):
To adjust the 0V trimmer, remove all inputs and outputs from SE1 and make sure it its powered up. Monitor the main output with a voltmeter or oscilloscope and simply adjust the "0V" labeled trimmer until 0V is obtained.

Level CV Null Adjustment (Accessed from BOTTOM side of module):
To adjust the LEV trimmer, install an unconnected patch cord into the "Level" input and then continuously trigger an envelope with an LFO or other source. Monitor the main output with an oscilloscope and adjust the LEV trimmer clockwise until you see a signal on the oscilloscope. Then , turn the LEV trimmer back counter-clockwise until the signal *just* disappears.

REVISION HISTORY

01: Initial release.