

DETECT-Rx



SYNOPSIS

DETECT-Rx offers three useful synthesizer functions including a versatile envelope follower (DETECT-R), voltage controlled gate extractor (EXTRACT-R) and signal rectifier (RECT).

The **DETECT-R** provides advanced features compared to typical envelope followers with the addition of a detection frequency select switch, manual smoothing filter and attenuation/gain control.

The **EXTRACT-R** provides both manual and CV attenuated control over signal threshold levels for gate extraction. Three selectable signal ranges are available to accommodate all signal types, including line level signals.

RECT is a positively rectified signal output that will also accommodate all signal levels. Rectification is useful for both CV and audio. You can turn bipolar signals into positive signals or create octave up effects and 2nd harmonic distortion among other uses.

Please read the manual carefully to understand the module functions and get the best use out of the **DETECT-Rx**.

1 DETECT-R INPUT and NORMALIZATION

This is the input to the DETECT-R, a versatile envelope follower. The DETECT-R will transform signals into time varying control voltages that follow the amplitude level of the input signal. Controls for the DETECT-R are explained in sections 8-10, below.

The input signal is buffered to the THRU output (section 2) for routing to another module without the need for a multiple. For example, patch a dynamic mix into the DETECT-R, THRU out to a VCF's signal input, and ENV out to the VCF's CV input.

The DETECT-R input is also the input to the rectification circuit (RECT, section 4).

NORMALIZATION:

In addition to the direct routing scheme explained above, the DETECT-R input will route to the gate EXTRACT-R when nothing is patched into the EXTRACT-R input. This allows for all DETECT-Rx functions to be used simultaneously from a single signal input. Otherwise, the DETECT-R and EXTRACT-R may be used exclusively.

Similarly, the GATE output is normalized into the DETECT-R input when nothing is patched into the DETECT-R. The normalized gate signal routes into the DETECT-R to provide a simultaneous GATE and *gated envelope* out. The envelope shape is affected by the EXTRACT-R controls as well as the gate length, which is adjustable via the THRESHOLD control.

2 THRU

Provides a buffered copy of the signal applied to the DETECT-R input.

3 ENVELOPE OUTPUT

This is the DETECT-R's envelope follower output.

4 RECTIFIER OUTPUT

All signals patched into the DETECT-R are rectified and sent to the RECT output jack.

5 GATE EXTRACT-R

INPUT and OUTPUT of the threshold based gate extractor. See section 1, above for normalization scheme when solely using the EXTRACT-R input.

6 THRESHOLD and THR CV

The knob controls the voltage threshold level. At minimum, the gate will fire for all signals above 0V (zero volts). At maximum, the gate will fire at the voltage level determined by the RANGE switch, described in section 7, below.

A control voltage may be used as a dynamic threshold control when patched into the THR CV input. The knob controls the CV depth when CV is applied to this input.

7 EXTRACT-R RANGE SWITCH and LED

The RANGE switch provides three common levels that set the maximum span of the threshold control.

10V - best when extracting gates from external envelopes and louder signals - BLUE LED

5V - typical range for extracting gates from common modular audio signal levels - GREEN LED

LINE - for consumer line level instruments such as synthesizers, desktop boxes and effects. Can also accommodate louder guitar pick-ups. Some gain staging may be necessary for lower level instruments - RED LED

8 ENV LEVEL CONTROL and LED

Controls the gain of the output ENV of the DETECT-R. Largely dependent on the signal level applied to the DETECT-R input, this control will accommodate just about any signal level. Signals can be both attenuated and amplified using this control. You may choose to use this control in conjunction with external CV input attenuators, or as the sole envelope CV depth control.

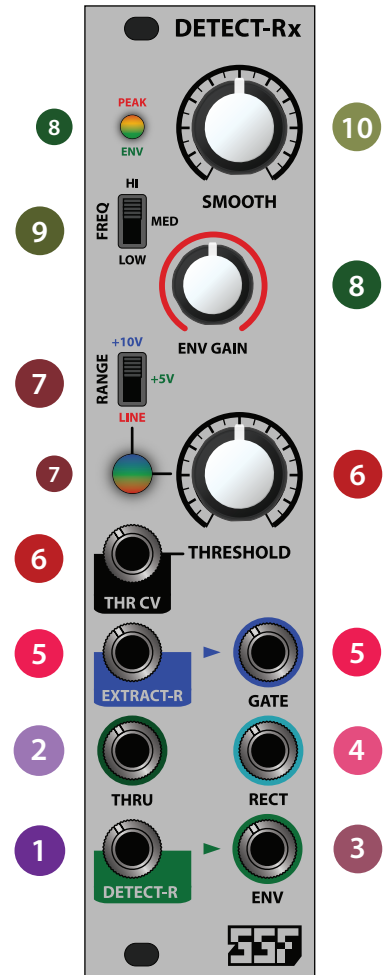
The LED indicates an active envelope shown in GREEN. The envelope peak is indicated in ORANGE - this indicates that the envelope has reached it's clipping level. Peaking is not a bad thing unless the LED is constantly ORANGE - which indicates that the signal is constantly at maximum level - this will result in very little dynamic content but will not do any harm.

9 FREQUENCY RANGE SWITCH

One of the most useful features of the DETECT-Rx, the FREQ range switch allows you to select three frequency bands that the envelope follower will sense from the input signal and create dynamic transients that follow the selected frequency band. In general, HI produces fast transients as it follows the high frequency content of a signal, MED is a bit slower as it follows the mid bands and LOW produces longer transients as it follows the low bands and overall emphasis of the input signal.

10 SMOOTH

This manual smoothing filter adds an additional transient shaping function to the DETECT-R envelope follower circuitry. Essentially a low pass filter that scales appropriately to the selected frequency band, this control can smooth out the ripple commonly associated with envelope followers as well as provide a means for fine tuning the desired envelope output for a wide variety of expressive transient shapes.



WHAT IS SIGNAL RECTIFICATION?

The graph to the right illustrates the function of DETECT-Rx's signal rectifier.

FIGURE (a.) Shows an example bipolar input signal from the Triangle output of a VCO. The BLUE arrows highlight the negative portion of this bipolar signal. Note the entire region from 0V to -5V.

FIGURE (b.) Shows the rectified output. The RED arrows highlight the previously negative region of the Triangle waveform in FIGURE (a.)

They are now flipped (rectified) into the positive voltage region.

Notice that the rectified signal is now twice the frequency of the input signal. This is the typical function of 'octave up' guitar effects and can also be used for the same function in a modular synthesizer.

Also try using the rectifier on a total mix or external audio for extreme 2nd harmonic (even ordered) distortion effects.

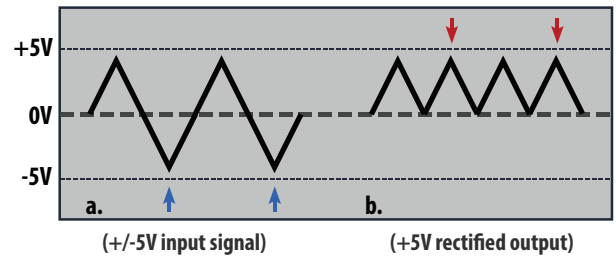
OTHER COMMON USES:

Not all control voltages are compatible.

For instance, there are modules that *produce bipolar* control voltages and modules that only *accept positive* control voltages.

Therefore, a bipolar CV will only affect a positive CV input when the input signal is positive.

A rectifier can be used to convert bipolar or even completely negative CV into a full range positive control voltage.



WHAT IS GATE EXTRACTION?

The graphs to the right illustrate the function of DETECT-Rx's gate extractor. The examples show a Triangle wave in GREY as the input to the EXTRACT-R.

For this example, we will consider that the RANGE switch set to 5 or 10V.

The broken GREEN line is a graphical representation of various threshold settings of 0-60%.

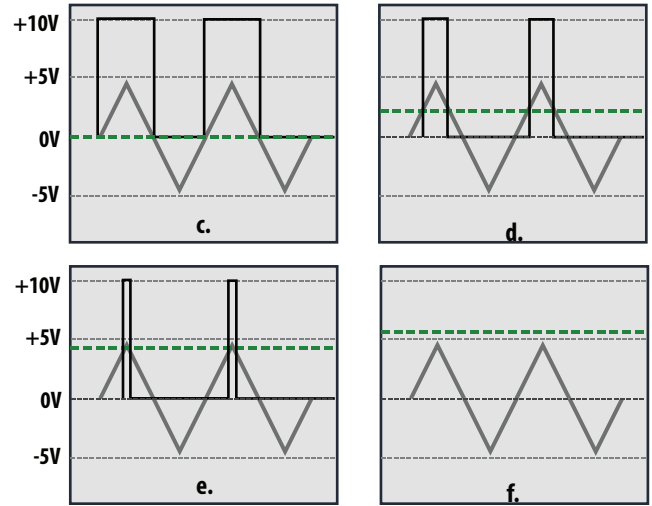
The BLACK waveforms illustrate the output gate for the respective threshold levels, explained below.

FIGURE (c.) Shows the threshold set to 0V (zero volts). Notice that the gate goes high for the entire duration that the input waveform is positive.

FIGURE (d.) Shows the threshold set to roughly 2.5V. Notice that the gate is more narrow in this example because the region above the threshold is also more narrow.

FIGURE (e.) Shows the threshold set to roughly 4.5V. As expected, the gate is now very thin and fast, behaving like a trigger. A trigger is simply just a very fast gate.

FIGURE (f.) Shows the threshold set to beyond the region where the input signal is active. Since there is no signal voltage that reaches this threshold setting, there will be no gate or trigger output.



A FEW EXTRACT-R USES:

Extract a gate clock from audio or drum machines to time events within a modular system.

Create delayed gates and triggers from slower control voltages such as LFOs and Envelopes.

Convert any signal from a VCO into a pulse. Use a Sine, Triangle or any sloped waveform as a control voltage into THR CV to time vary the pulse width (Pulse Width Modulation.)

Produce extremely heavy distortion when patching audio into the EXTRACT-R input.

Utilize the GATE output normalization into the DETECT-R to create an adjustable slew gate (gated envelope).

Create threshold based events within a complex patch.

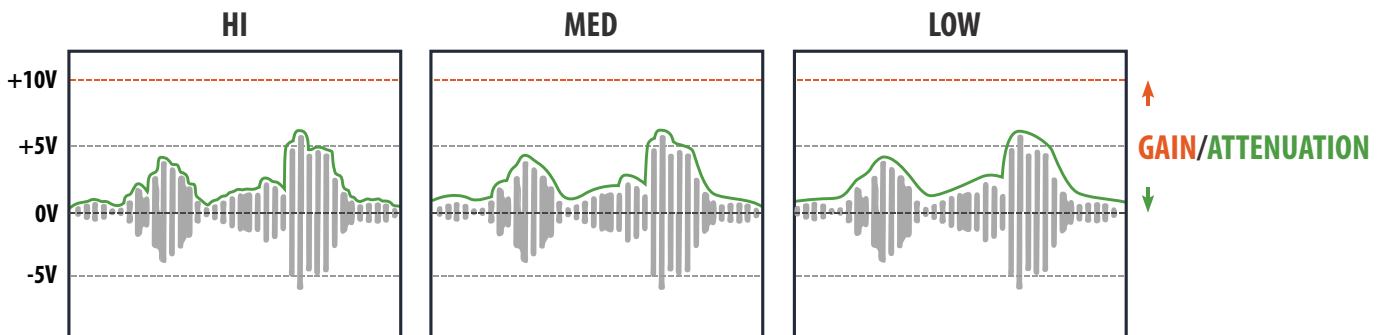
Boost 5V and low level gates and triggers up to 10V.

WHAT IS AN ENVELOPE DETECTOR?

An Envelope Detector follows the amplitude dynamics of a given input signal. The output is a positive control voltage that can be used to modulate any parameter in a modular system. Since the output CV follows the input signal's amplitude levels, an Envelope Detector is also commonly referred to as an Envelope Follower.

The DETECT-R includes special features for greater control of the output envelope shape. The FREQ select switch provides three signal bands to choose from, allowing for finer control of the output signal based on the input frequency content. The figures below illustrate the general envelope shapes for the relevant frequency bands. Envelope outputs are shown in GREEN, Peak level shown in ORANGE.

The SMOOTH control adds an additional 6 dB low pass filter that will alter the attack and decay response of the output and smooth the ripples, for example, as seen in the 'HI' figure, below. The cutoff frequency of the SMOOTH filter scales to the selected frequency band, which allows the DETECT-R to be tuned across the entire audio spectrum.



A FEW DETECT-R USES:

- Side chaining
- Dynamics processing
- Signal processing
- Slewing control voltages
- Gated envelope generation

POWER CONSUMPTION
 QUIESCENT: +29mA, -29mA
 MAXIMUM: +47mA, -44mA