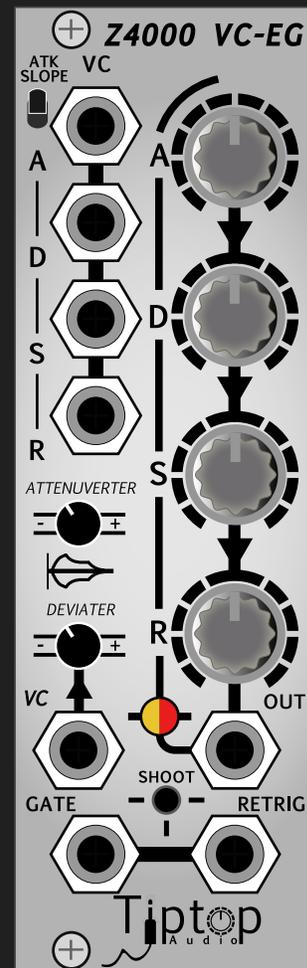


# Z4000 VC-Envelope Generator

## *User Manual*



[www.tiptopaudio.com](http://www.tiptopaudio.com)

## **Introduction.**

The Z4000 is a four segment envelope generator with an additional CV processor that can be used to scale, invert, mirror, and clip the generated envelope. With its snappy envelopes, the Z4000 can generate complex CV signals for controlling any CV input in your modular.

## **Let's get started.**

To start using the Z4000, plug in a gate signal into the gate input, set ATTACK to minimum, DECAY to 50%, SUSTAIN to 50%, and RELEASE to 50%. Set the ATTENUVERTER all the way to the right and set the DEVIATER to 50%. Connect the OUT jack to the CV of a VCA or the FM of a filter like the Z2040, or the FM input of the Z3000. When the gate goes high, the led should turn red indicating an envelope. You should also hear the effect of the envelope over the VCA or filter.

Playing with segment knobs will let you set different envelopes, and playing with the Attenuverter will let you scale down the envelope and invert it if set left of the 50% position

With the Deviator you can offset the envelope's position, pushing it into the negative voltage range (CCW, yellow light) or positive voltage range (CW, red light). By applying CV into the Deviator's CV input, the same effect can be done using external cv control from sequencers, LFO's, or another Z4000. You can even feedback the signal from the Z4000 into itself for further manipulation of the curve shapes and time.

## **Segment Control Knobs Range up to 50%**

You might have notice that the segments control knobs start being responsive from about 50%. Although that might seem odd at first, there is a good reason. Creating snappy envelopes requires fast transients, but fast transients can also add artifacts to the sound the envelope is applied to: This is known as pop or click. In some sound design, this click is a welcomed part of the sound but in other designs, there is a desire to reduce the click yet keep a snappy response.

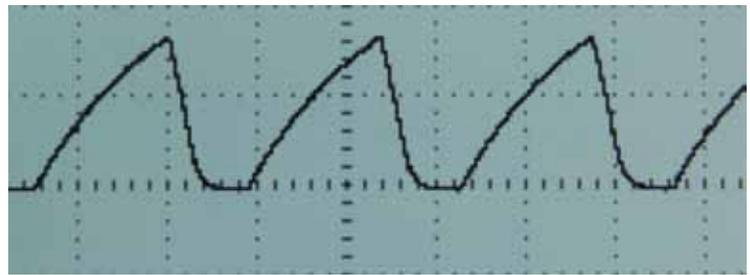
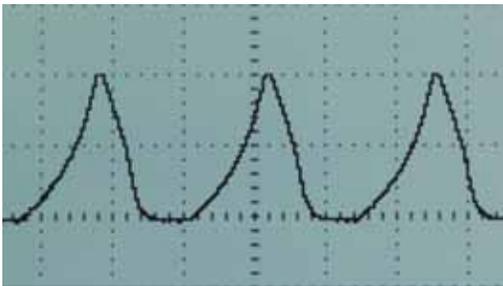
Those two qualities are in opposite relation to each other. The Z4000's first 50% of the segments' knob range is dedicated to that initial area of sound design, providing you high resolution for fine tuning of the envelope segments in the millisecond range. This large millisecond range makes up for a great kitchen to cook up transient sounds and percussive elements.

## Segment Control Knobs Range from 50% and up

From 50% and up, the segments set envelopes in the range of a second and up to minutes and infinity with the release set to maximum.

### Attack Curve Switch

The attack curve switch (ATK) switches the attack segment slope from exponential to logarithmic. This has a subtle effect and can be heard best with envelopes having long attack segments. Below are two scope shots of the same envelope with the switch set in the two modes:



### Voltage Controlled Segments

Each of the four segments in the Z4000 are voltage controlled. The effective voltage input range for each input is 0 to 5V. Higher voltage levels or negative levels will not damage the Z4000. For example, the Z8000 Matrix Sequencer has a voltage range of 0 to 10V so the effective range for the Z8000 to control the Z4000 segments is up to 50% of the knob rotation. Please note that the incoming CV is summed up with the internal voltage provided by the segment control knob, i.e. if your Decay knob is set all the way to max, a CV in will do nothing as it has no headroom left.

The CV inputs are what makes the envelope live, use them.

## **Attenuverter and Deviator Explained**

The Attenuverter is a voltage attenuating and inverter; this means that in the 50% position, the Z4000 will output no signal, turning the knob CW the envelope will become a positive voltage and CCW will turn it into a negative voltage. The LED will indicate those states with either an unlit, red, or yellow state, respectfully.

In addition, the envelope signal passes through yet another cv processor circuit called the Deviator. What this does is add a static voltage to the signal, this is a mathematical analog function of summing. The static voltage can be set to negative (CCW) or positive (CW). So when summing the static voltage with the envelope voltage, a lot of interesting things can happen such as offsetting, mirroring and clipping. But voltage manipulation doesn't end there, the Deviator includes a VC input allowing you to inject even more static signals or dynamic signals into the analog "calculator". Go wild with the Deviator plug in audio or another envelope?

## **Retrigger input explained**

In its classical use, the retrigger input is there to provide retriggering of the envelope when used with CV/Gate keyboards playing legato notes. In this case, the envelope will retrigger even if it is in the ON state, providing an accent effect to the new note that had been played.

But the use of the retrigger doesn't end there: using pulses other than the gate input signal will give an extra cycle of the attack segment, this can be very musical and fun to play with. Use clock dividers or any other pulse source to experiment.

## **Reverse Polarity Protection**

How annoying it is to lose a module due to reverse plug-in? The Z4000 is totally immune to that; no matter how you are going to hook it up, it will not cause it to burn. This protection is infinite, meaning that even if you keep it connected in the wrong way for very long time, there will still be no issues and no overheating or damaging of the module or the power supply.

We hope you will enjoy your Z4000, it's an analog envelope made with love.