Psychedelic Voltage Processor

Quad LED Chaos User’s Manual - Eurorack

Hello and thank you for using the Psychedelic Voltage Processor for Eurorack, one of the first collaborative modules from SetonixSynth and Tidbit Audio. We hope you will find its fluctuations most pleasing!

The Psychedelic Voltage Processor, or PVP, is a four-channel chaos module. It uses color-changing LEDs to produce fluctuating voltages in response to the Channel input, with each channel normalized in series to create increasingly chaotic “taps” that can be used one after another for different variations.

Any positive voltage input such as unipolar LFOs, envelopes, stepped voltages, or simply the onboard normalized voltage patched to a channel input is reproduced approximately on each channel output, with the PVP inducing unpredictable fluctuations due to the variable current consumed by an LED circuit with a mind of its own.

Technical Specifications (Eurorack standard)
Width: 8hp
Depth: 25mm
Peak Current Draw: 135mA @ +12V, 10mA @ -12V
Input Impedance (Channel 1): 150kΩ
Input Impedance (Channels 2-4): 100kΩ
Output Impedance (All Channels): 1kΩ, DC Coupled

1. Connecting your Psychedelic Voltage Processor

Before using the PVP, take extra note of the Peak Current Draw spec above. This module’s current draw from the +12V rail depends largely upon the brightness of the LEDs and is continuously variable, but will reach 120-135 mA on occasion. As such, it’s a good idea to double check that your Eurorack power supply has at least this much current to spare at all times, or ideally a larger amount such as 250mA to spare.

Connect a 10-to-16 pin ribbon power cable to the header at the top of the Psychedelic Voltage Processor pcb. The -12V/red stripe side of the connector must be aligned with white stripe silkscreen indicator labeled “-12V” for proper use. If your PVP has a shrouded power header, this will prevent you from plugging it in the wrong way, so do not modify it. This module is reverse voltage protected, but it is still not recommended that you plug it in backwards to see what happens.

2. Theory of Operation

The PVP began life as an active adaptation of the Tidbit Audio Random CV Processor. It uses similar LEDs to those found in the Random CV Tidbit to create a chaotically fluctuating voltage signal that is related to the input voltage, but utilizes the Eurorack format to expand on this circuit’s ability to provide chaos and also create a visually-pleasing “window” with the panel of the module for viewing the workings of the module. With this design, we hope to retain the original Tidbit’s minimalist appeal while also creating something new and uniquely useful.

The Input/Output routing scheme of the PVP is designed to encourage messing around and happy accidents, but there are just a few things to keep in mind while patching:

- The PVP responds to and processes positive input voltages only; negative voltage inputs are ignored. It will also not output any voltage below 0V, and will act as a “half wave rectifier” on any

signal that would otherwise drop below this level. For example, a +/-5V input signal will be processed into an approximately 0-5V “chaotic” output with the waveform’s bottom half “clipped” at 0V. Most audio signals in Eurorack are centered around 0V, so if fed into the PVP without any additional offset the signal’s bottom half will be clipped. (Note: this sounds cool!)

- The input of each Channel is normalized to the prior channel’s output (except Channel 1’s input, see below). If a signal is patched to a Channel input, the normalization from the prior channel will be broken and the Channel in question will process the input signal only.
- The Upper Knob is a simple unipolar attenuator for Channel 1’s input normalized to a static voltage. If anything is patched to the input of Channel 1, the knob will act as an attenuator for this signal. If anything is patched into the inputs of Channel 2 onwards, the normalization from Channel 1’s output is broken and the knob will have no further influence over other channels.

3. Summary of Functions

Front Panel: LED circuit visualizers. Each Channel’s LEDs “steal” current from one another to create an unpredictable chaotic voltage which the PVP utilizes for your patching pleasure.
Upper Knob: Input signal level attenuator for Channel 1. With nothing patched to the Channel 1 input, a 10V static voltage is normalized to the input and the Upper Knob thus controls the level of the voltage sent to Channel 1, from 0-10V. Patching a cable to Channel 1’s input will interrupt the normalized voltage and the Upper Knob becomes an attenuator, with the input signal to Channel 1 “muted” when fully CCW and at Unity Gain when fully clockwise.
Channel 1 Input: The module’s “Master” CV input in a sense. Any signal patched to this input will be attenuated by the Upper Knob before being processed by Channel 1 along with any other Channels for which normalization is maintained.
Channel 2-4 Inputs: Non-attenuated direct CV inputs for each LED processor Channel. A signal patched to one of these Inputs will interrupt the normalization from the preceding Output and be processed directly by the corresponding channel. With nothing patched, these Inputs receive their signal from the previous Channel Output, and using more Channels in a row to process a signal will lead to a more chaotic output.
Channel Outputs: Signal outputs for each of the four processor Channels. Positive input voltages fed to the corresponding Channel input are processed chaotically and reproduced on the output, which will generate an unpredictable, fluctuating output voltage that somewhat tracks the input between 0V and 10V but will deviate in either direction. An input of Ground/0V generally causes low-level chaotic fluctuations near 0V on the Channel output, while negative voltage inputs will lead to an output of 0V that does not fluctuate much, if at all.

5. Calibration
Calibration of the PVP is easiest with an oscilloscope, but can be accomplished with a Multimeter as well.

- Patch a unipolar (aka, positive voltage only) low-frequency variable CV source such as a looping envelope or slope generator (ideally 0-10V but 0-5V or 0-8V will work too) to the Channel 1 Input.. Use your oscilloscope to monitor the voltage range of the input, or make a note of the range if using a multimeter.
- Turn the Upper Knob fully clockwise and monitor the first Channel Output. Adjust the top rear trimmer so that the range of the Channel Output roughly tracks the voltage of the input, with the output neither spending too much time at exactly 0V nor going more than about 500mV above the original input level. (Note there will be variations between cycles as it is a chaotic module.)
- When you are satisfied, patch the same input signal to the Channel 2 Input and monitor that Channel output. Repeat the prior rear trimmer adjustment directions, but for the second trimmer.
- Repeat this process for Channels 2, 3 and 4.