



Solar Gravity Vactrol Response VCA User's Manual - Eurorack
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Hello and thank you for using the Solar Gravity Vactrol Response VCA for Eurorack. We hope you will find its sounds most pleasing!

The Solar Gravity is an analog vactrol-based VCA designed to bring the lovely response of optocouplers into the realm of clean, performance-based Eurorack VCAs. Starting with this simple concept, the Solar Gravity utilizes some neat active circuitry to significantly reduce the bleed inherent in vactrol-based VCAs and to provide the user with lots of control over the level, direction, and response of incoming control voltage.

Though it's primarily designed for use with audio signals, the Solar Gravity can also be used to control the level of CV such as envelopes or stepped voltages with a unique vactrol response through its DC-coupled input.

Technical Specifications (Eurorack standard)

Width: 4hp

Depth: 28mm

Peak Current Draw: 16mA @ +12V, 18mA @ -12V

Input Impedance (All Inputs): 100k Ω

Output Impedance: 1k Ω

AC Input Cutoff Frequency (-3dB High Pass): 5 Hz approx.

1. Connecting your Solar Gravity

Connect a 10-to-16 pin ribbon power cable to the header at the top of the Solar Gravity pcb. The -12V/red stripe side of the connector must be aligned with white stripe silkscreen indicator labeled "-12V" for proper use. This module is reverse diode protected, but it is still not recommended that you plug it in backwards to see what happens.

2. Theory of Operation

The Solar Gravity is an active adaptation of the Tidbit Audio Vactrol VCA. It uses the same vactrol as found in the Tidbit, but uses op-amps to provide various CV processing options and simultaneous AC- and DC- coupled inputs, to mitigate the bleed at low level settings often inherent in vactrol-based circuits, and to match the voltage level of the input relatively closely.

In short, the Solar Gravity is a fun, useful and great-sounding VCA that harnesses the pleasing behavior of vactrols to provide interesting contours for your audio and CV signals, and there are a lot of fun ways to use it! We hope you enjoy it.

3. Summary of Functions

Offset: Controls the initial level of the VCA by increasing the brightness of the LED controlling the vactrol as the knob moves clockwise. With standard calibration, moving the Offset knob fully clockwise produces unity-gain amplification.

CV Level: Bipolar control (aka attenuverter) for processing the level of the incoming CV signal influencing the vactrol. A setting close to the middle will have little to no influence on the vactrol's LED and consequently the level of the VCA, while settings further clockwise will have a

positive/amplitude-increasing effect and settings further counter-clockwise will have a negative/amplitude-decreasing effect relative to the setting of the Offset knob.

CV Response: Controls the speed at which the vactrol LED will respond to incoming CV. At the furthest counter-clockwise setting, the vactrol will quickly track CV up to low audio rates, while moving the knob clockwise will “slew” the incoming CV signal. This can be particularly useful when controlling the Solar Gravity directly with gates or triggers, as this control can act as a one-knob envelope.

DC Input: DC-Coupled signal input. A signal of any speed or level (such as sequenced voltages, envelopes, LFOs, etc) fed to this input will be processed by the VCA without any offset being introduced after it is mixed with the AC Input signal.

AC Input: AC-Coupled signal input. This input filters out any signal below a frequency of approximately 5 Hz and centers any frequencies above it around 0V in order to provide maximum headroom for processing by the VCA. After the AC Coupling stage, this input is mixed with the DC Input signal before reaching the VCA stage. As such, this input is ideal for use with VCOs and other audio signals.

CV Input: Input for CV controlling the vactrol LED. The signal sent to this input is processed through the CV Level and CV response controls before influencing the level of the VCA.

5. Calibration

The Solar Gravity contains a few trimmers in order to optimize the range and performance of the VCA. While we do our best to calibrate every module to be ready “out of the box”, the Solar Gravity may need re-calibration when added to a new case if the rail voltages are significantly different. To calibrate the Solar Gravity:

1. Power on the module with nothing patched in. Turn the Offset knob on the front fully down, or counter clockwise. Turn the trimmer labeled “Offset” on the back of the module until the front LEDs turn off, which they do abruptly when the correct level is reached. **(This is the only trimmer that may need adjusting between power supplies!)**
2. Patch an audio signal into the AC input, preferably an easily-discernable signal such as a simple VCO waveform. Turn the Offset knob on the front fully up, or clockwise. Monitor the output with an oscilloscope or your ear and adjust the rear trimmer labeled “Gain” so that the output level approximately matches the input level.
3. With the same waveform patched to the AC input, turn the Offset knob all the way down. Adjust the rear trimmer labeled “Out-Null” until as little “bleed” as possible is heard from the output.
4. Turn the front Offset knob back fully CCW and make one final adjustment of the rear trimmer labeled “Gain” so that the output level closely matches the input.
5. That’s it. Your Solar Gravity is calibrated!