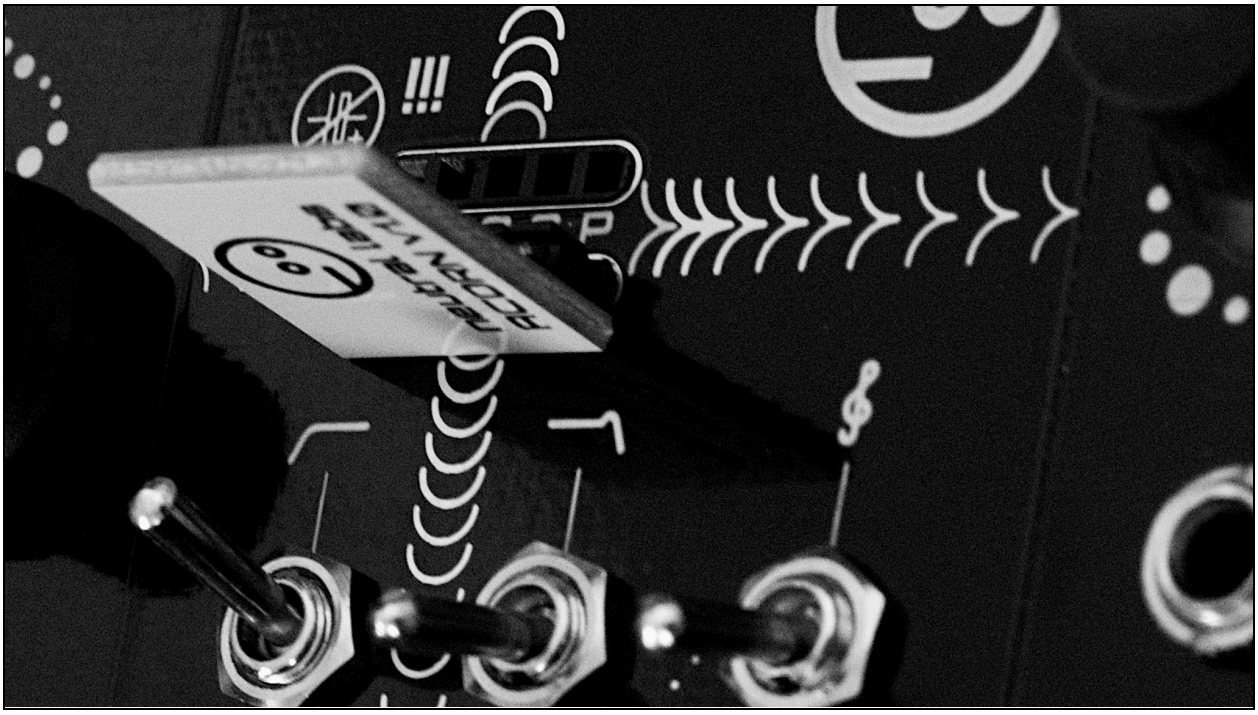
SCRAT v1.1

by neutral labs



Manual

Hello, owner.

SCRAT is an aggressive sounding multimode Steiner-Parker filter with a twist: You can change the resonance response by plugging in components like diodes, capacitors or resistors directly to the front panel. A set of preset cartridges is also available, which gives you instant access to a variety of filter sounds.

Specifications

- Width: 9 HP
- Supply voltage: +12V/-12V (Eurorack 10-pin header)
- Current draw:
    - +12V: 35 mA
    - -12V: 35 mA
    - 5V: unused, 0 mA
- CV inputs: 2x 0V to 10V usable, -12V to 12V absolute

Connecting SCRAT to Eurorack power

Connect a 10 pin Eurorack power cable to the 2x5 power header on the back of the module. There is an arrow indicator next to the word STRIPE on the circuit board. Unsurprisingly, the red stripe side of the cable goes on the side that says STRIPE. The module (and your power supply) is protected in case you should ever connect it the wrong way around, but it won't turn on if you do.

Module Function

SCRAT is a 2-pole (-12 dB/Octave) multimode Steiner-Parker filter (VCF) that offers high-pass and low-pass modes and is quite aggressive sounding.

In addition to the built-in sound-shaping possibilities, the user can optionally modify the filter's character by plugging passive electronic components like diodes, capacitors or resistors into either or both of two modifier ports on the front panel, or special pre-made cartridges that contain small circuits made up of such components.

SCRAT also includes a pre-filter drive circuit that can be used to further shape the sound.

Manual Controls

Control	Function
	This switches the filter mode from high-pass (top position) to low-pass (bottom position).
	This changes the type of resonance. In the top position, you will get a clean resonance curve while in the bottom position there will be added harmonics that heavily distort the sound – a dirty type of resonance. **Note:** The specific result may be different in case components or cartridges are currently inserted into the modifier ports (see below).
	In case the resonance type switch is in the bottom position (dirty resonance), this switches between primarily high additional harmonics (top position) as indicated by the treble clef and predominantly low additional harmonics (bottom position) as indicated by the bass clef. **Note:** The specific result may be different in case components or cartridges are currently inserted into the modifier ports (see below).
RESO	This changes the filter's resonance (Q factor). In the fully counterclockwise position, there is no resonance. Around the 10 o'clock position, the filter will start to self-resonate (depending on the other controls' settings), with the intensity increasing up to the fully clockwise position.
FREQ	This determines the cutoff frequency for the filter. In the fully counterclockwise position, the frequency is at its minimum (high-pass filter fully open, low-pass filter fully closed) and vice versa.
PRE	This changes the pre-filter drive intensity. In the fully counterclockwise position, there is no additional drive. While rotating the knob towards the fully clockwise position, the amplitude of the signal is gradually increased, with an emphasis on high frequencies. Due to the Steiner-Parker filter's excellent response to being driven in this way, it is recommended to make use of this functionality as often as possible. :)

FREQ CV AMOUNT (unlabeled – bottom right knob)	If no cable is inserted into the cutoff frequency CV jack, this acts as a secondary cutoff frequency control, which is added to the current FREQ setting. The range of this knob is limited, making it a control for fine adjustments. The full range can only be accessed by adjusting both knobs, however, with this knob set to the 12 o'clock position, the FREQ knob by itself should cover most use cases. If a cable is inserted into the cutoff frequency CV jack, this attenuates the CV signal. In the fully counterclockwise position, no CV modulation occurs. With some skill and possibly the use of a tuner app, it is possible to get 1V/Octave tracking for the cutoff frequency. **Note:** The cutoff frequency depends on the RESO setting, so changing the resonance will also slightly adjust the cutoff. This is inherent to the Steiner-Parker filter design. If you need 1V/Octave tracking throughout your track or performance, do not change the RESO setting once a satisfactory tracking has been established.

Control Voltage (CV) Inputs

Both CV inputs expect signals within the 0V to +10V range. Don't worry about supplying a higher or lower CV though: It will not harm the module. CV modulation at frequencies within the audio range is both possible and recommended.

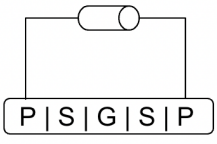
Input	Function
RESO	This controls the intensity of the filter resonance, similar to the RESO knob. If a cable is inserted, both the incoming CV and the knob will manipulate the resonance amount.
FREQ	This adjusts the filter cutoff frequency. The intensity of CV modulation is determined by the unlabelled FREQ CV AMOUNT knob (bottom right knob). The front panel graphics indicate the multiplication taking place between the CV and the FREQ CV AMOUNT value. The LED behind the X indicates the resulting FREQ setting.

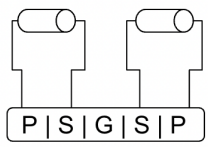
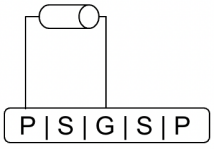
Modifier Ports

The ports on the top of the module labeled P|S|G|S|P support the plugging in of pre-assembled cartridges available from Neutral Labs, as well as individual passive components like resistors, capacitors or diodes. LEDs and LDRs (light-dependent resistors) can be used as well, even in combination. Any combination of components and/or cartridges will change the resonance behavior in its own unique way.

There are 2 rows of ports which work exactly the same, and they can be used at the same time. E.g. it is possible to connect two cartridges to both rows of ports simultaneously, or one cartridge and a number of components on the other row of ports. When using cartridges, their orientation doesn't matter, they will work the same way facing either up or down.

Caution: As shown by the warning icon to the top left of the ports, **do not use normal (unipolar) electrolytic capacitors** unless you know exactly what you're doing! Reverse voltage may make them explode violently. You may use them with the positive leg on one of the P ports and the negative leg on one of the G ports, but it is better to avoid them completely. Large value bipolar ceramic capacitors are easily available and should be used instead. The use of active components like transistors could result in unexpected behavior and might damage the module, so avoid them as well. An exception would be a BJT with either its emitter or its collector leg remaining unconnected. Rule of thumb for the novice user: **Plugging in any kind and combination of diodes, resistors and ceramic capacitors is always safe.**

Connection type	Function
Parallel (P) 	Connecting a component between the left and right P ports puts this component in parallel to the filter's main feedback circuit. Doing the same on the other row of ports will put both of these components in parallel. **Accidentally shorting these ports will not harm your component or the module, as the circuit is protected by 100 Ohm resistors on either side.**

Serial (S) 	This is used for putting two components in series, the combination of which will then be in parallel to the feedback circuit. Put the first of the two components from P to S and the other one from the other S to the other P. Both of the S ports on either row are interconnected (as visualized by the half circles on the front panel graphics), so a series connection will be made between the components. You could e.g. put a resistor between P and S on the left side, and an LED between S and P on the right side.
Ground (G) 	This is for components that should go from the feedback circuit to ground. In this case, components should be placed in such a way that one of their legs connects to any P port and the other connects to a G port. In case two components should go to ground in series, connect the first one between a P and an S port and the second one between the other S port on the same row and a G port. In case two components should go to ground in parallel, connect either of them to one of the P ports and both of their other legs to a G port. **Accidentally shorting from P or S to ground will not harm your component or the module, as the circuit is protected by a 1k resistor to ground.**

Modifier Port Patch Ideas

- Diodes or LEDs work well in parallel, especially if using two different diode types while their polarities are opposite each other, so e.g. a Schottky diode on port row 1 and an LED in reverse on port row 2.
- Light-dependent resistors (LDRs) can be used. Put an LDR in parallel and change the amount of light it receives (either by shining a light on it or using your hand to cover it in a well-lit room). You can also put an LDR in series with a diode in order to adjust the amount of effect the diode has.
- You may use an LED in conjunction with an LDR, in various combinations. Place the LED close to the top of the LDR, so the light from the LED modifies the LDR’s resistance.
- Capacitors to ground give sonically interesting results, as they will bleed high frequencies from the feedback loop, resulting in harmonics created in the resulting audio signal.