SERGE Active Processor / Noise / CV-Pro (ANC) for Eurorack

The ACTIVE PRO / NOISE / CV-PRO combines three extremely useful Serge modules, two of which are of the new 5th generation:

The **Active Processor (ACPR)** is an accurate, linear crossfader for either control voltages or audio signals. The new version designed by Serge in 2017 offers a widely increased precision. This module provides an important link in complex patches, allowing to smoothly change from one control voltage to another. It is possible to cross-fade between different envelopes, for example, or to gradually switch control over a bank of oscillators from one output of a sequencer to another output. The ACPR also offers interesting uses in the audio range, from wave-blending even to waveshaping (with CV in audio-range).

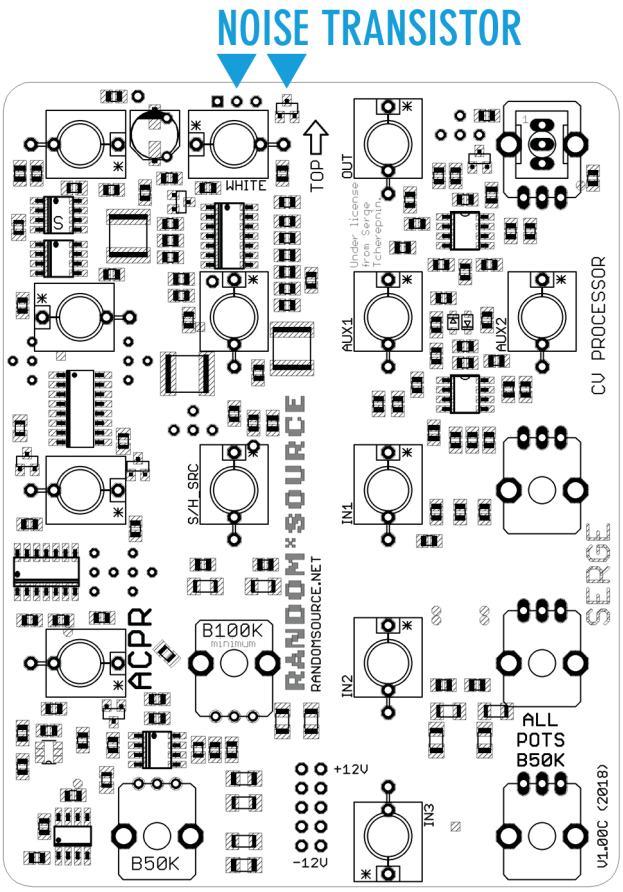
The Serge **NOISE SOURCE (NOI)** generates both white and pink noise waveforms. The S/H Source output produces the necessary input for a sample and hold function to produce equi-probable random voltages, similar to a 1/F distribution function and is a perfect companion for the Smoothed & Stepped Generator (SSG).

The **Precision CV-Processor (CV-PRO)** is also a new development that goes beyond adding and inverting control voltages. A precision input stage allows mixing 1V/Oct voltages, e.g. to cent-accurately transpose sequences (i.e. stay in tune). A switch transposes precisely one octave up or down. The attenuverting stage offers full processing control of level and polarity of three inputs voltages including Serge's unique diode-based wave-compression. This new version now allows using the non-linear attenuverter mixing stage with precise 1V/Oct (AUX) inputs without losing their precision. IN 1 is normalled to 5V and therefore can be used to add an DC offset when no input signal is present.

The Random*Source ANC for Euro is a licensed and authorized Serge design. It uses best parts available today (e.g. Burr-Brown op-amps, C0G capacitors, precision references) for optimum precision and performance.

Building the module - DIY Version

The Random*Source ANC kit consists of a front panel, a main pcb that already contains all parts in surface-mount technology (SMT) and serves as an interface to the front panel.



Please note:

- The aluminum front panel is color (screen) printed. **Do not use strong cleaning liquids, solvents, acid, ethanol, detergents or similar to clean the front panel** as that could solve/harm the paint. A damp cloth should be sufficient if you need to clean it.
- **Use antistatic precaution** when handling the main pcb - don't touch the SMD parts with your hands.
- Orientation of the main pcb: **power header is at the bottom** (when looking at the module upright, e.g. in a rack), RED STRIPE (-12V) should be on the bottom side.
- **Octave switch has to be a 3-position switch (ON - OFF -ON)!**
- The **main pcb is designed to sit upside-down**, so that all the SMT components are between the two pcbs - that means the **trimmers and the power header have to be soldered on the SMT side**.

Bill of Materials

Trimmers

4	50k Multiturn	Active Processor	Bourns 3296Y-1-503LF or anything that fits
2	10K Single-turn	Noise Source CV-Pro	Trimpot (Bourns 3362P, Vishay T73YP104KT20 or anything that matches the footprint). See calibration info below.

Misc

1	PNP e.g. BC557A* only if not already installed in SMT!!!	Noise transistor *pick for best sound ;-)	Use through-hole or SMT (check if SMT is already installed!): TH: e.g. BC556A, BC560A SMT: BC860A, BC857A Note: Low gain types (A) seem to work better than B or C.
1	47uF BP capacitor		Only if not already installed in SMT!! Check the other side!
1	Switches SPDT ON - OFF - ON	Octave up / down 3-positions!	Sub-Miniature Switch, e.g. Mountain Switch 3 positions: Mouser: 108-0044-EVX
13	Thonkiconn Jacks		3.5mm Jack Sockets (PJ301M-12) from Thonk
4	Potentionmeter 50k	linear (B50K)	Alpha 9mm vertical pcb mount available from Thonk, Tayda
1	Potentionmeter 100k	linear (B100K)	Alpha 9mm vertical pcb mount available from Thonk, Tayda
1	Euro Power header		MTA-100 power connector, Reichelt: WSL 10G

Power Connector

The module is designed to be powered using a standard Eurorack 10-pin DIP header (pinout +12V / GND / GND / GND / -12V with the **red stripe on the cable indicating the -12V side**).

Building

1. Solder the power connector and the trimmers onto the pcb).

2. See if a large “47” electrolytical cap is already installed in SMT (net to the WHITE noise output). If not, install the 47uF BP cap (bi-polar or non-polar) where indicated on the pcb.

3. Check if a **noise transistor** is already installed. If not, it is recommended to simply stick the transistor in (**SQUARE PAD = Emitter**, Center pad = Base) and only solder it after the white noise output has been tested (best using a scope). If the direction is incorrect, you will not have a noise signal.

4. Mount the Thonkiconn jacks, the pots and the switche and onto the pcb (as marked on the board). Don‘t solder them in yet.

5. Carefully mount the pcb (with the pots etc. inserted) onto the front panel. You may have to wiggle each pot a bit to get the pots through. Make sure the threads of the pots go through completely and the pots sit right at the front panel. Screw a few of the jacks, pots and switches to the front panel to make sure of that (not all needed - you have to remove them again!).

6. Once everything is nicely in place, solder the pots, jacks, and switch (while the front panel is attached).

7. Connect a power cord supplying +12V, GND, GND, -12V to the power-header on the main board and double **check the direction of the power header before you turn power on**.

8. Power up and check out the WHITE noise (the PINK is derived from that). Try different transistors if desired. If WHITE sounds as desired, solder the transistor in.

9. Calibrate as described below.

Calibration - Active Processor

Calibration is fairly easy provided you have a **2-channel oscilloscope**. You have to calibrate both channels / sides, so that ultimately when the XFADER knob is fully CCW you get **exactly** the signal present at in IN 1 at the output and in full CW position, **exactly** the signal present at the other channel (IN 2) - both in level and offset.

Each side (channel) has two trimmers, one for DC (offset) and one to control the scale (amplification).

Feed a (audio) signal into IN 1 and turn the XFADE knob fully CCW. Watch both the incoming and outgoing signal on the scope. Use the 2 trimmers marked 1A and 1B until the waveforms to precisely overlap.

Turn the XFADE knob fully CW and send a signal to IN2. Trimmers 2A and 2B allow you to get the output identical to the input.

Turning the XFADE knob should now blend from input 1 to input 2.

Calibration - Noise Source

The SH/SRC trimmer sets the DC offset of the SH/SRC output signal. Using an oscilloscope, adjust the trimmer so that the signal “sits on 0V”, i.e. roughly ranges from 0V to 5V.

Calibration - Precision CV-Pro

Calibration is required to set the Octave switch to exactly 1.000V meaning exactly one octave. This can be done in 2 ways - make sure you have no input signal going into the CV-Pro anywhere:

1. **By DMM**: Use a precision multimeter (DMM) to measure the voltage at the output (against 0V of the output patchcord). The DMM should read about 0V / 0mV when the switch is in center position. Flip the switch up or down and adjust the trimmer so that the output is exactly 1.000V higher or lower.

2. **By ear / tuner**: Send the output to a VCO that tracks well (e.g. a Serge NTO) and tune it to an exact note / semitone. Flip the switch up or down and check if the pitch of the VCO is exactly 1 octave from where it was. Adjust the trimmer and repeat until you get an exact octave in either direction.

Power Consumption

Power consumption: <=45mA @ +12V and <=40mA @ -12V

Module width: 18HP, depth: < 35 mm

(Version 17. March 2019, 1:41 PM)