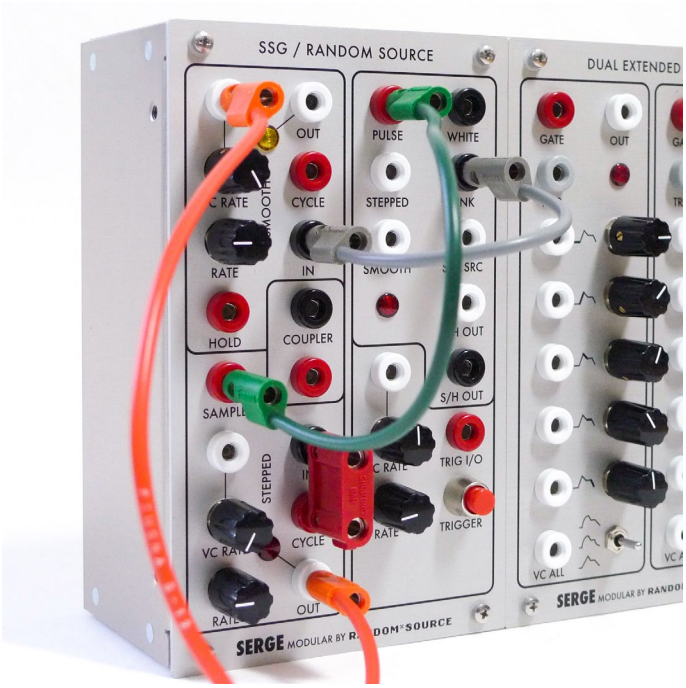
SERGE
Random Source (RS)
= Serge Random Voltage Generator + Serge Noise Source and Sample&Hold

The Serge Random Source (RS combines a Serge Random Voltage Generator (RVG, left column) and a Serge Noise Source (right column) in one module.) As the name suggests, the Random Voltage Generator produces random voltages which vary in a smooth or in a step-wise manner. Random timing pulses are also available.

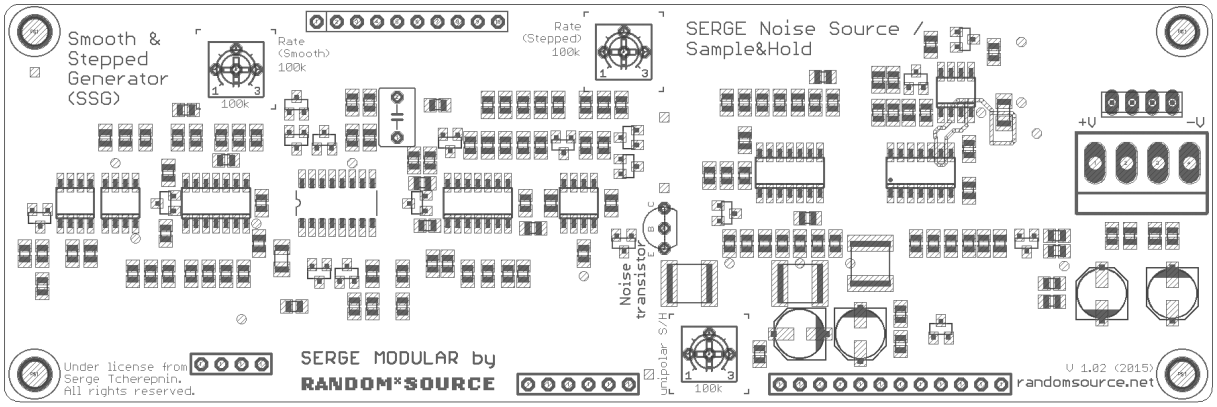
The Noise Source (NOI) provides both white and pink noise waveforms. The S/H SRC generates a special ("noisy") waveform as an ideal input for Sammple & Hold functions to produce random voltages of equal probability (similar to a 1/F distribution function). In addition, the Noise Source features a random voltage output which can be stepped through random voltages by sending trigger pulses or using the pushbotton.



Technically, the Random Source is a combination of a Serge Smooth & Stepped Generator (SSG) with the Noise Source module. The Random*Source edition combines both modules on one single pcb, so that no stacking of pcbs is required any more. The Random*Source version of the Random Source is a licensed and authorized adaption of the original Serge designs.

The Random*Source SSG + RS 4x4 kit consists of a front panel, a component pcb serving as an interface to the front panel as well as two main pcbs (one for the SSG, one for the RS), each of which already contains most of the parts in surface-mount technology (SMT). **This document only describes the RS side**.

Random Source and SSG essentially use the same main pcb, however, the SSG version only contains parts in the upper area whils the **RS requires the fully installed pcb** (i.e. also the lower area containing the Serge Noise Source and Sample&Hold).



Please note:

- The Random*Source SSG pcb is available in different configurations - **for the RS you need the pcb version that only contains all parts**.
- The (full) RS version of the SSG pcb will **most likely contain a noise transistor in SMT.** There is an additional through-hole footprint for a noise trasistor next to it (in case you wanted to experiment with different transistors). **Do not install that through-hole transistor if/while that SMT transistor is installed**.
- Orientation of the main pcb: **power header is at the bottom** (when looking at the module upright, e.g. in a rack).
- **Use antistatic precaution** when handling the pcb - don't touch the small SMD parts and ICs with your hands.
- Only these parts have to be soldered in: trimpots, 220nF Film capacitor, pin stripes to connect the main pcb to the component pcb, MTA power header (see picture above).
- LED: To set / control LED brightness, install either a trimpot ("LED") or a resistor (e.g. 2k) on the component pcb - do not install both! **Use a low current (max 2mA) LED** - at least 100-130mcd or ultrabright LEDs (60°) plus a **trimpot of (only) 2k or (or a 2k resistor) for (fairly) bright LEDs (**100-150mcd). If you use ultra-bright LEDs, a 5k trimmer might make sense, higher values for the trimpot are probably not needed (but work also).
- The component pcb contains some potentiometer footprints that allow you to chose the direction in which the potentiometer works. Use the "NORMAL" orientation (as marked on the pcb) unless you have a good reason not to.

Bill of Materials

Trimmers

3	100k	Rate Stepped, Rate Smooth, unipolar S&H	Trimpot (Bourns 3362P, Vishay T73YP104KT20 or anything that matches the footprint). See calibration info below.
2	2K or more	LED brightness (instead of RLED resistors)	Trimpot (Bourns 3362P or Vishay T73YP202KT20 or anything that matches the footprint) to adjust the LED brightness. Pick value depending on LED (see text).

Resistors

2	(2k*)	RLED*	Pick according to LEDs and desired brightness if not using trimpots.

Capacitors

1	220n		Film (Wima MKS-2-5 or similar) or C0G

Misc

1	LED 5mm	low current (max) 2 mA	pick color to suit LED lens.
1	LED lens 5mm		VCC, Mouser 593-3000R (red), 593-3000A (amber) ...
1	Pushbutton	OFF - (ON)	C&K Pushbutton: Mouser: 611-8125-222 Dress Nut: 611-702501201 Red switch Cap: 611-801803000
1	SIL header 4pol		pin connectors/headers, linking main pcb to component pcb - using precision strips allows to break off pieces as needed
1	SIL header 6pol		
1	SIL header 10pol		
5	Banana Jacks	2x CYCLE, HOLD, SAMPLE, (normal) COUPLER (red)	Emerson-Johnson Mouser: 530-108-0902-1 (red) or Thonk
2	Banana Jacks	2x IN, (“hot”) COUPLER (black)	Emerson-Johnson Thonk / Mouser: 530-108-0903-1 (black)
4	Banana Jacks	2x CV, 2x OUT (blue or white)	Emerson-Johnson Thonk / Mouser: 530-108-0910-1 (blue), 530-108-0901-1 (white)
4	Potentionmeter 50k	linear (B50K)	Alpha 9mm vertical pcb mount available from Thonk, Tayda
1	MTA-156		MTA-156 power connector

Building

This is simply a suggestion - you might find a different workflow more practical:

1. Mount the Banana jacks, the LED lens and the switch onto the front panel. If you use retention rings for the LED lenses, attach the ring to the lens.

2. Mount the pots onto the component pcb. Pots should sit on the side marked on the pcb - this side faces the front panel. Don‘t solder them in yet. Stick the LEDs into the component pcb - the long leg must be at the + side.

3. Carefully mount component pcb (with the pots and LEDs inserted) onto the front panel. First slide / push the LED into the LED lens - all the way, this may take a bit of force. You may then 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. You can even screw the pots to the panel to make sure of that, but you have to unscrew them again later (for Step 5).

4. Once everything is nicely in place, especially the LED sitting inside (and not on top) of the LED lens, solder the LED and the pots onto the component pcb (while the front panel is attached). DO NOT SOLDER THE BANANA JACKS YET!

5. Solder the through-hole parts onto the main board.

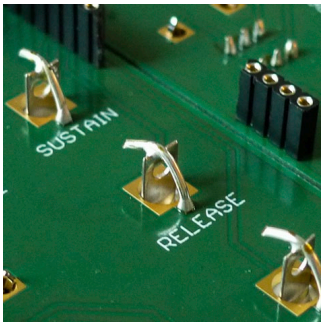
6. Main pcb and component pcb are to be connected through precision DIP socket and pins. It is recommended to use the pins on the main pcb (facing down, soldered from above) and the pin sockets on the component pcb (standing up, soldered from the front panel side). Break or cut off the pieces you need and stick them together so that main pcb and component pcb form a nice sandwich (don‘t solder yet). Check that you didn‘t leave out any pins / holes and that the sockets are all on the same side (component pcb). Solder all the pins in while keeping the sandwich together - this avoids any misalignments.

7. Carefully separate the sandwich - if you used precision sockets, this may not to too easy - they stick together nicely (giving a good connection).

8. Mount the component pcb onto the front panel again and screw on the pots from the front side.

9. Make sure everything is in place.

10. Solder the banana jacks in. You can either solder them directly to the surrounding vias (ring round) or - which makes removing easier should you ever need to do that - by inserting a stiff (bare) wire into the little hole (via) and solder that wire to the top of the banana jack:



11. Attach any screws / spacers if desired and mount the main pcb onto the component pcb.

12. Connect a power cord supplying +12V, GND, GND, -12V to the MTA-header on the main board and you should be ready to go :-)

Calibration

There's one trimmer for each side that - among other things - determins the range covered by the RATE potentiometers. The simplest way seems to be to calibrate the (full) SSG pcb to be used in the Ranndom Source as a "normal" SSG - using the SSG side of the 4x4 module - and then insert it into the Random Source side. Please refer to the SSG documentation for calibration.

If you installed a trimpot for **LED brightness** on the component pcb, adjust it according to taste.

Power Consumption

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

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