



SCRAT v1.1

by neutral labs



Build Guide

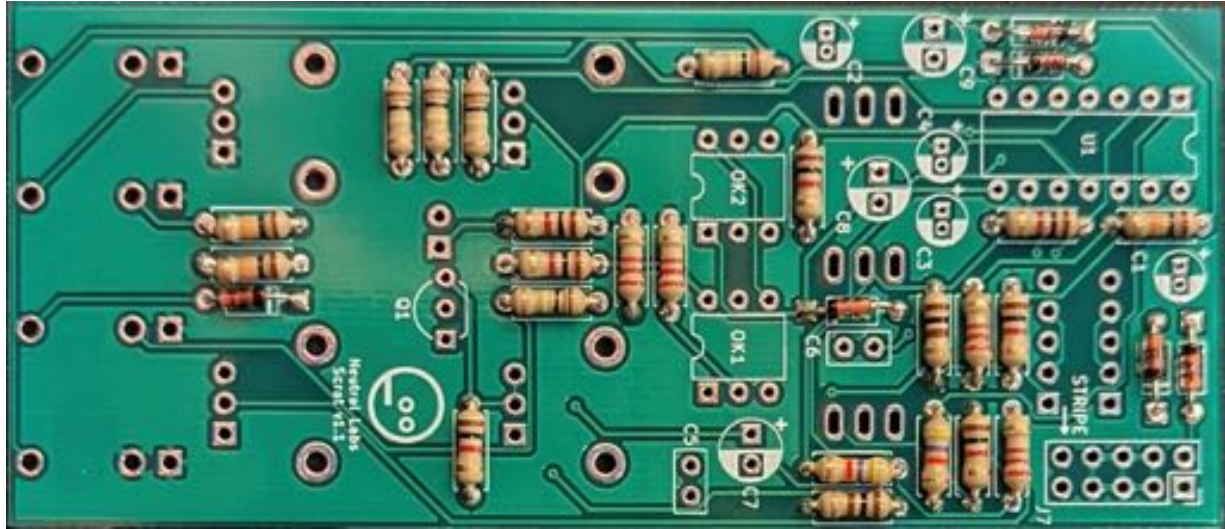
Important!

DO NOT EMPTY ANY OF THE COMPONENT BAGS NOW! The components are grouped into the bags so that all of them can be identified without having to look up resistor ring codes or inspect diodes with a loupe. Rather leave everything inside the bags and take out what you need while soldering. This way you will not have to use resistor ring codes or a multimeter to determine the values.

Component List

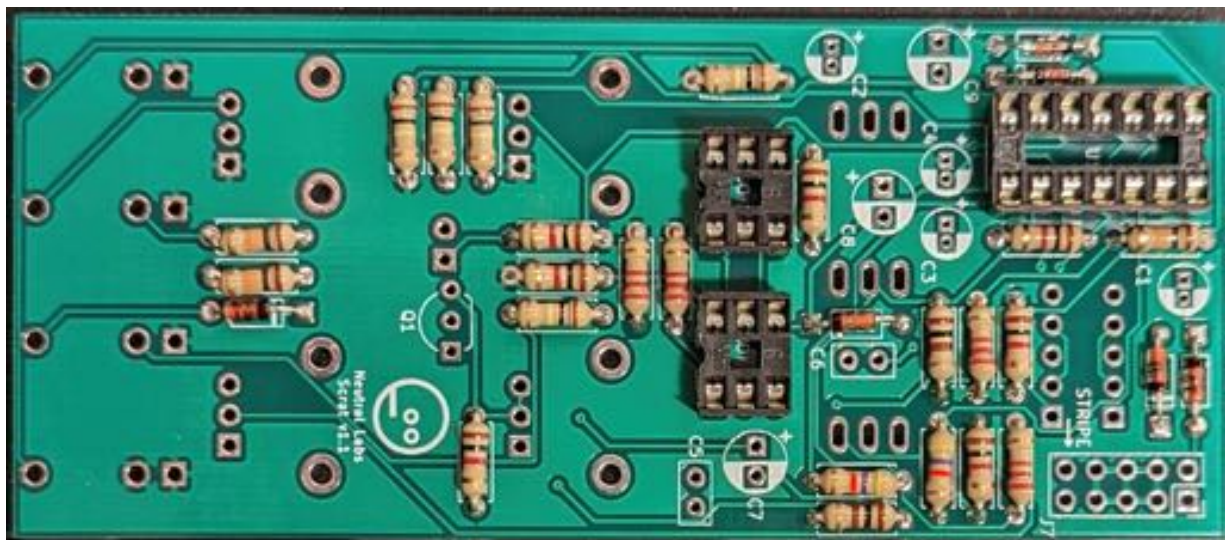
Part	Count	Type	Polarity matters?
C1-C4	4	electrolytic capacitor 0.1 μ F	yes
C5-C6	2	ceramic capacitor 3.3 nF	no
C7-C9	3	electrolytic capacitor 10 μ F	yes
D1-D4	4	BAT85 Schottky diode	yes
D5-D6	2	1N4148 signal diode	yes
D7	1	LED orange 3 mm	yes
J1-J4	4	Thonkiconn mono 3.5 mm switching jack	-
J5-J6	2	5-pin header (panel port)	no
J7	1	Eurorack 10-pin power header	no
OK1-OK2	2	H11F1M analog FET optocoupler + DIP6 socket	yes
Q1	1	transistor J175 P-Channel JFET	yes
R1-R3	3	10 k Ω	no
R4-R8	5	100 k Ω	no
R9-R10	2	100 Ω	no
R11-R12	2	4.7 k Ω	no
R13-R19	7	1 k Ω	no
R20-R23	4	2.2 k Ω	no
RV1-RV4	4	10 k Ω linear potentiometer	-
SW1-SW3	3	SPDT switch	no
U1	1	TL074 quad op-amp and DIP14 socket	yes
XX	-	various sample components to be used with the panel ports of the completed module These do not go on the PCB!	-

Step-by-step instructions



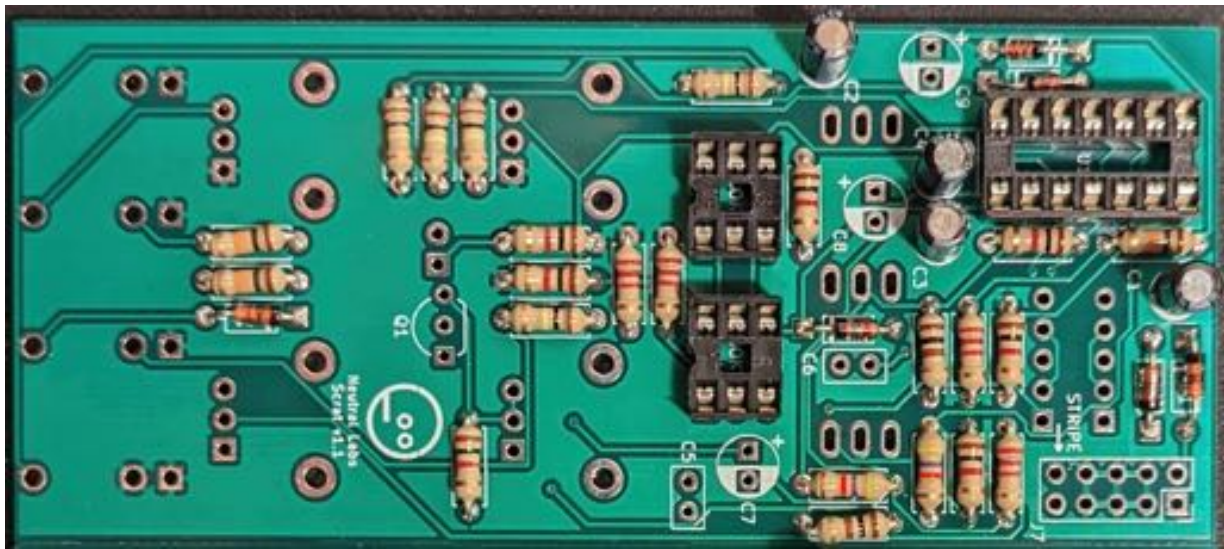
Solder the diodes D1-D6 (except D7!) and all resistors first (R1-R23). You do NOT have to read ring codes or use a multimeter to determine the resistor values. Neither do you have to use a loupe to inspect the labels on the diodes. There are only unique sets, so you can just count the ones in each set to find out the value. Some of the resistors in your kit may be white, green or blue instead of beige. Don't worry, they all work pretty much the same.

Caution! Polarity matters for diodes. **The black line on each diode must match the white line on the PCB.** In case of reversed polarity, you may damage your module when plugging it in!



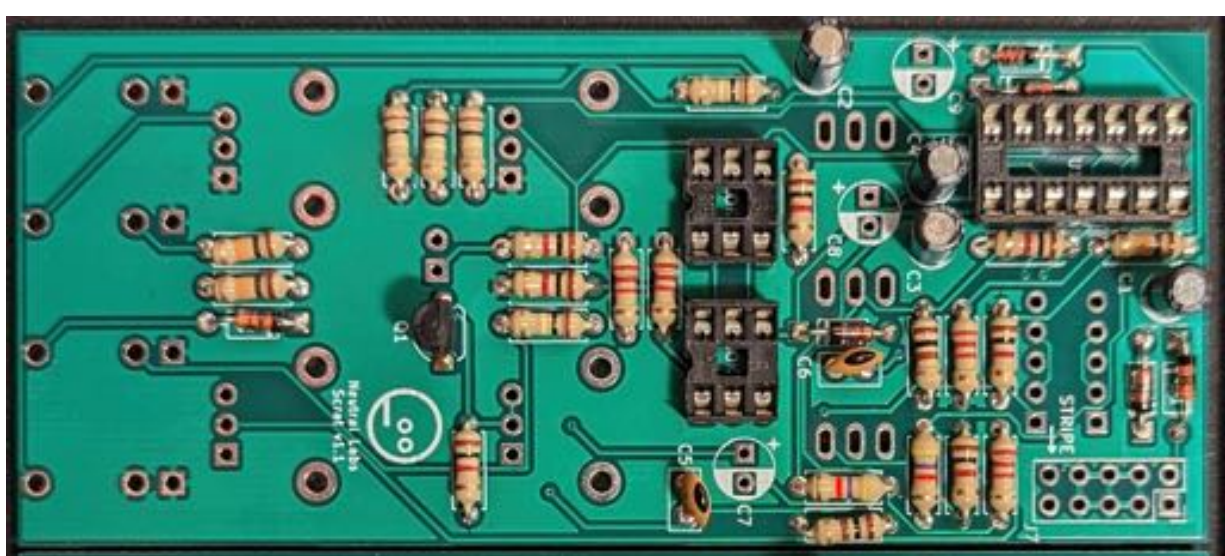
Next, put in the IC sockets (U1 and OK1-OK2). They have a little notch on one side which should match the notch of the white outline on the PCB. (It's not harmful if you put one in the other way around by accident, as long as you make sure the IC is facing the right way when you plug it in later.)

An easy way to solder these sockets is to set them into the PCB holes, put the front panel or a piece of cardboard flat on top and flip the whole thing over. Alternatively, use some sticky tape to hold it in place. Solder a single corner pin and then the opposite corner pin - now you can remove the tape, front panel or cardboard and freely move the PCB to solder the rest of the pins.



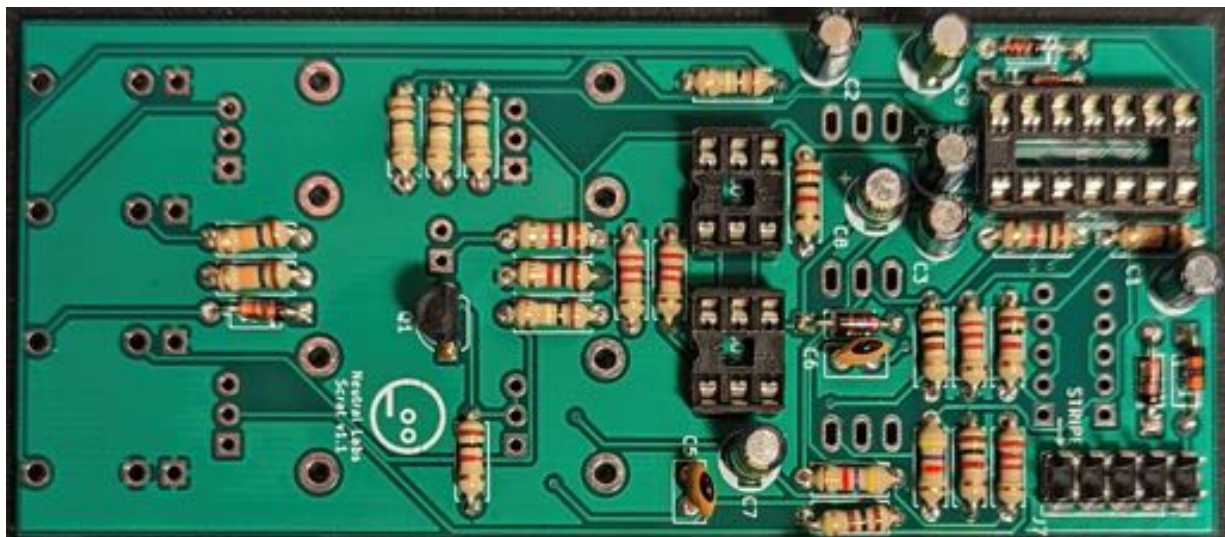
Put in the $0.1 \mu\text{F}$ capacitors now (C1-C4). **Caution! Polarity matters for all of the electrolytic capacitors.** Their longer leg goes on the plus side as indicated on the PCB.

The solder pads for the small capacitors are quite close to each other, so make sure there's no accidental solder bridge between them, or you might damage the module when plugging it in. It helps to bend the capacitor's legs slightly outward before soldering. Test connectivity with a multimeter if you are unsure.

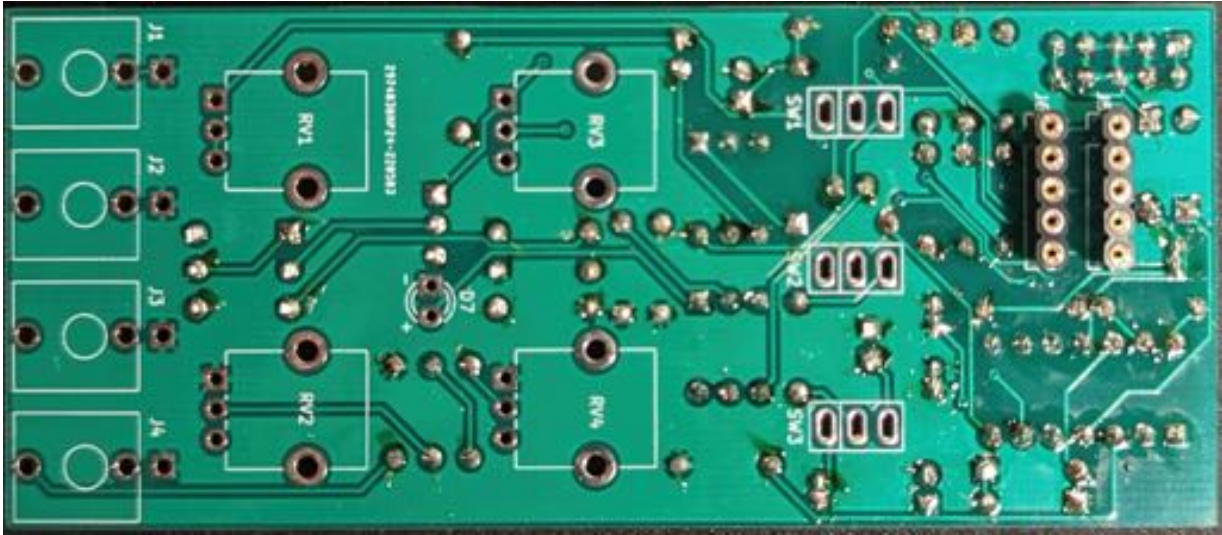


Put in the small 3.3 nF capacitors next (C5-C6, polarity does not matter for them). In your kit, C5 and C6 may be different in size, shape and/or color from the ones shown here. Don't worry, ceramic capacitors come in different designs, but they work the same way.

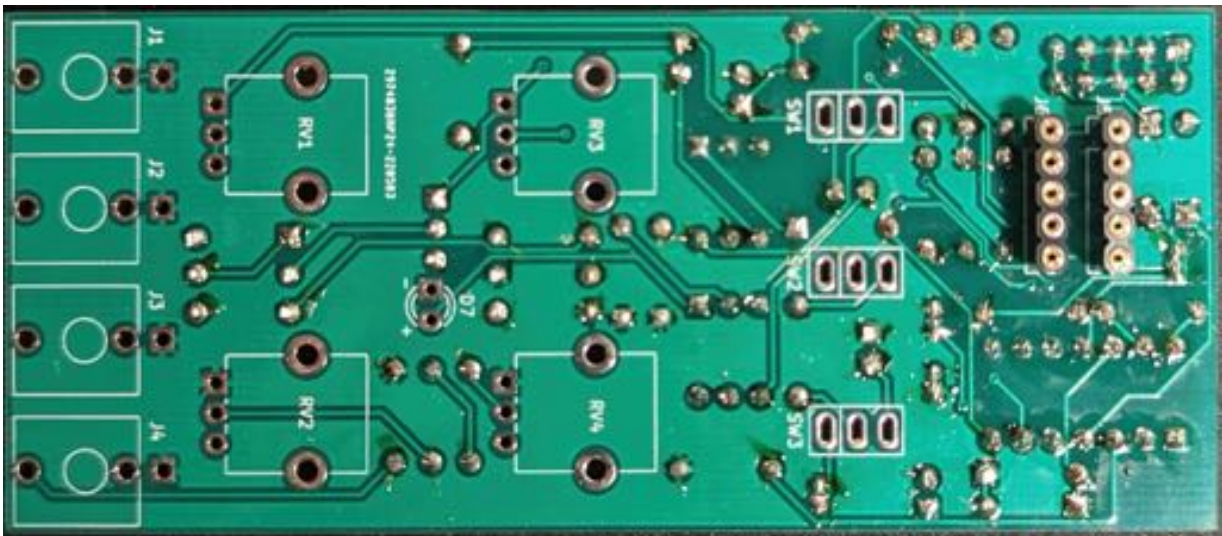
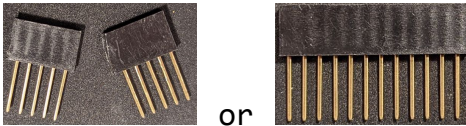
Add the J175 JFET (Q1). **Polarity matters for the JFET!** Insert it facing as indicated by the outline on the PCB.



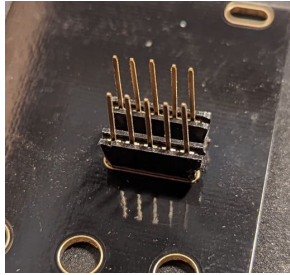
Now add the 10 µF capacitors (C7-C9). **Caution! Polarity matters for C7-C9!** Put in the 2x5 pin power header (J7). As with the IC socket, it's best to solder a single pin first. You may want to hold the headers in place with a piece of sticky tape while soldering. Another trick is to plug the Eurorack power cable into the header before and hold it this way.



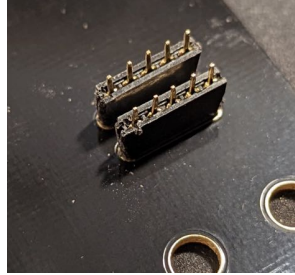
Flip the PCB over. Now on to J5 and J6 (the panel port headers). There are 2 different types of DIY kits with different types of headers. If your kit has headers with long legs that look like this, skip the next step.



If your kit has two 5-pin precision headers with round holes and short legs, put them into J5 and J6 as shown and solder them. They are there in order to increase the overall height, so the panel port headers will be flush with the front panel.



or



In case your kit has these 5-pin precision headers, it will also have a regular 19-pin or 20-pin female header strip (with short legs). Otherwise it will have either two 5-pin headers with long legs or a longer header strip with long legs.

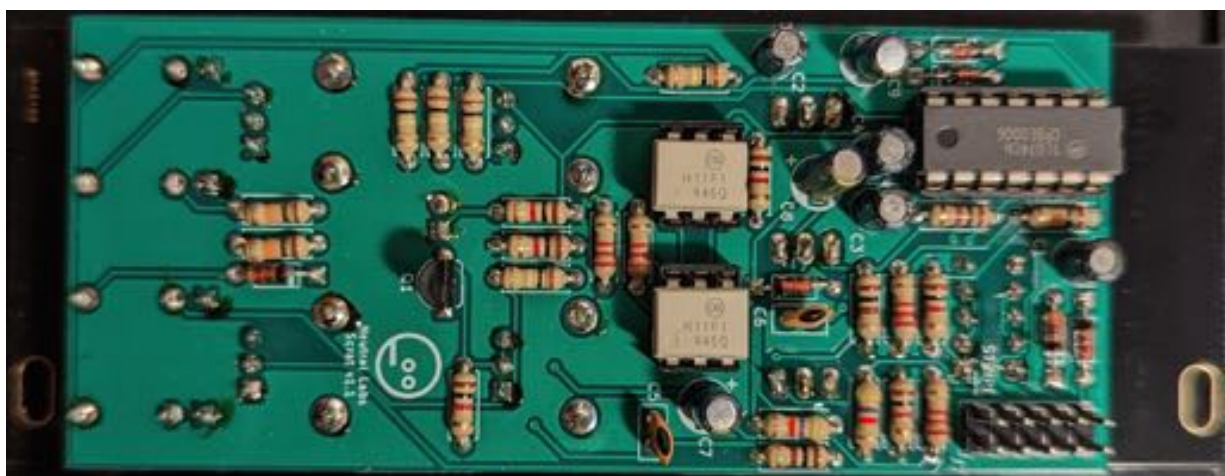
Unless you have two individual 5-pin headers already, break two 5-pin wide pieces from the longer header strip, you will need them for the front panel ports. Splitting a header is best done with a wire cutter or a pair of pliers. Cut right along the position of a pin and be aware that you will lose that pin when breaking apart the headers.

The two 5-pin headers (with long or short legs depending on your kit) must now be inserted into the two slots from the back of the front panel. They should sit in there tight, flush with the front panel - or protrude ever so slightly - and not wiggle! In order to achieve this, use either a file, sandpaper or an X-Acto knife, taking away bit by bit of plastic and rounding the short edges, so they will eventually fit the slot. Be careful not to file, sand or cut into one of the 5 square holes that will be exposed on the front panel!

Put in the orange LED (D7). Polarity matters: The short leg goes on the negative (minus) side. Do not solder it in place yet!

Remove the nuts from the pots (RV1-RV4) and jacks (J1-J4). You may want to clip the little silver anti-rotation tab off the pots with a wirecutter. Remove the top nuts, knurled washers and anti-rotation washers from the switches (SW1-SW3). Leave the bottom nut, but do not tighten it: Give it about half a turn to one full turn from its lowest position. Discard the anti-rotation washers.

Fit the pots, switches and jacks onto the PCB without soldering yet. Then put on the front panel. The headers inside the panel slots should fit into the holes on the PCB (or the holes on the precision headers if your kit has them). Add and lightly tighten all the nuts to hold the panel in place. Carefully flip everything back over and solder. Make sure the LED sticks out from the PCB to touch the panel.



Plug the ICs into their sockets (U1 and OK1-OK2). They have little notches or dots on them, which should match the little notch on the socket (and the notch in the white outline on the PCB). Bend their legs slightly inward if you have trouble fitting them in.

Now plug in and test your module. Refer to the manual if needed.

If something's not right, it may be best to unplug the module from Eurorack power immediately so as not to damage it (or the PSU).

Most problems can easily be fixed by reheating all solder joints so the solder can reflow. Also visually inspect joints and see if you can spot accidental solder bridges.

When everything is working correctly, you can now tighten all the nuts. If using a wrench or pliers, be careful not to scratch the front panel surface. As the final step, put the knobs on the pot shafts.

If you need help troubleshooting or want to share photos, audio and/or video of your creations (please do), send a message to admin@neutral-labs.com