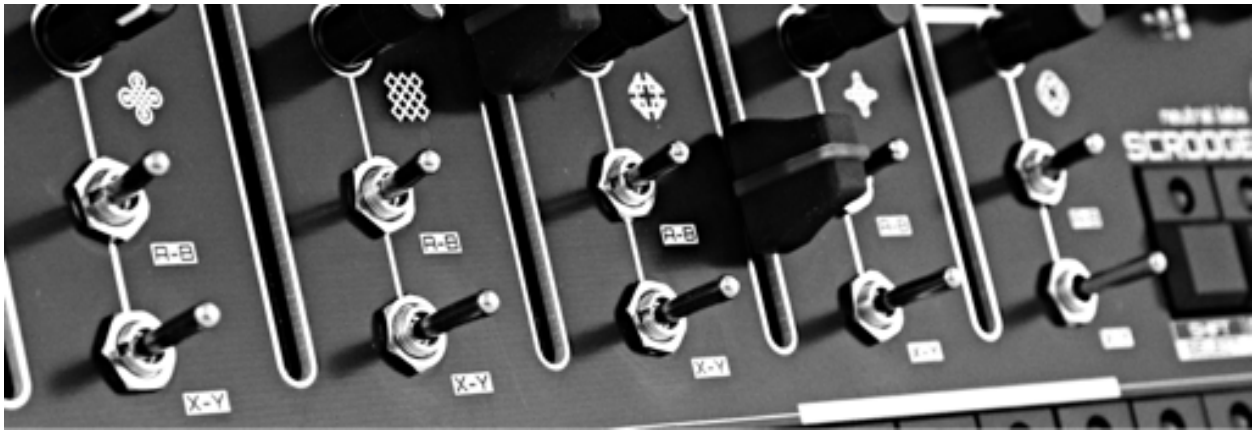
SCROOGE HW v3

by neutral labs



Build Guide

Scrooge comes with all SMD components presoldered, and as such it is a very straightforward build. Due to the number of front panel components, it will take some time though (1-3 hours depending on level of experience). Some of the soldering will be in close proximity to SMD parts, so care must be taken. The kit is intended for builders of medium or advanced skill level, but can be completed by a motivated and diligent beginner (ideally with some previous soldering experience). It is of course possible to complete the build by simply placing the components according to their IDs and soldering them, but there are some peculiarities to observe if you want the best physical appearance and ergonomics. **So it is highly recommended to read the guide thoroughly and follow it step by step.**

Note that this guide covers the HW v3 version, please use the appropriate PDF for other versions.

Component List (common parts for Eurorack + desktop)

Part ID	Count	Component type	Polarity matters?
J3	1	10-pin male header	no
J4, J5, J21	3	Thonkiconn TRS (stereo) socket + nut	-
J6-J20	15	Thonkiconn TS (mono) switching socket + nut	-
D90, D91	2	LED 3 mm orange	yes
-	1	LED housing	-
C59	1	1000 µF electrolytic capacitor	yes
SW1-SW10	10	SPDT on-off-on toggle switch	no
SW11-SW29	19	PB86-A1 orange LED momentary button	-
RV1-RV10	10	100 kΩ linear mono plastic shaft potentiometer	-
RV11-RV13	3	100 kΩ linear mono metal shaft potentiometer + nut	-
RV14	1	100 kΩ linear stereo plastic shaft potentiometer	-
U21-U25	5	100 kΩ linear mono LED slider potentiometer	-
-	3	knobs for RV11-RV13	-
-	5	caps for U21-U25	-
-	1	spacer PCB	-

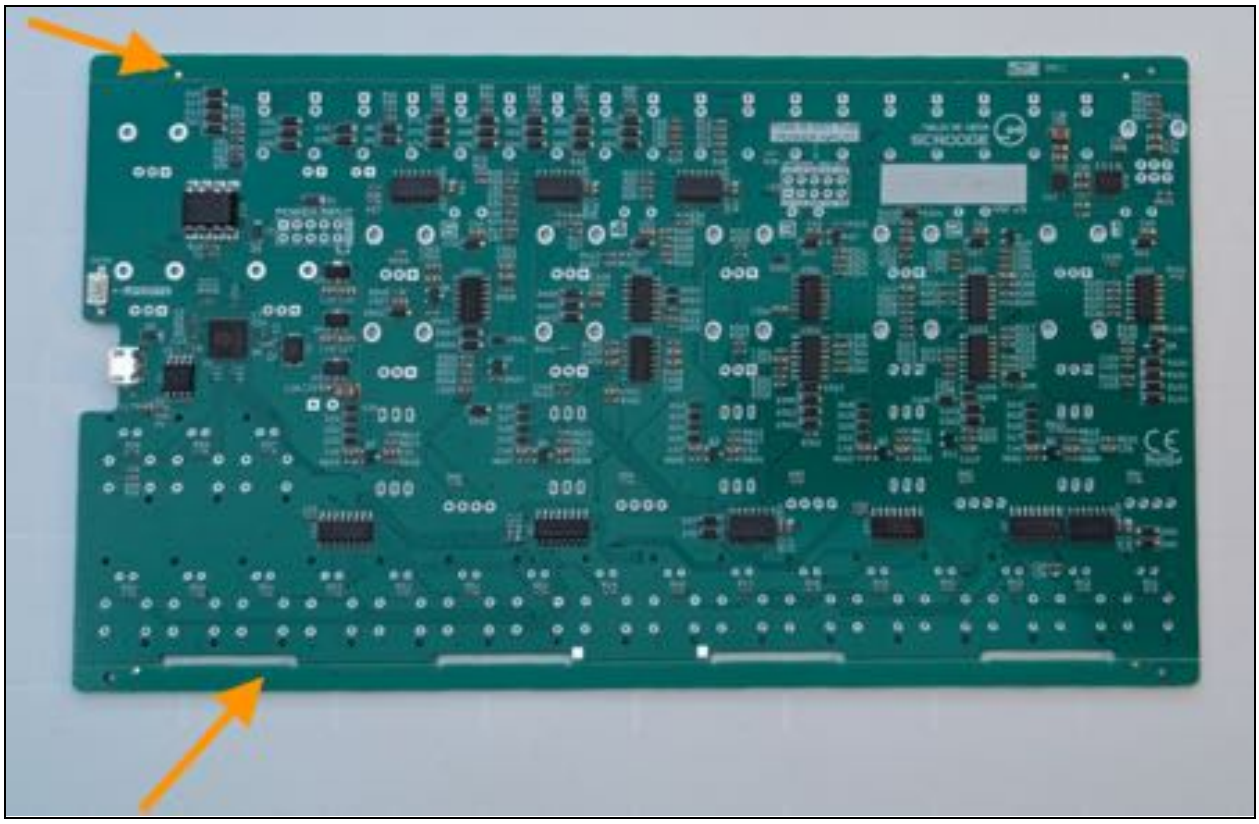
Component List (desktop kit only)

Part ID	Count	Component type	Polarity matters?
-	4	hex panel screw	-
-	1	USB-C to USB-A cable	-
-	1	PENNY A power supply PCB plus 2 headers	-

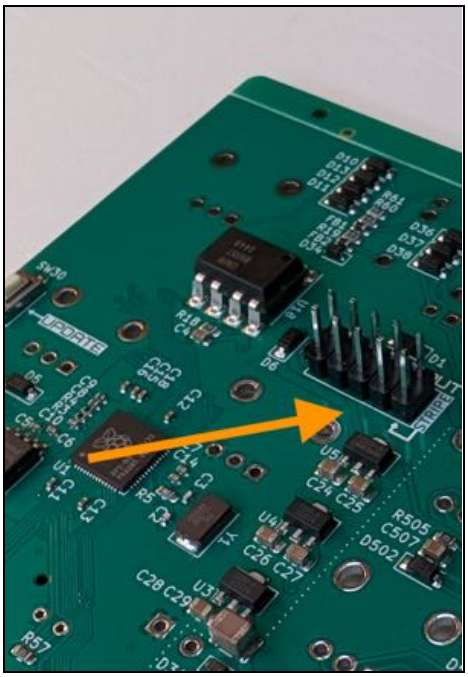
Component List (Eurorack kit only)

Part ID	Count	Component type	Polarity matters?
J22	1	(optional) 10-pin female header	no
-	4	panel screw	-
-	1	Eurorack power cable	-

Step-by-step instructions



Use a pair of pliers to snap off the edge rails from the PCB. These are remnants from the manufacturing process. **Keep both edge rails for now, as you'll need them later in the build!**

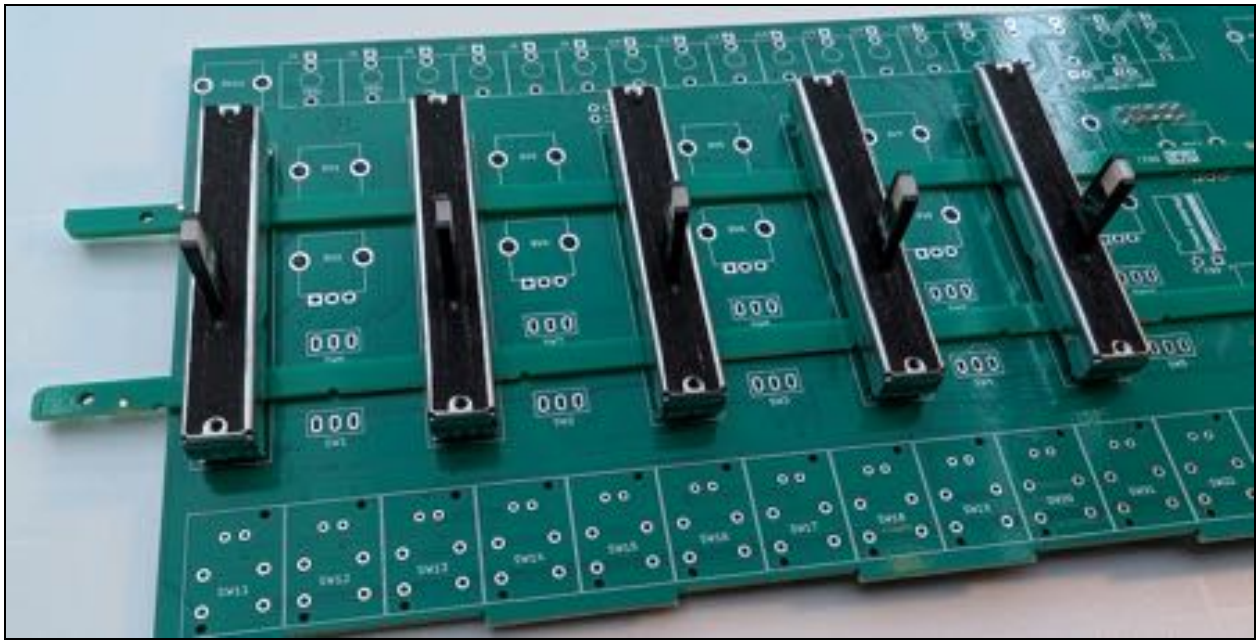


Insert the 10-pin Eurorack power header (J3) into the PCB footprint and solder from the other side.

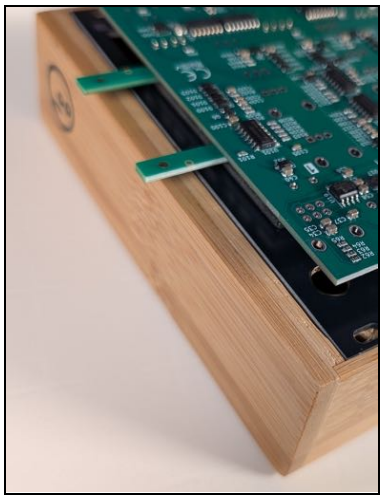
This header is part of both the Eurorack and desktop version of the kit, as the desktop version is powered from the PENNY A power supply that gets plugged into the Eurorack power header.

Make sure the pins are pointing straight up in a 90 degree angle. It's best to solder one pin first, correct the angle slightly if necessary, then solder the remaining pins.

Only the Eurorack version has a black 10-pin female connector for an expander module or for DIY projects that work directly with the 8 sequencer track outputs (J22). This is optional and not needed in order to use Scrooge by itself. If you want to use it, put it in place and solder.

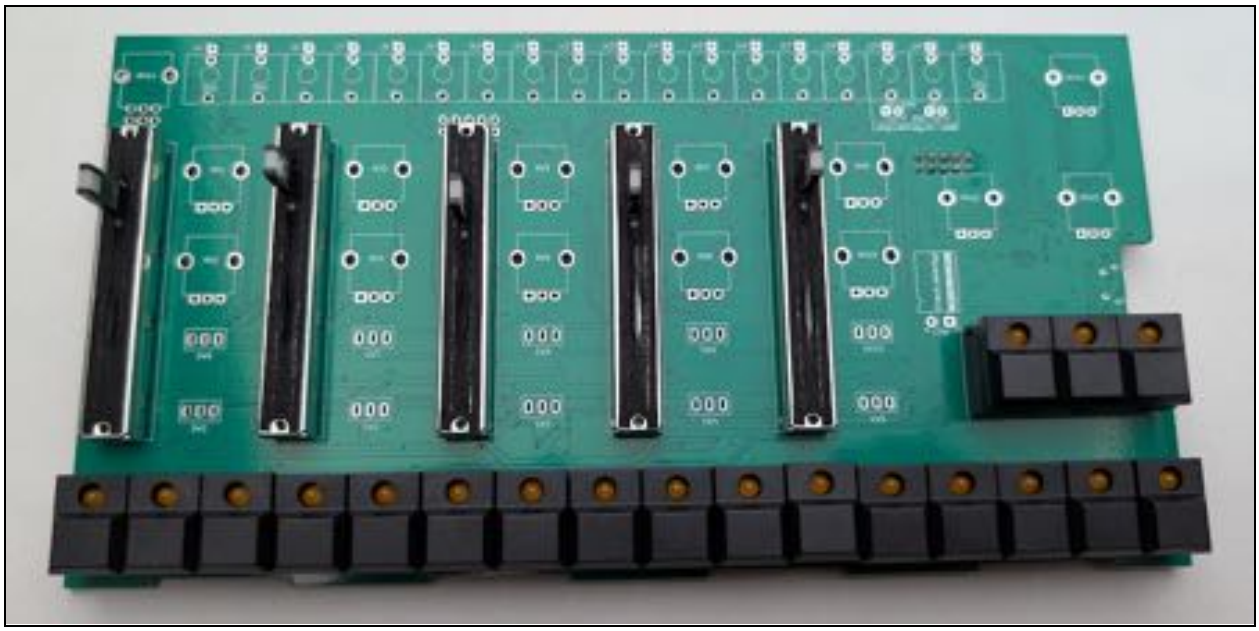


Now flip the PCB onto the side you just soldered the connectors to. Place the 2 edge rails you just snapped off across the PCB as shown in the picture. They will temporarily help set the height for the 5 slider pots (U21-U25). Put in those slider pots **without soldering yet!**



Fit the front panel on top of the sliders. Now you need to flip everything over while holding the front panel against the PCB, and lay it down so that the panel will be supported in the corners. If you're building a desktop unit, you can simply use the desktop case for that. Otherwise, use two objects of roughly the same height on the left and right side of the panel, such as two books, two solder spools or two bananas. **If using bananas, make sure they are unpeeled!** The objects need to be high enough for the slider levers to not touch the surface below.

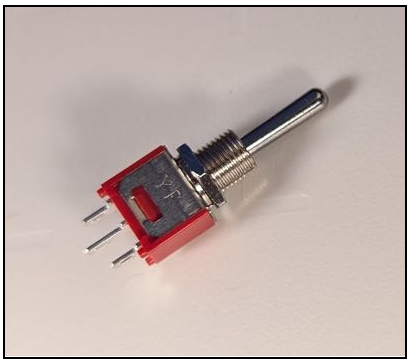
Gently push down on the PCB, so the slider bodies are pushed against the edge rails. This is to ensure the correct height for them. Solder **only one top pin and one bottom pin** on each of the sliders. The rest will be done later when everything else is mounted and aligned. Check that all of the sliders are close to horizontal. If not, you can move them while reheating one of the solder joints.



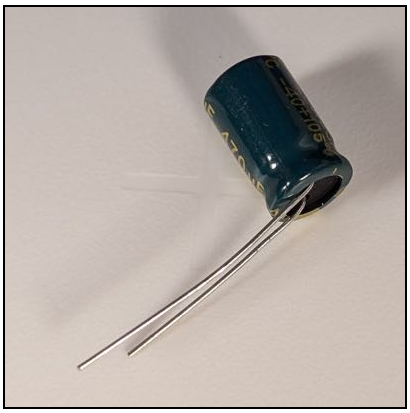
Pull the edge rails out to the side (they can be discarded now), remove the panel and insert the 19 buttons (SW11-SW29) into their footprints **without soldering yet!** They each have 2 plastic pins that need to sit securely in the holes on the PCB. Double and triple check the alignment of the buttons. It's best to look from all possible

angles. Make sure none of them rub against their neighbours when being pressed.

Insert the pots (RV1-RV14) and all the Thonkiconn sockets (J4-J21) **without soldering yet!** 3 of the sockets are marked “TRS” on the PCB. These are the green (stereo) sockets which are a little wider than the black ones.

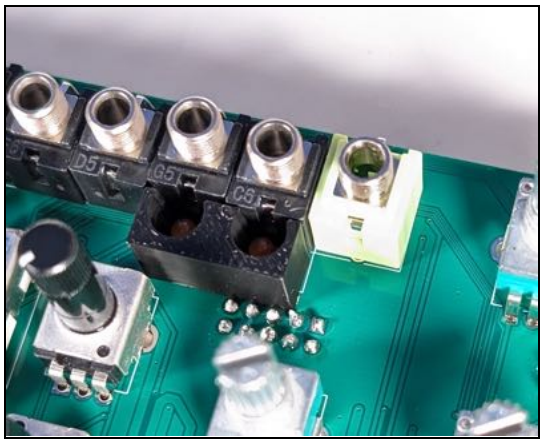


Each SPDT switch (SW1-SW10) has 2 nuts. Put 1 nut on each, all the way down the thread as shown in the picture. It doesn’t have to be tightened. Put all the levers in the middle position. Now place all of the switches into their footprints on the PCB.

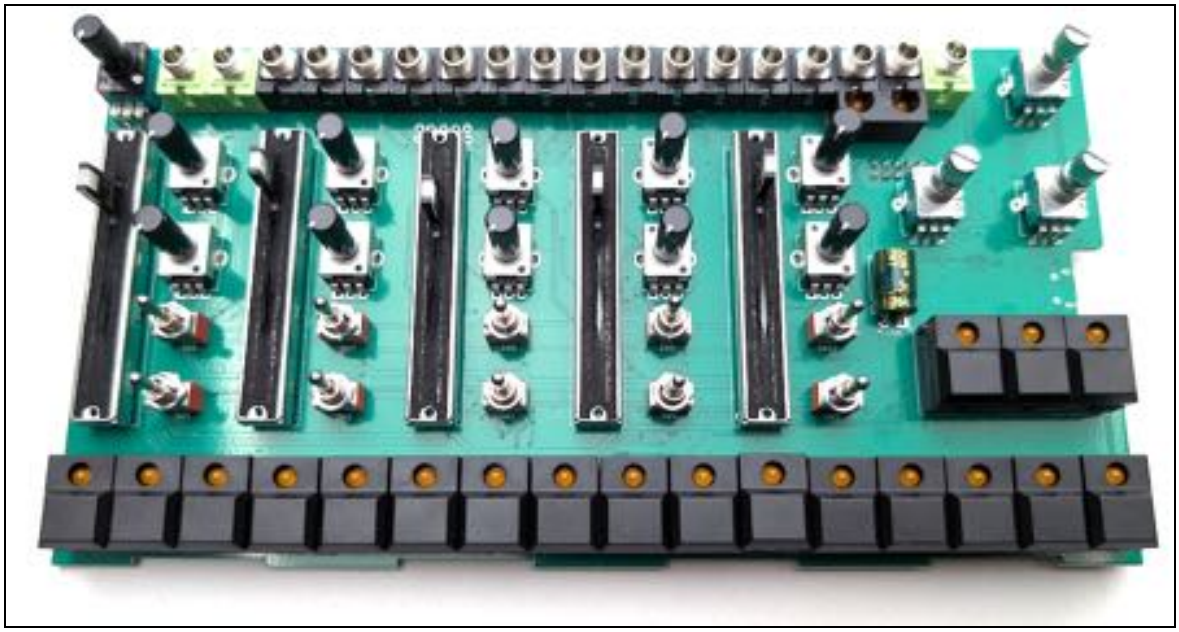


Insert capacitor C59 after bending its legs to the side. Scrooge is intended to produce the weirdest of noises, but the sound of an exploding capacitor should not be among them, so **make absolutely sure to place it in the right orientation as shown in the picture!**

The short leg goes on the “-” side. This side is also marked with a stripe on the capacitor body.



Then insert both LEDs. **The long legs of the LEDs go on the side marked on the PCB with a “+”. Double check the orientation!** Put the small black LED housing on top as shown. The inside shape is tapered like a funnel: Make sure that the wider part is on top, and the open side points towards the sockets.

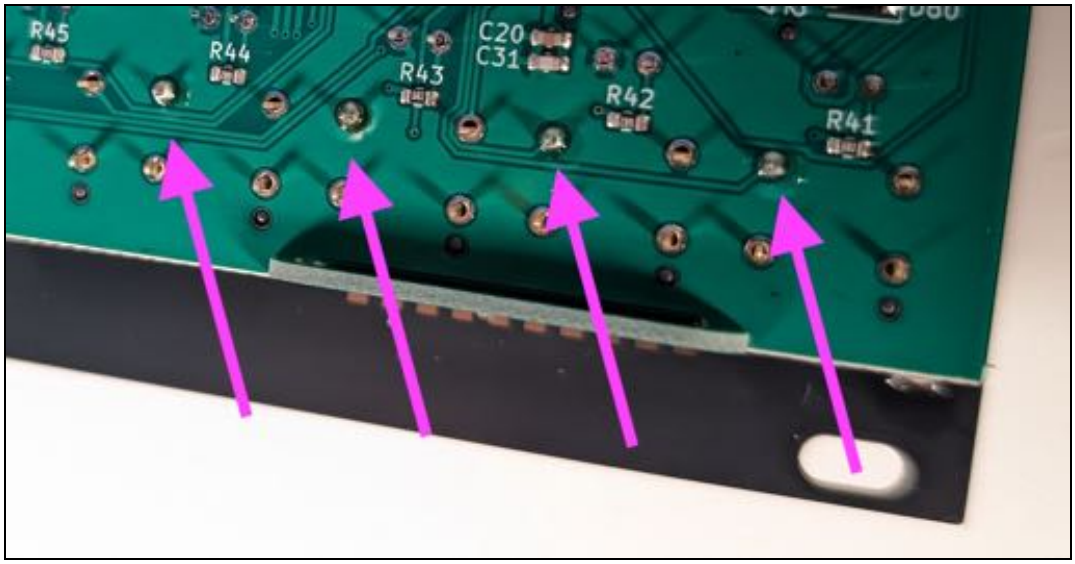


Now that all the components are in place, it’s time to combine front panel and PCB. Make sure all inserted components are standing up straight, and carefully place the front panel onto the PCB, keeping both of them parallel to each other and making sure all the components find their way through the holes. **Pay close attention to RV14, it should be completely snug inside the hole on the front panel.** Once everything fits together neatly, secure the metal shaft potentiometers with nuts from the top. Put the remaining nuts on all the switches and sockets. Don’t push down on the panel with any metal tools while tightening them, so as to avoid scratches.

Put the spacer PCB into its place as shown. Make sure it sits perpendicular to the front panel. The solder pads on the spacer should be on the outside! It might be slightly bent, this is normal as the material is not very thick. Solder one of the corner pads first. Use plenty of heat to make a good connection. Then solder the opposite corner, bending the spacer if needed. It should now sit well in the notches on the PCB. Don’t solder the remaining pads just yet.

Perform one last check of the buttons (SW11-SW29). Make sure they’re well aligned with the front panel and don’t snag on either the front panel or neighbouring buttons when pressed.

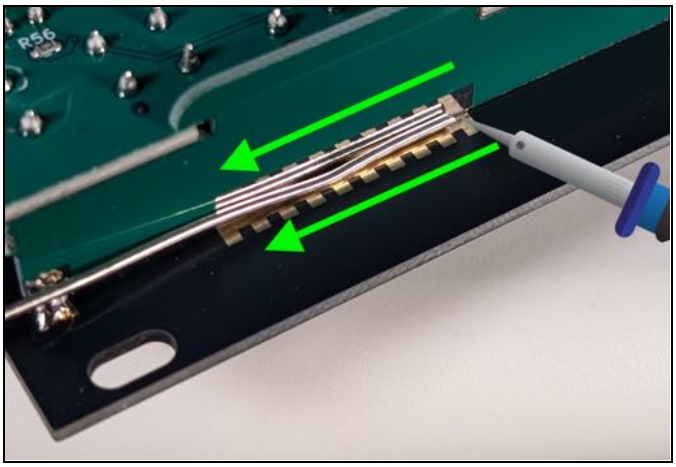
Now very carefully flip everything over. Pull back on the LED (D90, D91) legs as far as they will go, and spread them to the sides so that the LEDs sit close to the PCB, and away from the front panel.



Solder **just one pin** for each button as shown above.

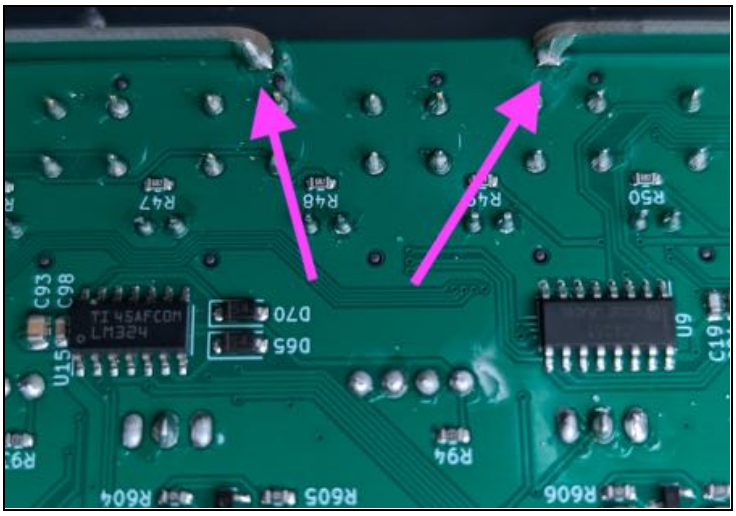
Test the movement of all the sliders, then solder all the other components (toggle switches, potentiometers including sliders, sockets, capacitor and LEDs). While soldering the sockets, make sure they're fully inserted into the PCB. It won't hurt to have another look at RV14 to make sure it still sits completely inside the panel. There is always enough space to solder the pins even with a standard tip, but **care must be taken not to accidentally move the iron and desolder, move or damage an SMD part**.

Now test all the buttons again, and adjust if necessary. In some cases, this means you'll have to reheat the single soldered pin and reposition the button. Once you're satisfied, solder all the remaining button pins. Don't forget the 2 LED pins each button has on top. Do these two pins one at a time or the LED might move (if it does, heat both at the same time for as short as possible and move it back into position, pushing it in from the front side). **Don't heat those LED pins for too long or you might destroy the LED.** Desoldering this type of button is no fun, and will usually be destructive. Again, pay attention to the SMD parts while soldering.



Now on to the remaining pads on the spacer PCB. The best way to solder them is to place the end of your solder wire across the pad as shown, and slowly move your (ideally very hot) soldering iron over it.

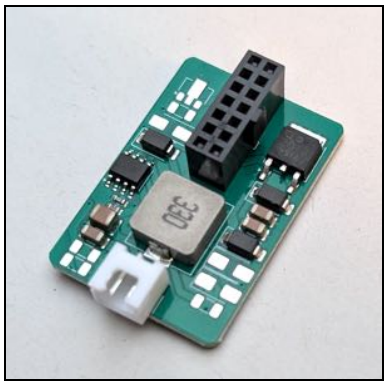
However you do it, make sure there is a good connection between the panel pads and the spacer PCB pads, as this spacer will ensure the PCB does not get bent away from the front panel when the buttons are pressed. If after soldering your spacer PCB is tilted away from the main PCB, you can reheat those pads one by one and slowly move it back into place.



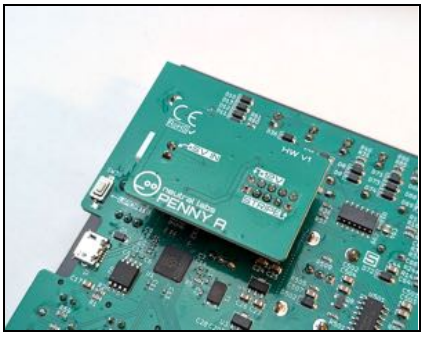
There are 2 small solder pads where the spacer PCB meets the main PCB, so you can solder the spacer PCB to the main PCB. For disassembly, the solder will have to be removed using a solder sucker or desoldering wick.

Test the movement on all the potentiometers. If a plastic shaft pot seems to have higher resistance to turning, this is usually because it's rubbing against the front panel. The easy fix is to reheat one of its mechanical solder pins (the large ones on the side) and wiggle it a little so it'll be centered in the hole.

Now snip off the LED and capacitor legs with a wire cutter.



The desktop version has a small power supply module called PENNY A. It comes with 2 headers that are to be installed and soldered as shown in the image on the left. This module converts the 5V coming in via the desktop case's USB-C port to 12V, so it can be plugged into the Eurorack power connector. (Note that it does not generate -12V as this is not needed for Scrooge, so it will not power other Eurorack modules that need the negative rail.)



Now plug in and test your module. For the Eurorack version, use the provided Eurorack power cable. For the desktop version, plug the PENNY A module onto the Eurorack power connector as shown, plug in the cable from the USB-C port into the white XH header, and power the case via a USB-C cable.

If something's not right upon power-up, it may be best to unplug the module from power immediately so as not to damage it (or the PSU), even though that's pretty unlikely.

Make sure to test the functions of all the potentiometers and buttons. Check that all LEDs are working. Refer to the manual if needed. Most problems can be easily fixed by reheating your own solder joints so the solder can reflow. Also visually inspect joints and see if you can spot any solder bridges, or stray solder blobs on SMD components.

When everything is working correctly, you can now put the knobs on the shafts of the metal potentiometers, and the caps on the sliders.

You may want to check the website for firmware upgrades before putting the device to use. The firmware upgrade procedure is described in the manual. For the Eurorack version, place your new module in a rack. For the desktop version, put the module into the case and secure it with the 4 black hex screws, or any other M3 screws (such as those commonly used for Eurorack).

Congratulations, you've now completed the build. Go and make some beautiful noise! If there are any questions or issues, feel free to reach out anytime at admin@neutral-labs.com.