Build Guide
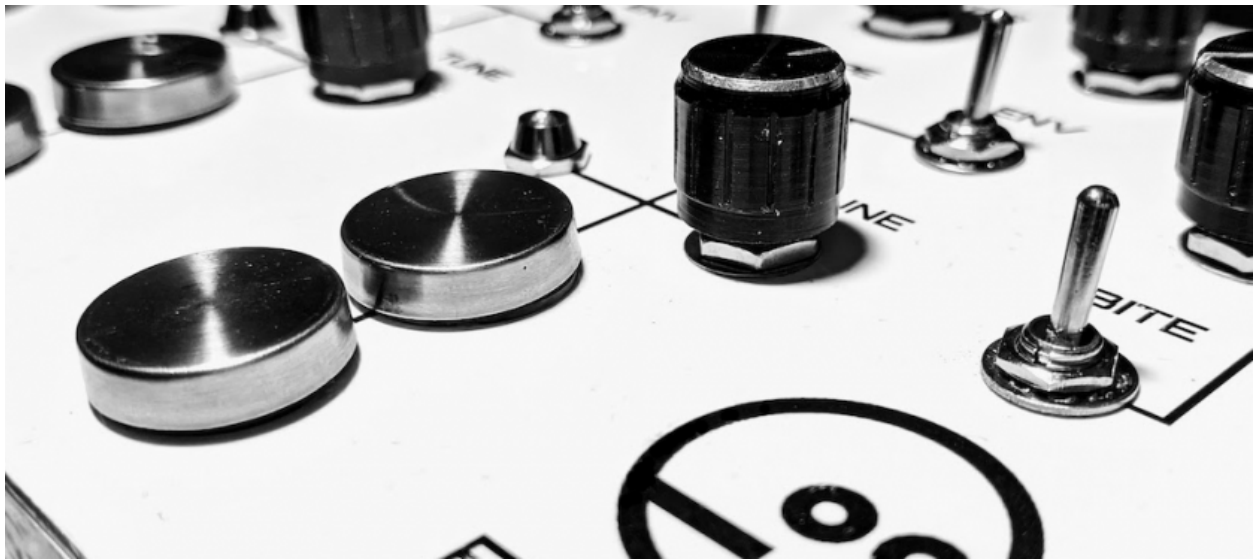
Congratulations on your decision to build the mighty Elmyra. Your life will change forever due to this experience. If nothing else, you'll be in possession of this wonderful machine that you likely did not possess before. Unless, of course, this is not your first build, in which case I need to tell you that you are a great person.
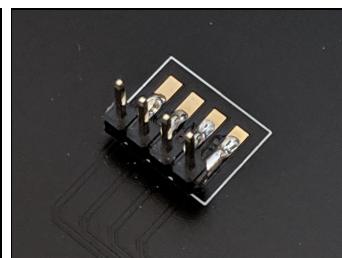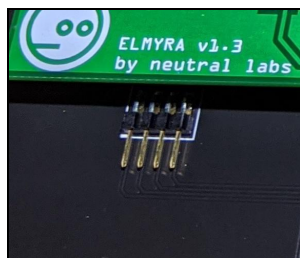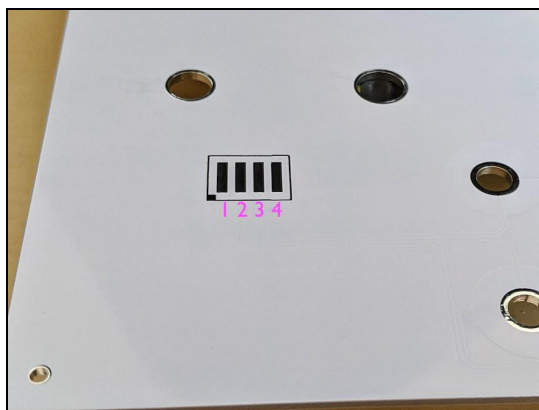
Panel

First prepare the panel. Place the 4 LED sockets in the positions shown below and fix them with the nut on the back.
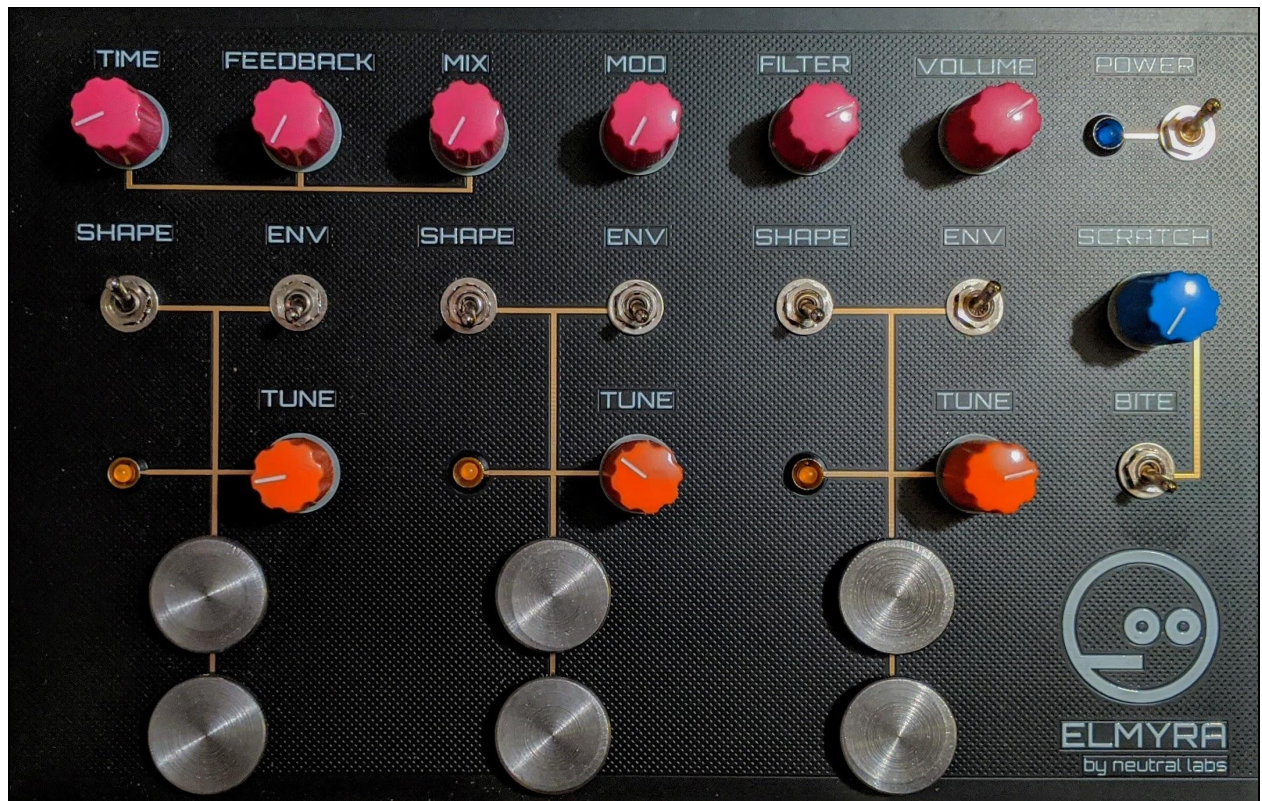
Now put in the 6 touchpads. **You must use the plastic washers under the touchpads on the top side!** On the bottom side, tighten the nut and do not use any washers. The nut must be in contact with the metal film below.

Then solder the 4 pin SMD header to the back of the panel so that the pins point towards the bottom edge. Your kit either has an angled header (right) or a flat one (middle), they both work the same way.

Do not put any of the pots or switches in at this time. Put the panel aside and continue with the PCB.

PCB Bottom Side

Solder the bottom side components as described below. If polarity matters, it means you need to pay attention which way you solder the components to the PCB or panel. Diodes have a black line on them which needs to match the line on the PCB. Electrolytic capacitors have a short leg that goes on the minus ("-") side, and they're also marked with a printed stripe on this side. The IC has a dot that must match the notch in the socket. And this in turn should match the gap on the PCB. **Double check the polarity! If the IC is flipped, you will see the infamous magic smoke and likely destroy the IC and potentially your PSU!**
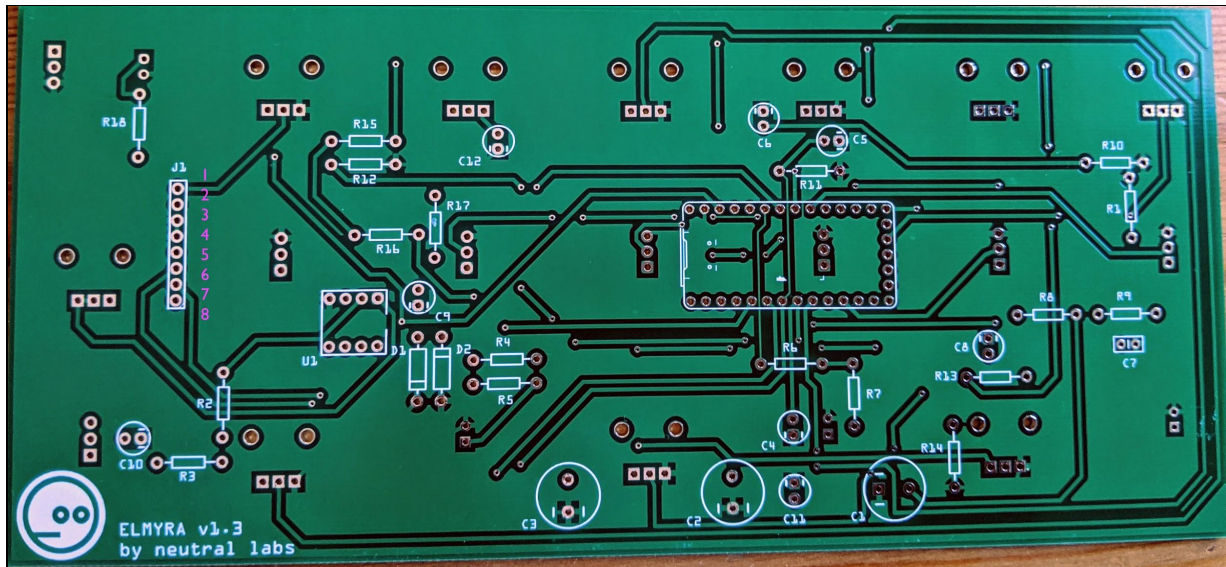
(D are diodes, R are resistors, C are capacitors, U are the potentiometers as well as the IC and its DIP8 socket, S are switches and LED are, you might have guessed it, LEDs.)

Part	Type	Polarity matters?	Notes
D1, D2	BAT85	yes	Distortion diodes. Can be substituted by BAT54. You may try other Schottky diodes as well, but regular diodes such as 1N4001 won't have the same edge to them.
R1, R15	1 MΩ	no	
R2, R17	1 kΩ	no	
R3, R5, R7, R9	47 Ω	no	
R4, R6, R8, R18	4.7 kΩ	no	You can substitute R18 for a lower value if you like the power LED to be brighter. Or for a higher value if you like it dimmer. Do not go below 50 Ω.
R10, R11, R12	220 kΩ	no	You could experiment with different resistor values for a different touchpad response. Don't go below 100k or above 1M though.
R13, R14, R16	10 kΩ	no	
C1, C2, C3	1000 µF	yes	
C4, C5, C6, C10, C11	1 µF	yes	
C7	3.3 nF	no	
C8	4.7 µF	yes	
C9	10 µF	yes	
C12	0.1 µF	yes	

J1	8-pin male header	no	Polarity does not matter for the header itself, but for the cables plugged into it later on!
U1	MCP6002	yes	Solder the socket without the IC first.
MCU	Itsybitsy M0 Express	yes	Solder male headers to the MCU. Place female headers on the board and plug the MCU board in for alignment. Now solder female headers to the board. The MCU is preprogrammed: You don't need to upload any firmware.

Begin by soldering the resistors and diodes.

Now solder the IC socket. It helps to solder one pin first and then ease it in place. Pay attention to polarity.
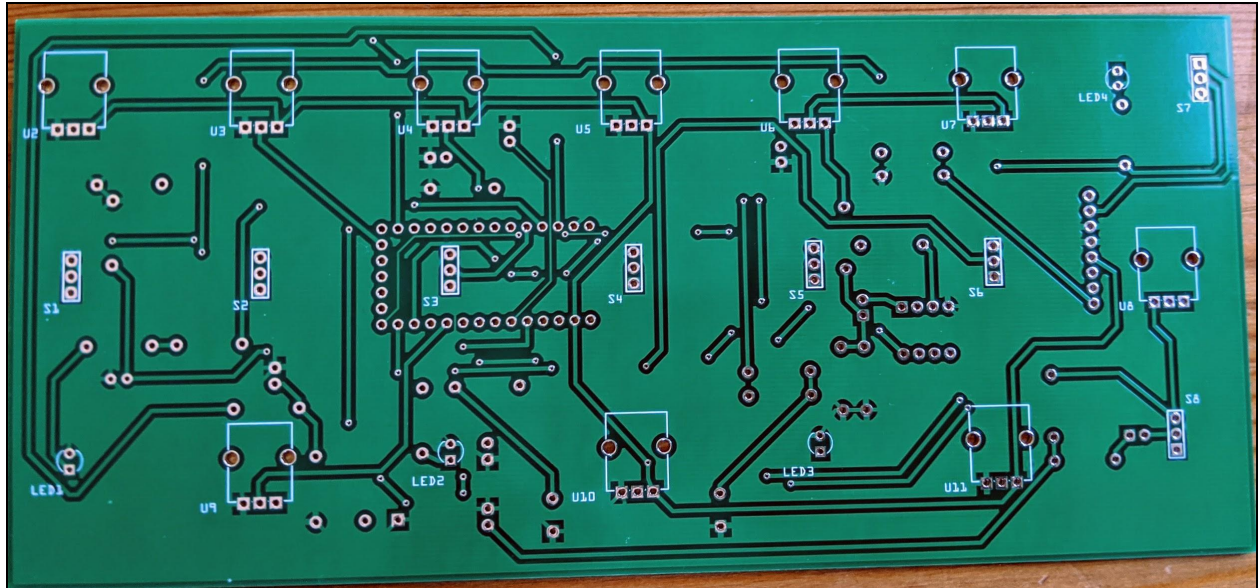
Next solder all capacitors except for the 3 large ones (C1, C2, C3). Once more, polarity matters, except for C7!

Now solder the headers onto the PCB. Break the long female header strip apart as needed by making a small cut on both sides with a sharp knife and then snap it along the edge of your workbench. You might want to use a file to remove burrs and make everything fit nicely.

Then place C1, C2 and C3 into their place and solder. I need not remind you to check the polarity, right?

PCB Top Side

Now place all the components on the top side of the PCB as per the table below. Be sure to put the LEDs all the way in at this time. Pay attention to LED polarity. **DO NOT SOLDER ANYTHING YET OR YOU MAY NOT BE ABLE TO FIT THE PANEL!**

Part	Type	Polarity matters?	Notes
U2 - U11	10 kΩ linear pot	yes	
S1 - S8	SPDT switch	no	Unscrew the top nut, remove both washers for now (keep the knurled washer and discard the anti-rotation one), leave the bottom nut in place (tighten it if needed).
LED1 - LED3	orange LED	yes	The short leg towards the PCB top edge (flat side of the printed circle).
LED4	blue LED	yes	The short leg towards the PCB bottom edge (flat side of the printed circle).

Now flip all the switches to the down position. Carefully place the panel on top of the PCB and wiggle it into position. This works best by slightly tapping the switches one by one with a long object (e.g. a screwdriver), until they're all in their mounting holes. Press the panel into place. Once everything is snug, put washers and nuts

(hand-tight is enough for now) on top of the U2 and U11 pots and flip everything over.

Push the LEDs all the way into their sockets. Be careful not to bend their legs.

Solder all the top panel components now. It's a good idea not to put on and tighten all the nuts now. Better wait until everything else is complete, in case you need to troubleshoot.

Connect Panel and PCB

You can now connect the panel and PCB with a 4 pin Dupont cable. Check the panel and PCB images below and connect as follows:
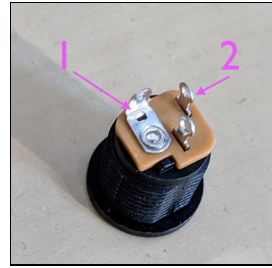
- panel pin 4 to PCB pin 5
- panel pin 3 to PCB pin 6
- panel pin 2 to PCB pin 7
- panel pin 1 to PCB pin 8
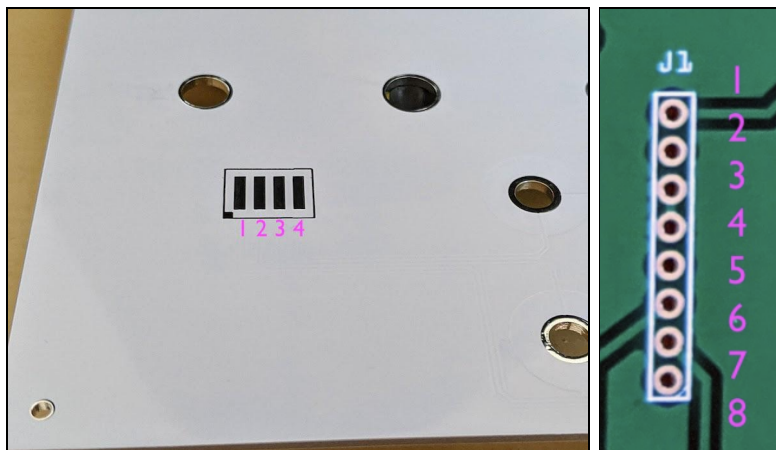
Power Input

Solder 2 wires to the power jack as shown below. Leave the 3rd pin on the jack unconnected. These wires connect to the male header J1 on the PCB as follows:
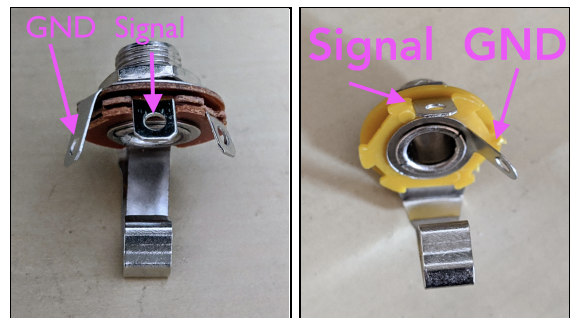
- power jack pin 1 (+5V) to PCB pin 2
- power jack pin 2 (GND) to PCB pin 3

Audio Output

Solder 2 wires to the audio output jack. (Your kit either has a 3-pin or 2-pin jack, see pictures.) The wires go to the header J1 on the PCB as follows:

- audio jack tip (signal) to PCB pin 1
- audio jack sleeve (GND) to PCB pin 4

(Almost) Done!

Connect the USB power cable and turn the device on by flipping the power switch down. If everything is working, the only tasks left are to put the knurled washers and nuts back onto the switches, the washers, nuts and knobs onto the pots and finally to secure the panel to the case using the 4 screws.

Now go create some noise!

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