

Electrosmith 2144 LPF Build Guide



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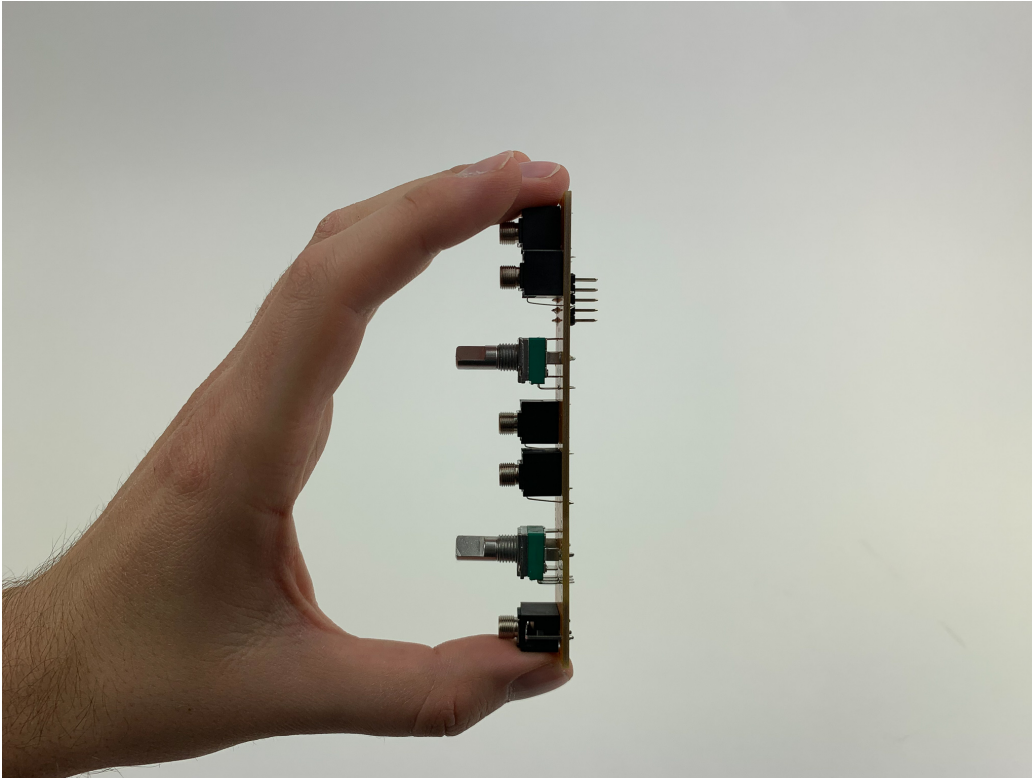
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Overview of the included parts



- x2 10k Potentiometers
- x5 Eurorack Jacks
- x1 Electrosmith 2144 Submodule
- x1 Electrosmith 2144 LPF 4hp PCB
- x1 Electrosmith 2144 LPF Front Panel
- x1 2x5 Male Header
- x2 1x8 Male Header
- x2 1x8 Female Header
- x2 Knobs

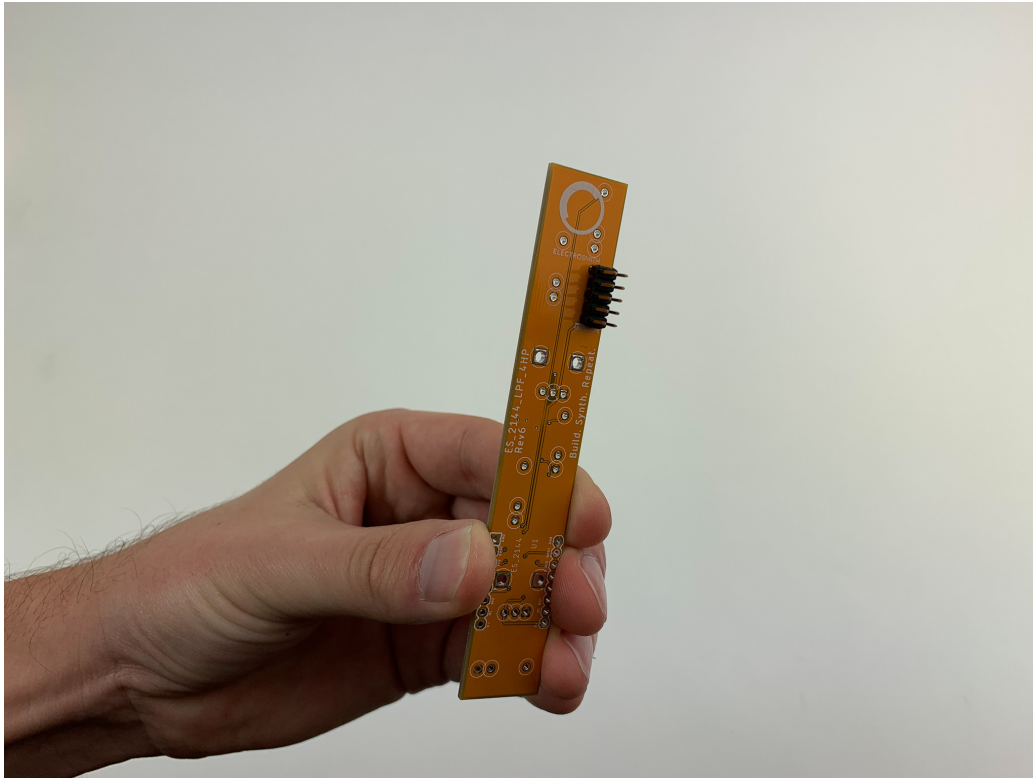
Build



1. Power Header

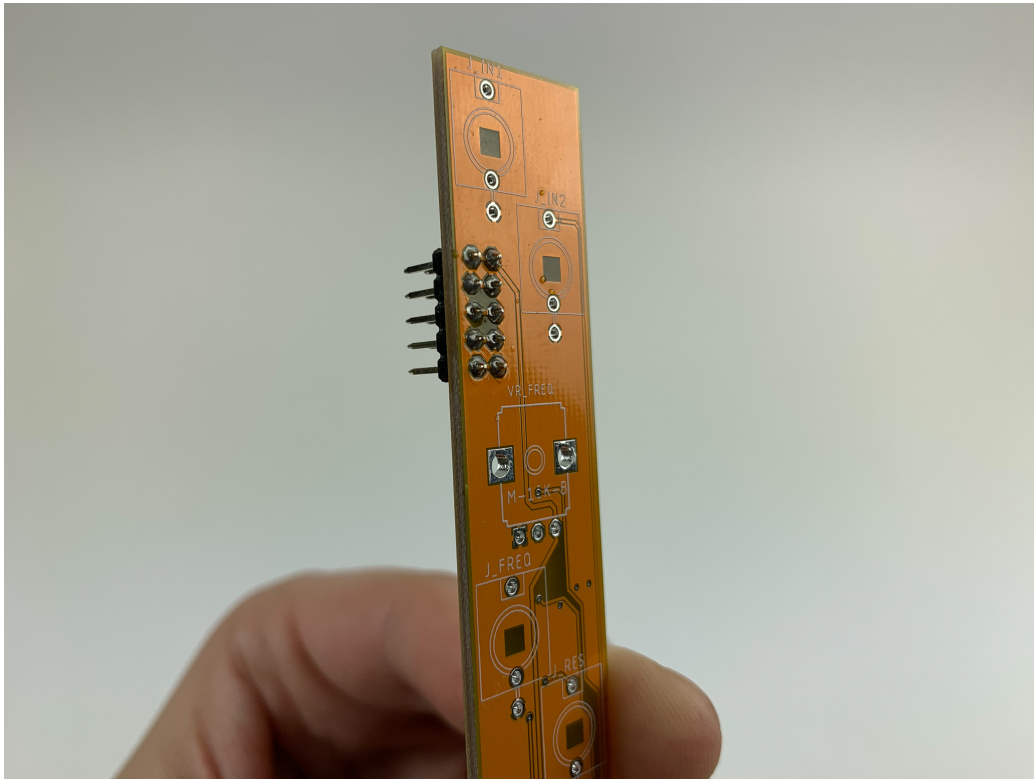


The short pins should be pointing through to the top-side of the PCB, while the plastic and longer side of the pins should be visible on the back of the PCB.



The side of the PCB with the red stripe notated is the bottom side of the PCB.

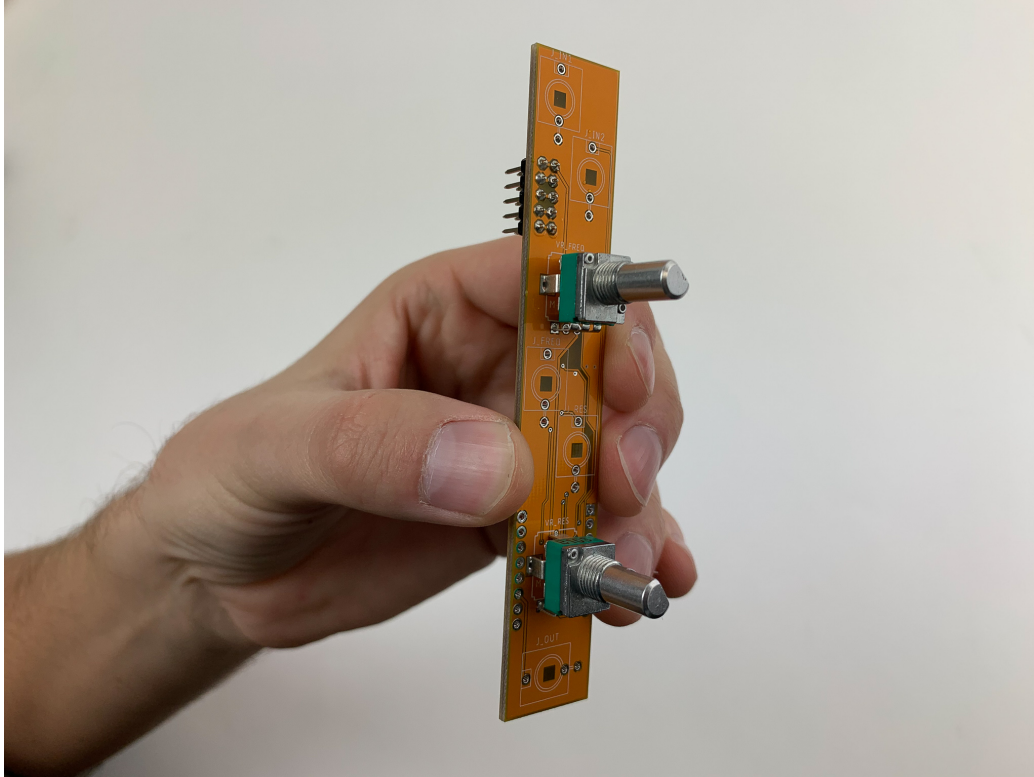
The holes for the power header are offset slightly in both positions so that once inserted, the power header will stay in position while you solder it.



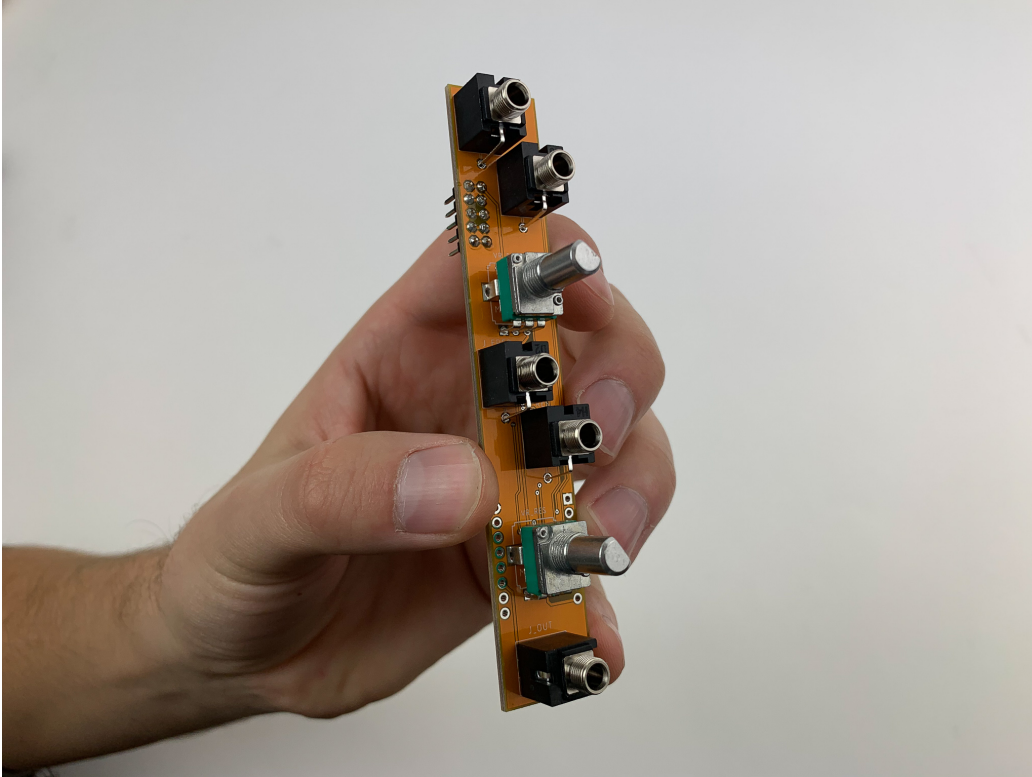
2. Jacks and Pots



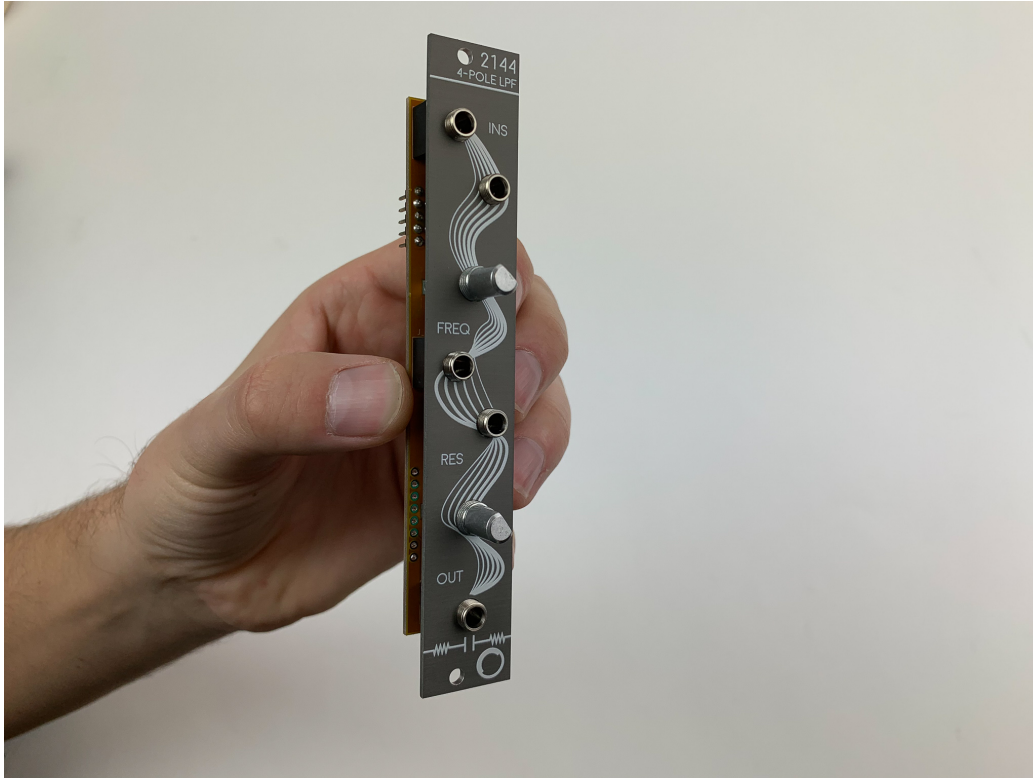
Populate the PCB with the 2 10k Potentiometers. They should be seated onto the top side of the PCB (easily verified by the boxes indicating the “M-10K-B pots”).



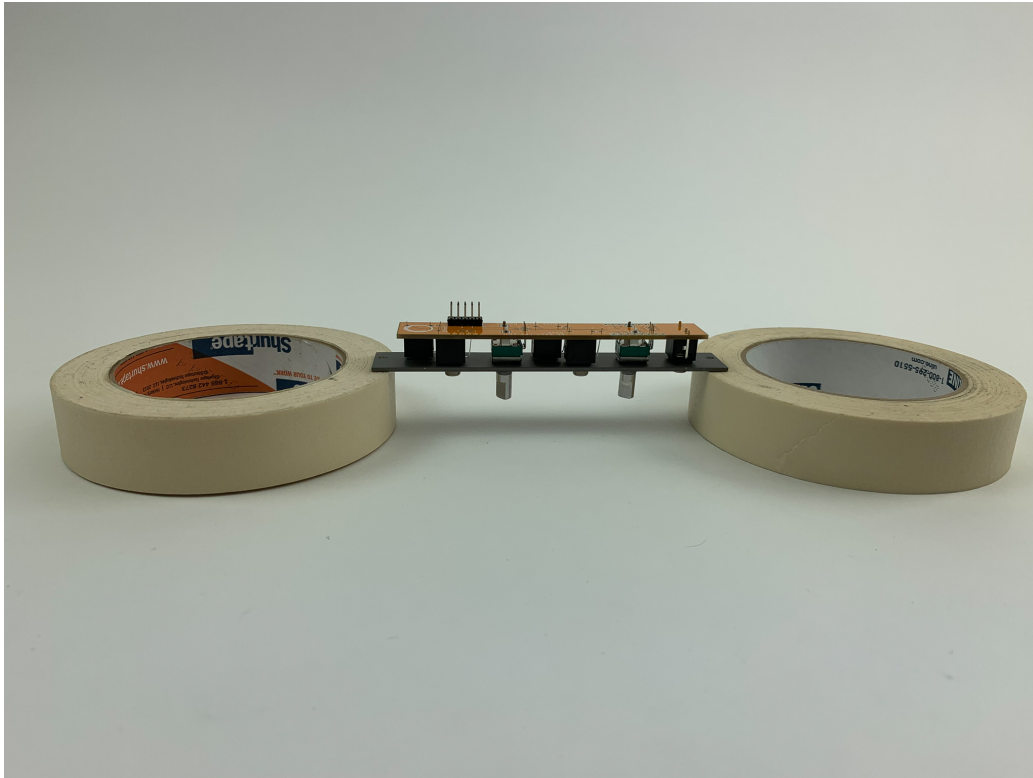
Populate the 4hp PCB with the 5 Eurorack Jacks. They should be seated onto the top side of the PCB (easily verified by box shapes around where the jacks will be placed).



Install the front panel so that all of the jacks and pots fit into their holes.

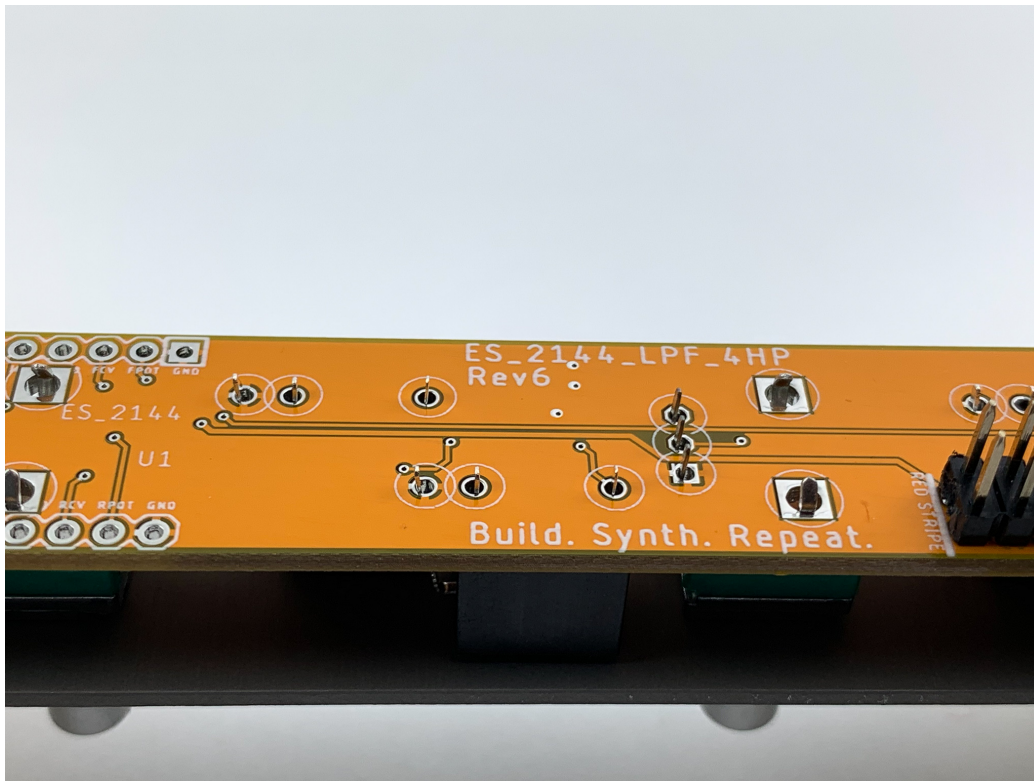


Flip the module over, and place the front panel on two objects of equal height to ensure that gravity is holding the PCB against the jacks.

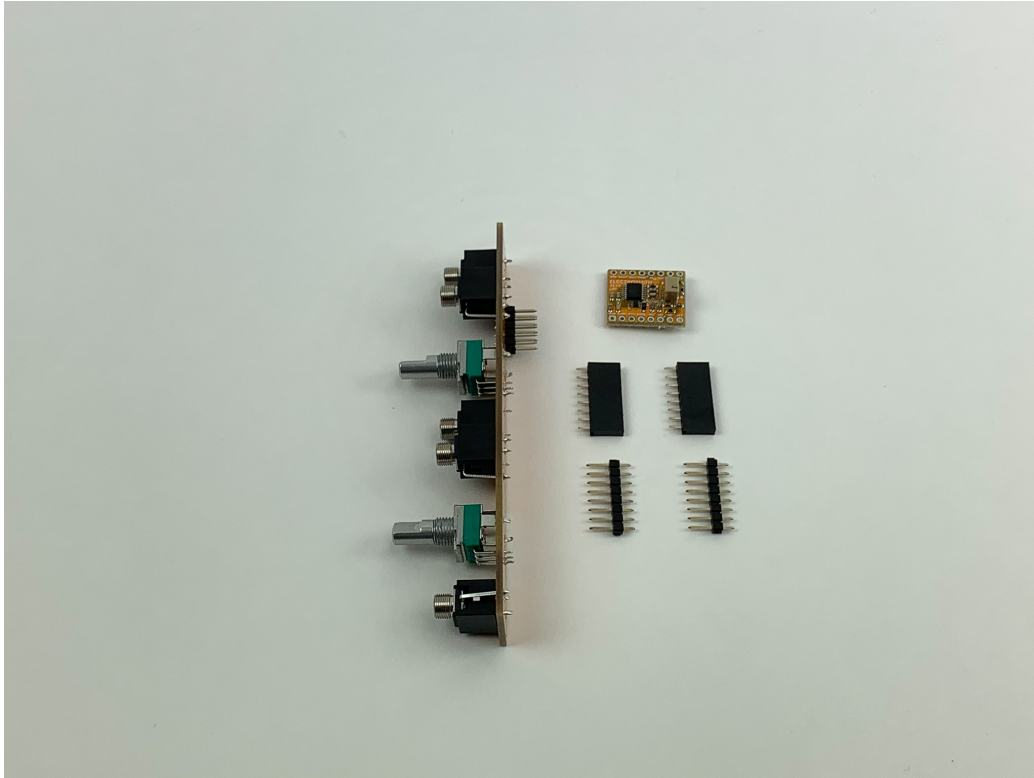


On the bottom side of the PCB all of the connections that need to be soldered are highlighted with white circles to visually assist in the build process.

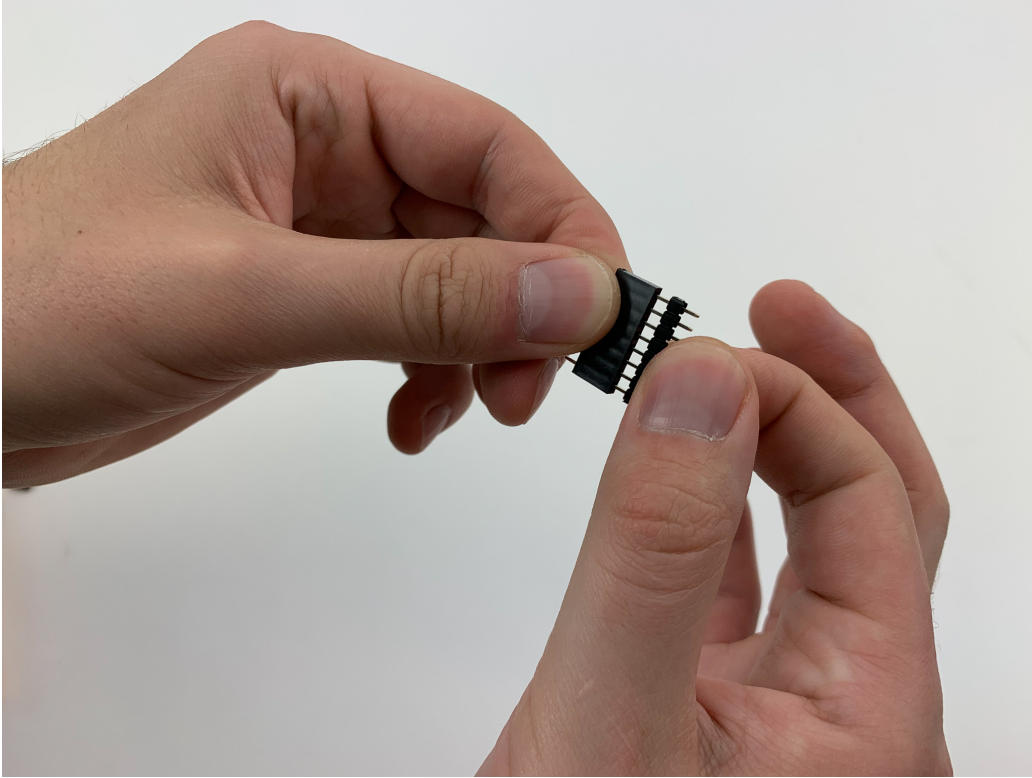
In total there will be 25 solder joints to hit on the bottom side of the PCB.



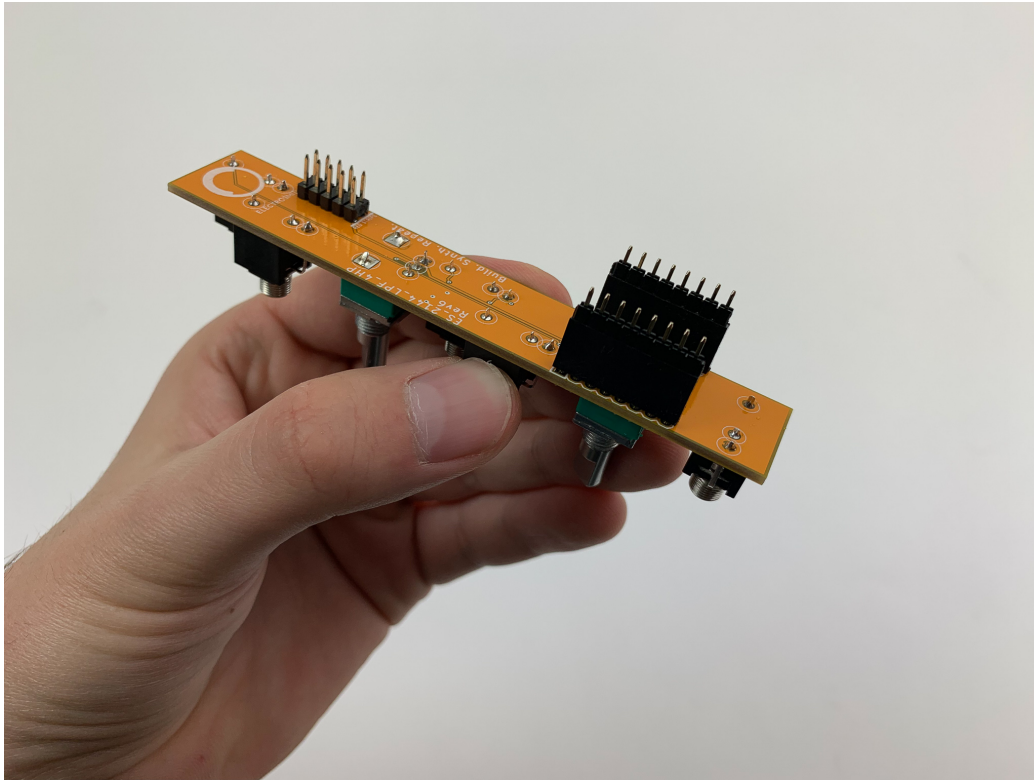
3. Submodule



Connect the female and male headers together.

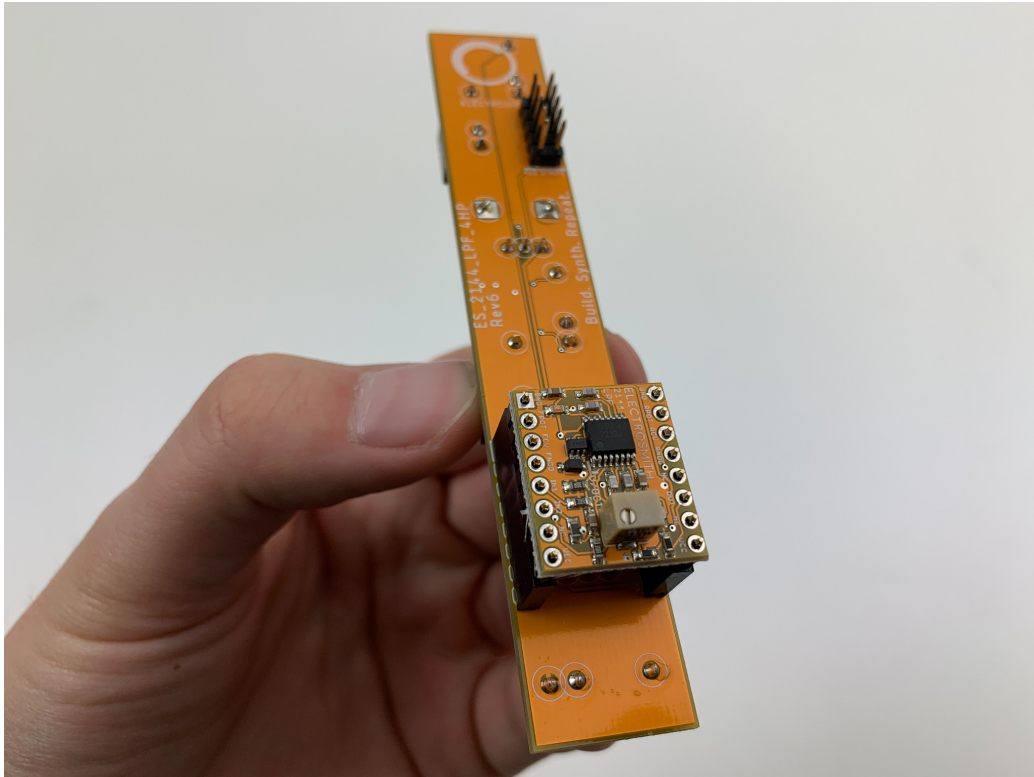


With the board face down, resting on the pots, insert the female headers into the 4HP PCB.



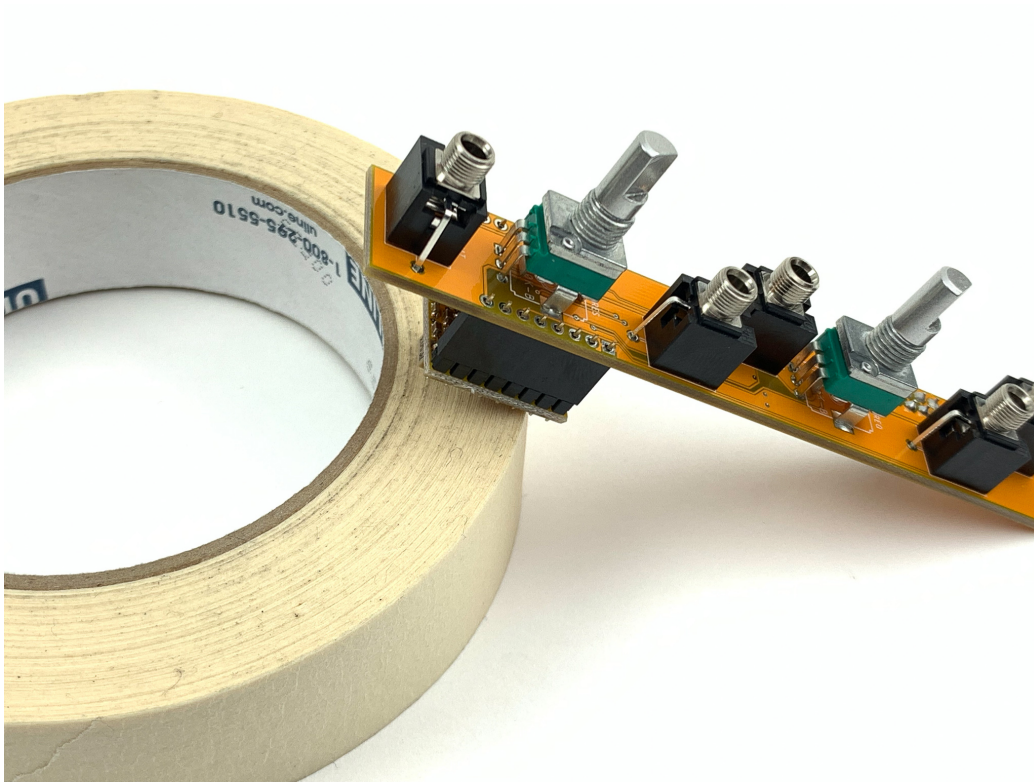
Place the Electrosmith 2144 submodule with pin 1 (indicated by a square pad) aligned with the marker on the 4hp PCB. The trim pot, and logo should be pointing up.

Solder the submodule onto the headers.



Flip the module over, leaning the now connected submodule against a surface that will keep all of the headers flush with the 4hp PCB.

Solder the female headers into the 4hp PCB.



Test

Double check that Pin 1 (GND) of the Submodule, indicated by a square copper pad, matches the pin 1 indicator on the 4hp PCB.

Attach the 2x5 power cable to the Electrosmith 2144 LPF with the red stripe matching the indicator on the PCB.



Power on the module.

Run audio (harmonic audio is easier to test with, i.e. square wave, etc.) into each input one at a time.

Connect the output to the input of a mixer where you can listen to the audio.

The Freq Knob should control the cutoff frequency of the filter. Closing completely at the bottom.

The Res knob should change the way the filter sounds, and will cause the

filter to produce a pure sine tone when turned all the way up.

The Freq CV should control the cutoff frequency and should respond from -8V to +8V depending on the freq knob position.

The Res CV should control the resonance, and should respond to -5V to +5V, adding to the Res pot position.

If everything has worked so far then you have successfully built an Electro-smith 2144 LPF!

Calibrate (optional)

To calibrate the Freq CV input for 1V/Octave or other musical interval tracking, you will need:

- a well calibrated voltage source (musical sequencer or quantizer), or a variable DC voltage supply.
- a frequency counter, musical tuner or golden ears

Turning the trim pot will expand or contract the overall range of the Freq CV.

To begin calibrating, turn resonance all the way up to generate a pure sine tone.

Use the Freq Knob to tune this to a recognizable frequency or note (e.g. 50 Hz or A0), and keep this note in mind throughout the following process.

Apply +1V – The frequency should now be about two times your original frequency (or one octave up).

Turning the trim pot clockwise will contract the overall range, while turning counter-clockwise will expand the range.

Based on the frequency with +1V applied, you will want to turn the trim pot so that the frequency moves away from the target.

Now remove the +1V. You should have a different frequency at the bottom.

Retune to the original fundamental tone, and repeat the above process until +1V is calibrated.

Now, move on to +2V, and +3V. The process is the same, with the exception that you will want to use the in between voltages to check whether the octaves are evenly spaced from each other.

Playing a familiar scale or sequence can be helpful when calibrating by ear.

The lower the desired range the easier it is to calibrate, and the more octaves it will track.

Finish

Affix the front panel to the jacks and pots using the included hex nuts. Once you've tightened them you can attach the knobs to the potentiometers by matching the cutout on the bottom of the knob with the position of the pot shaft, and pressing down.



You're done! Enjoy!