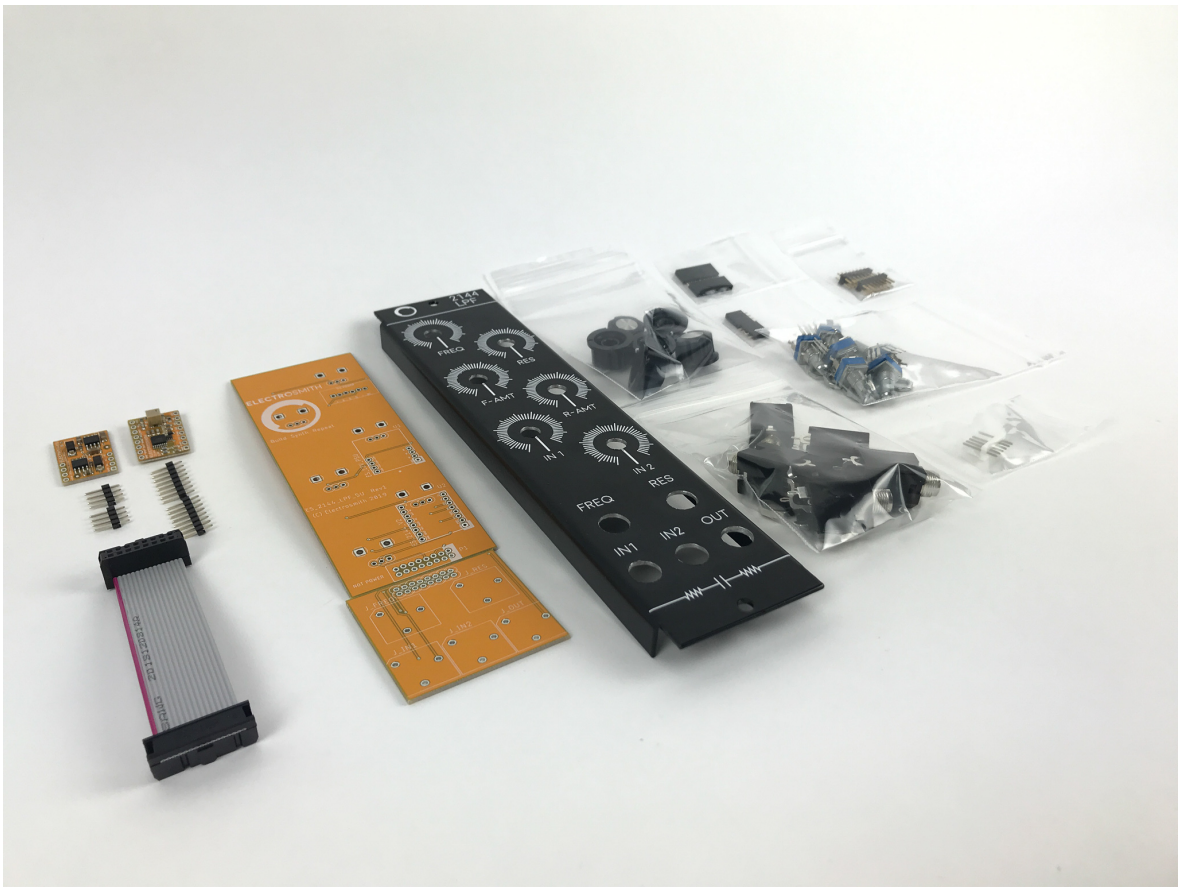
Electrosmith 2144 LPF MU Build Guide

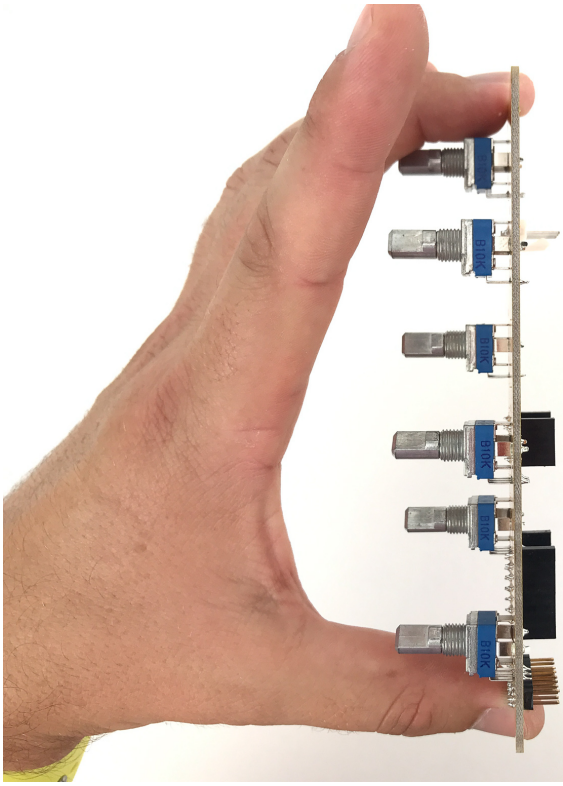


Contents

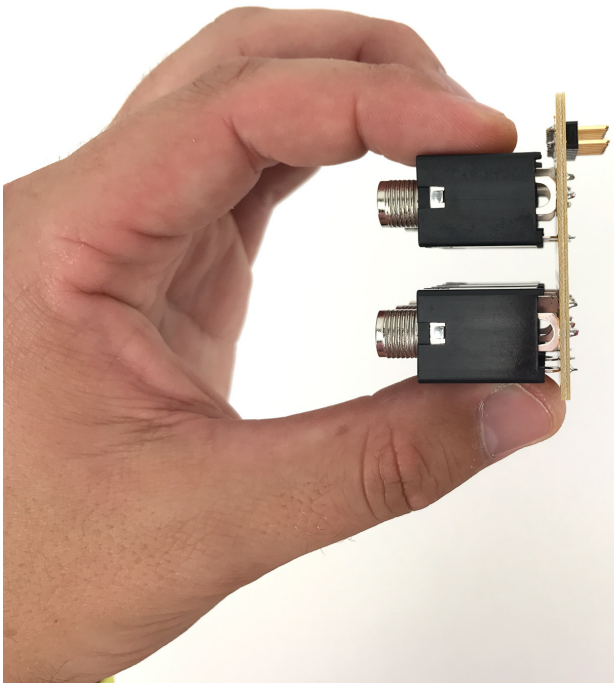
Overview of the included parts

- x6 10k Potentiometers
- x10 MU Jacks
- x1 Electrosmith 2144 Submodule
- x1 Electrosmith 12V PSU Submodule
- x1 Electrosmith 2144 LPF 1MU Top PCB
- x1 Electrosmith 2144 LPF 1MU Bottom PCB
- x1 Electrosmith 2144 LPF Front Panel
- x2 2x8 Male Headers
- x1 1x6 MU Power Header
- x2 1x8 Female Headers
- x2 1x8 Male Headers
- x2 1x4 Female Headers
- x2 1x4 Male Headers
- x6 Knobs

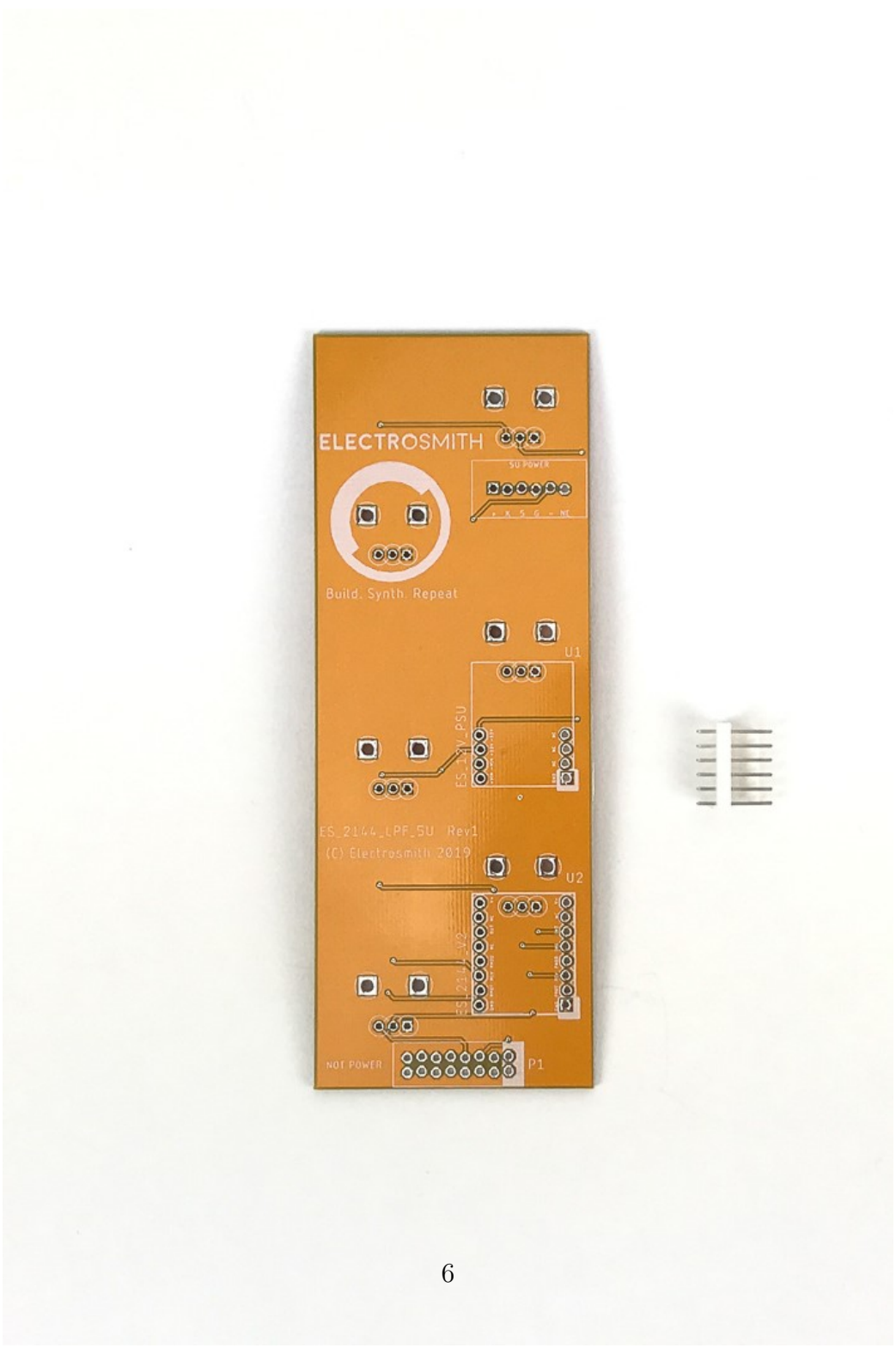
Build



Build



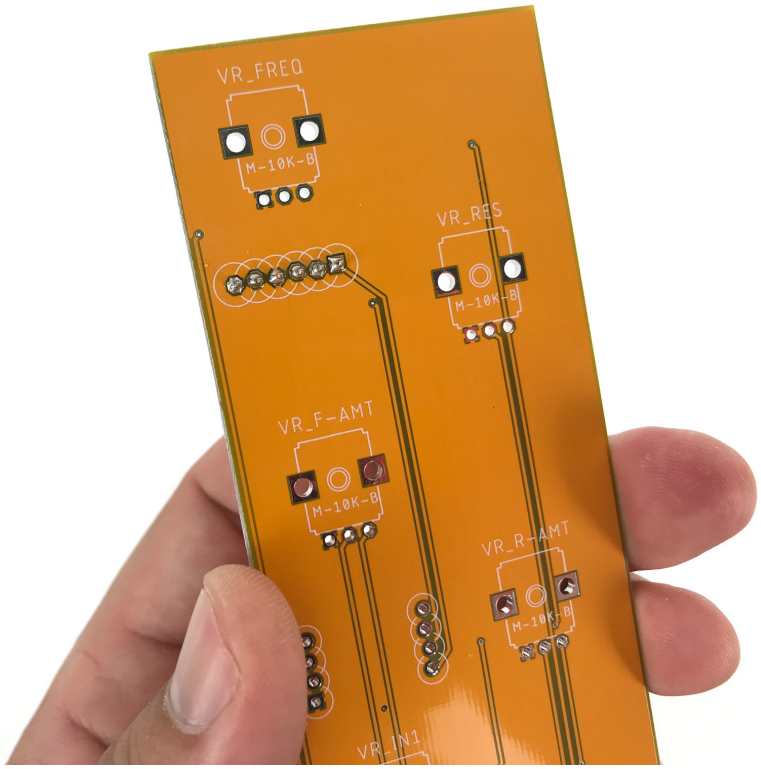
1. Power Header



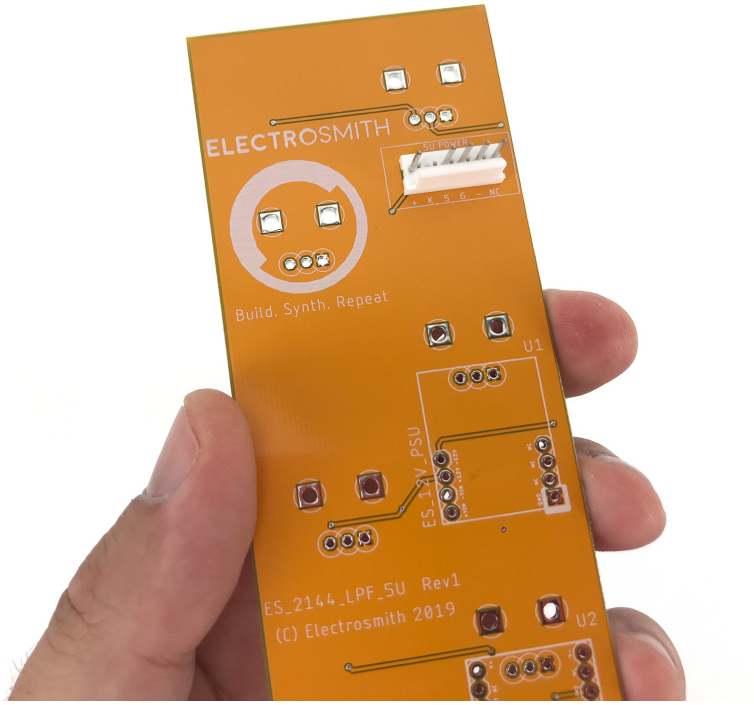
The short pins should be pointing through to the top-side of the PCB, while the plastic and longer side of the pins should be visible on the back of the PCB. Make sure the plastic lock tab is facing down.

The side of the PCB with the text “5U POWER” is the bottom side of the PCB.

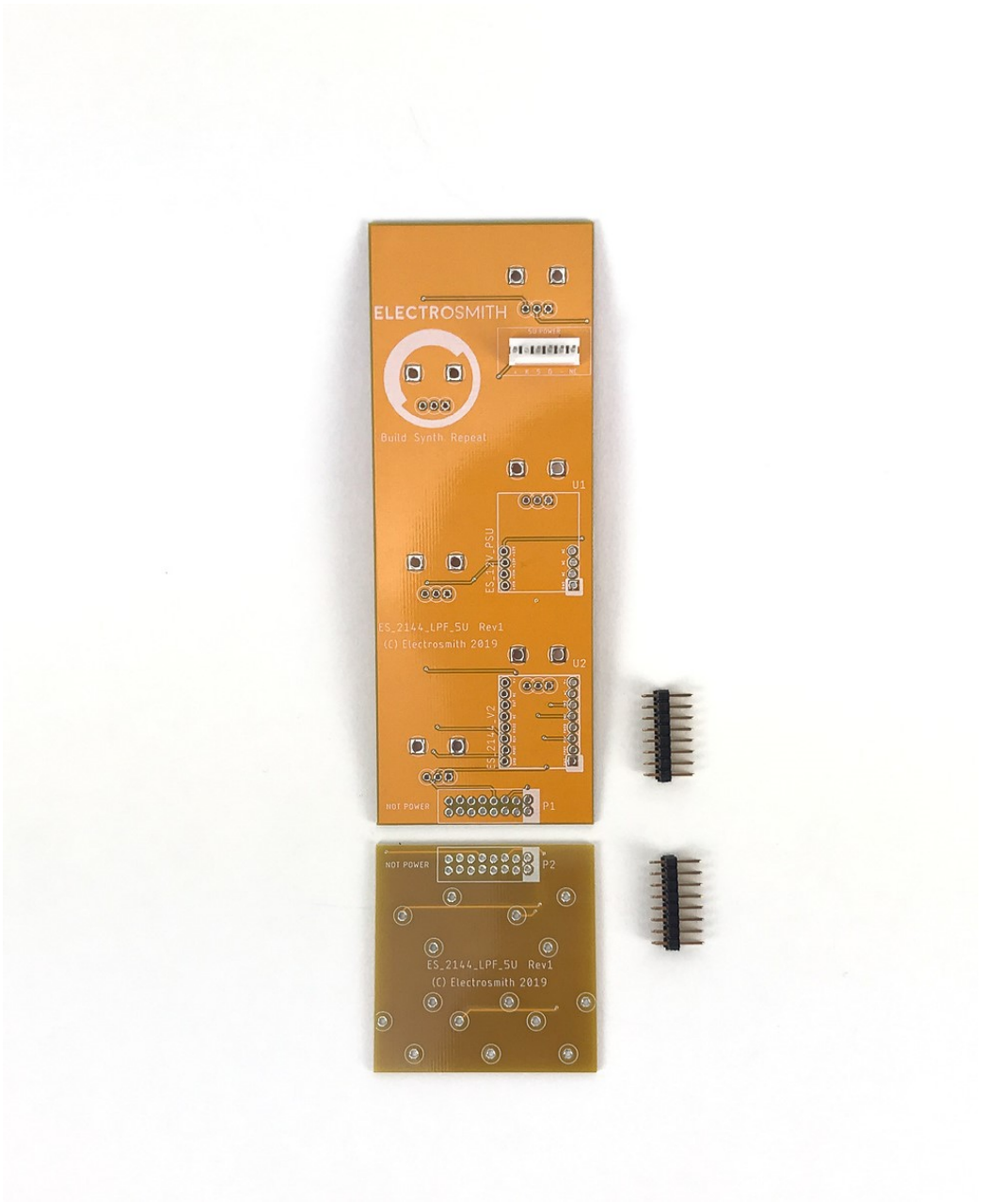
The holes for the power header are offset slightly in both positions so that once inserted, the power header will stay in position while you solder it.


VR_FREQ
M-10K-B
VR_RES
M-10K-B
VR_F-AMT
M-10K-B
VR_R-AMT
M-10K-B
VR_IN1

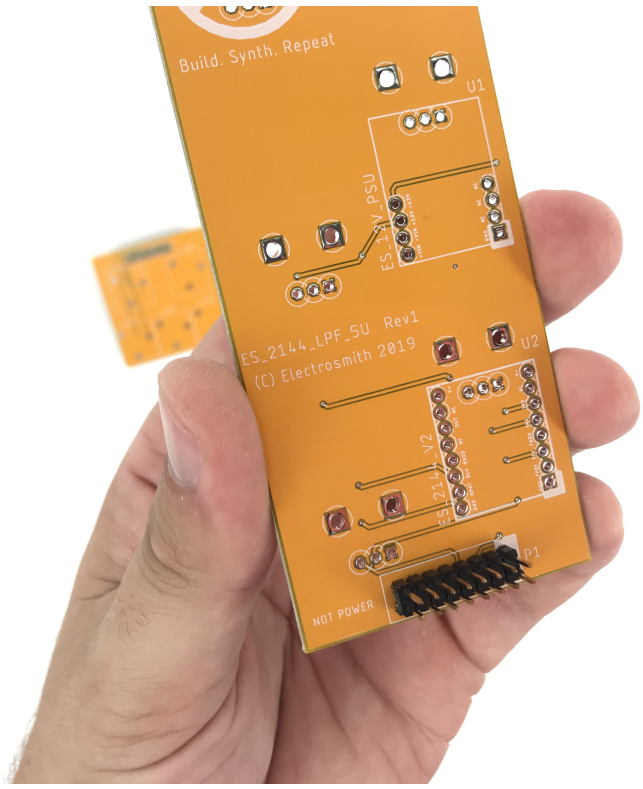
Once soldered, clip the pin labeled “K” from the power header.

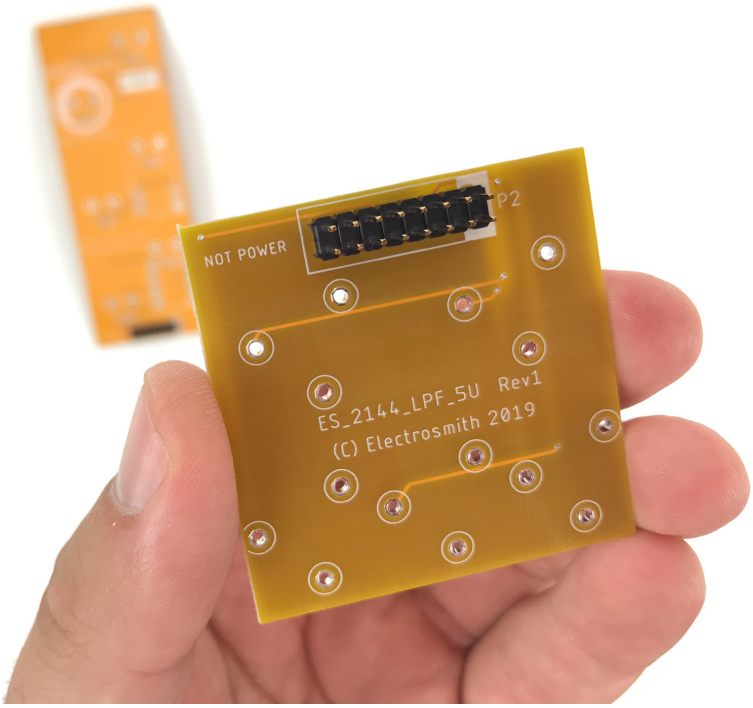


2. Link Headers

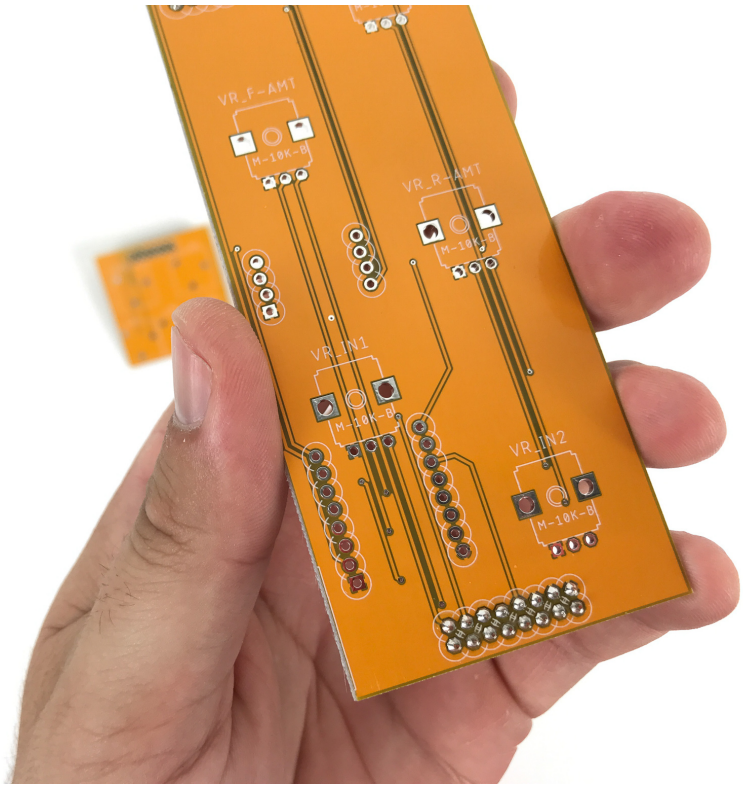


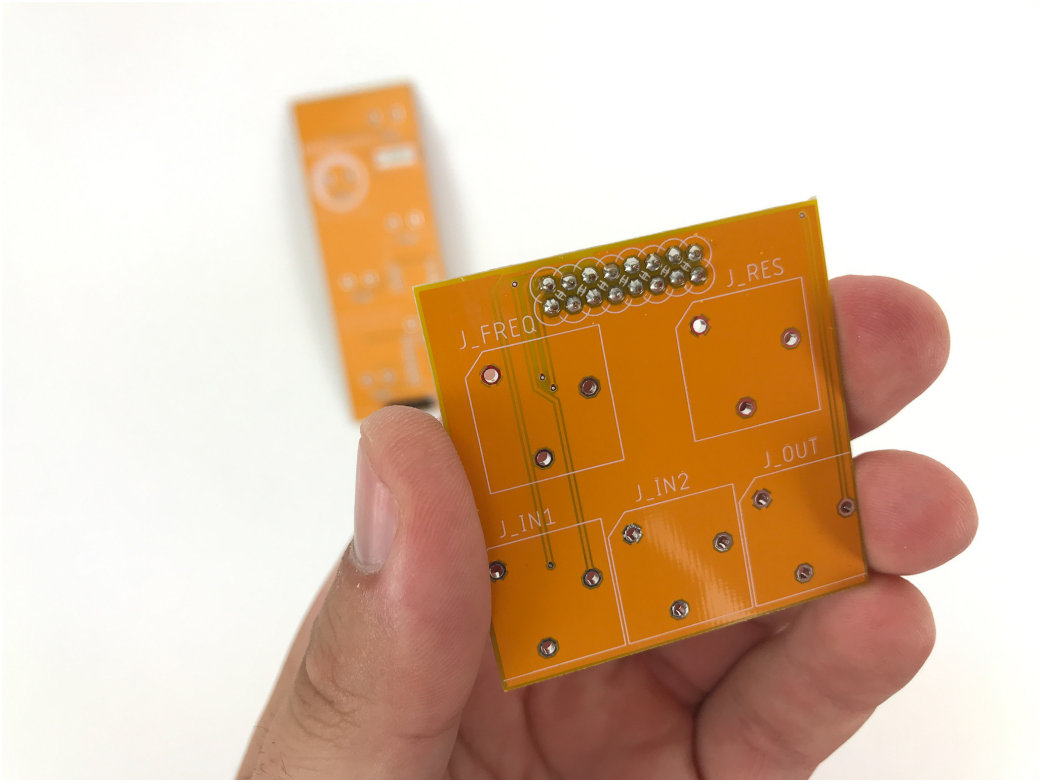
Populate both PCBs with the 2x8 male headers. The short pins should be pointing through to the top-side of the PCB, while the plastic and longer side of the pins should be visible on the back of the PCB.



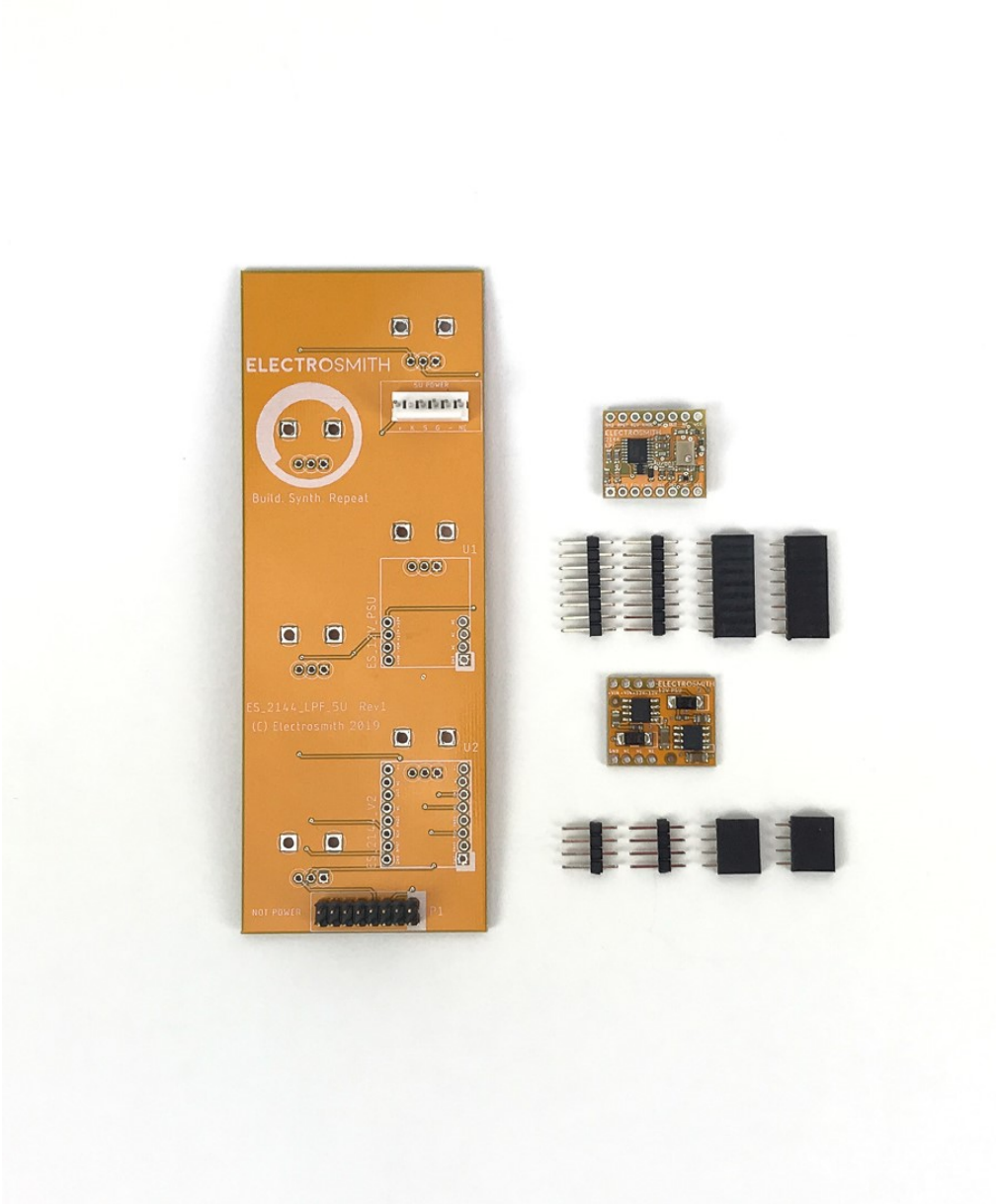

NOT POWER
P2
ES_2144_LPF_5U Rev1
(C) Electrosmith 2019

All of the connections that need to be soldered are highlighted with white circles to visually assist in the build process

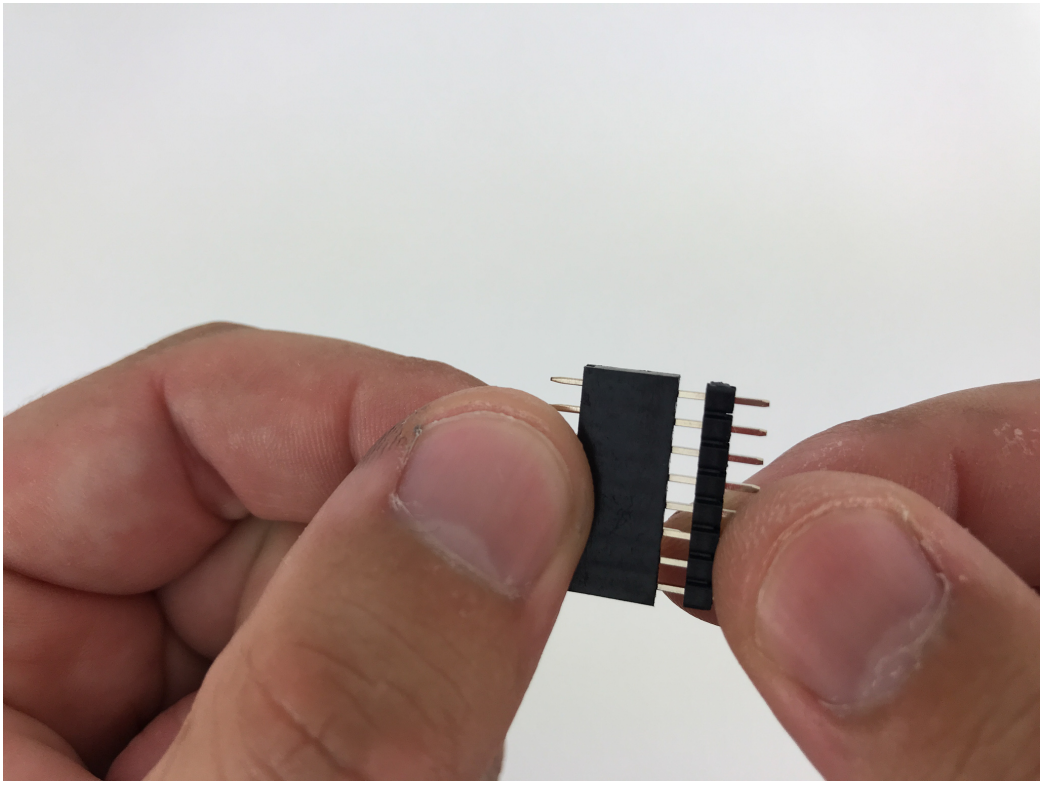



J_FREQ
J_RES
J_IN1
J_IN2
J_OUT

3. Submodule


ELECTROSMITH
Build. Synth. Repeat
U1
ES_2144_LPF_5U Rev1
(C) Electrosmith 2019
U2
P1

Connect the female and male headers together.



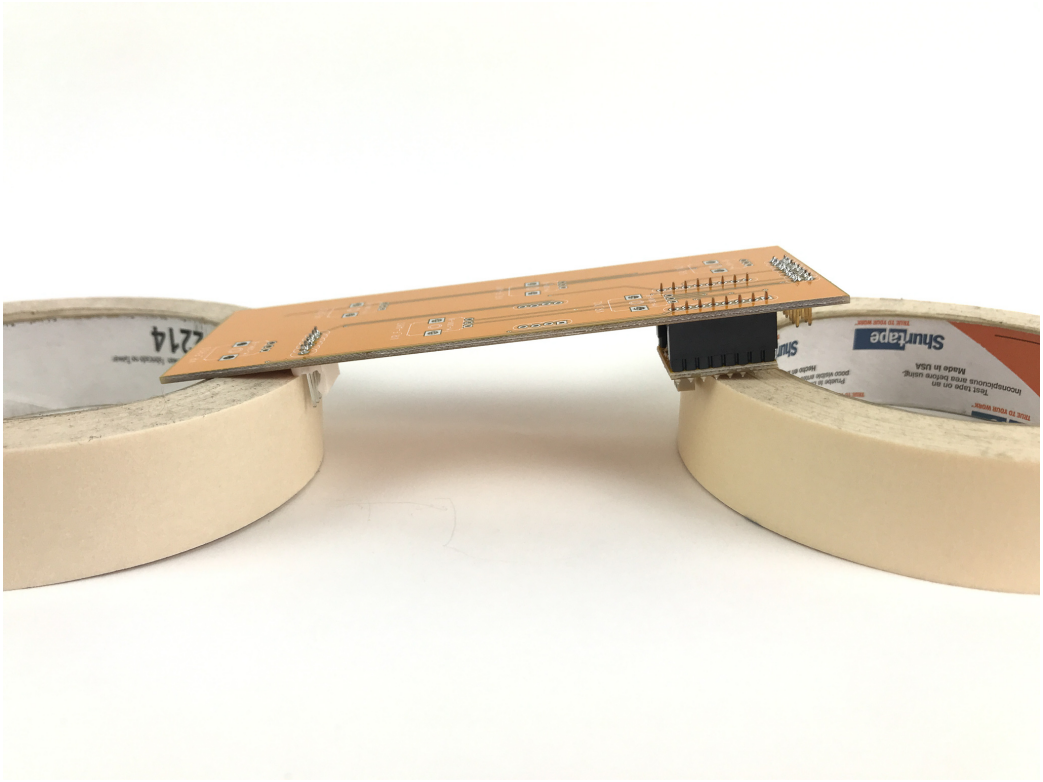
With the board face down, insert the female headers into the 1MU Top PCB.

Place the Electrosmith 2144 submodule and 12V PSU submodule with pin 1 (indicated by a square pad) aligned with the marker on the 1MU Top PCB. The trim pot, and logos should be pointing up.

Solder the submodules onto the headers.

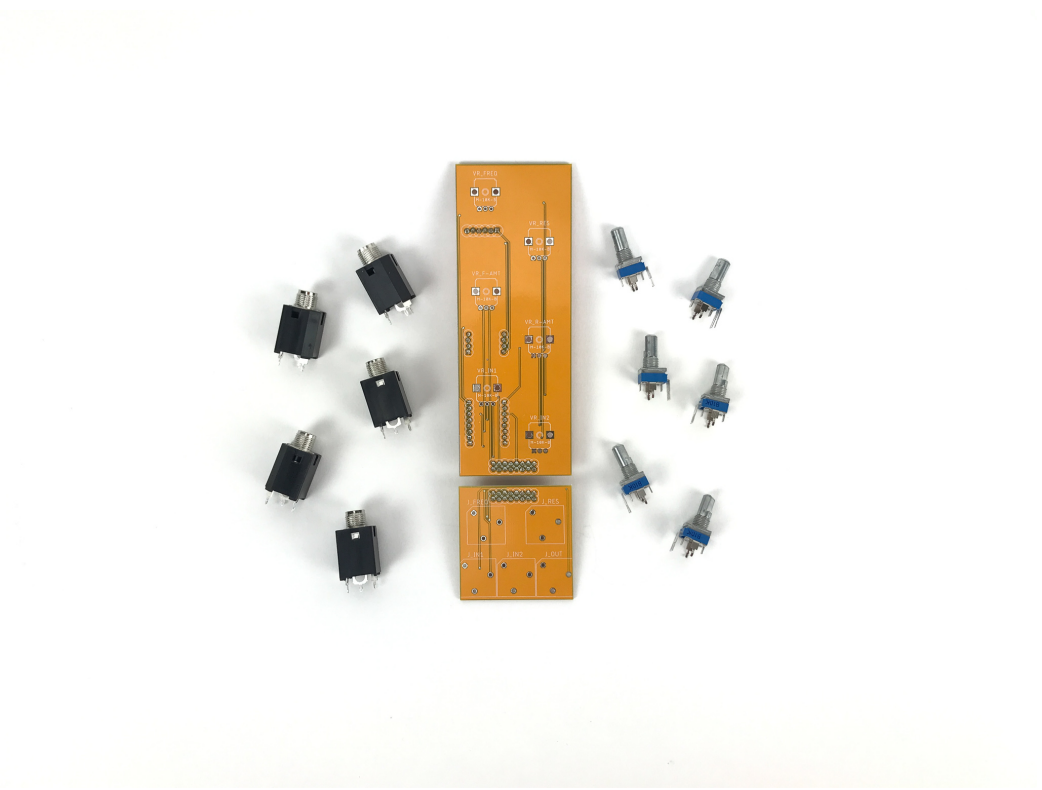
Flip the module over, leaning the now connected submodule against a surface that will keep all of the headers flush with the 1MU PCB.

Solder the female headers into the 1MU PCB.

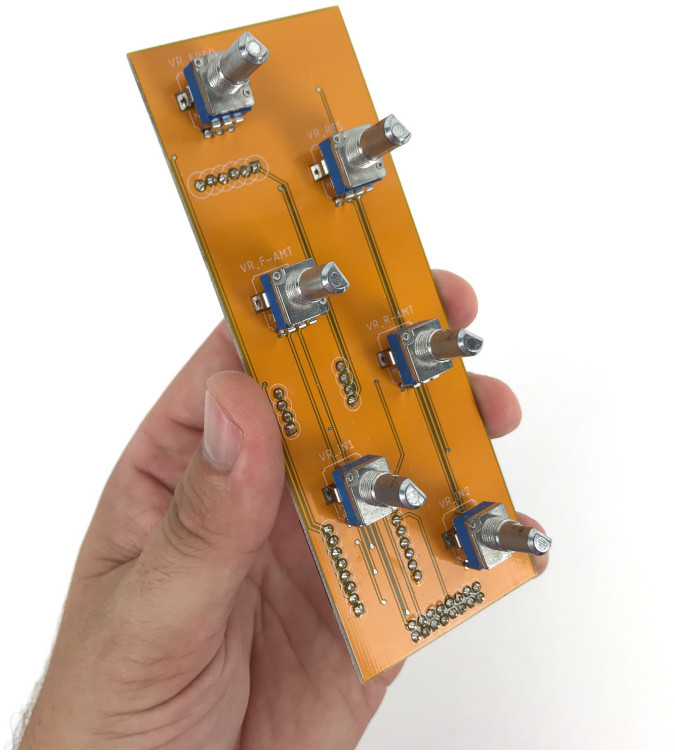



ShurTape
ShurTape
Made in USA

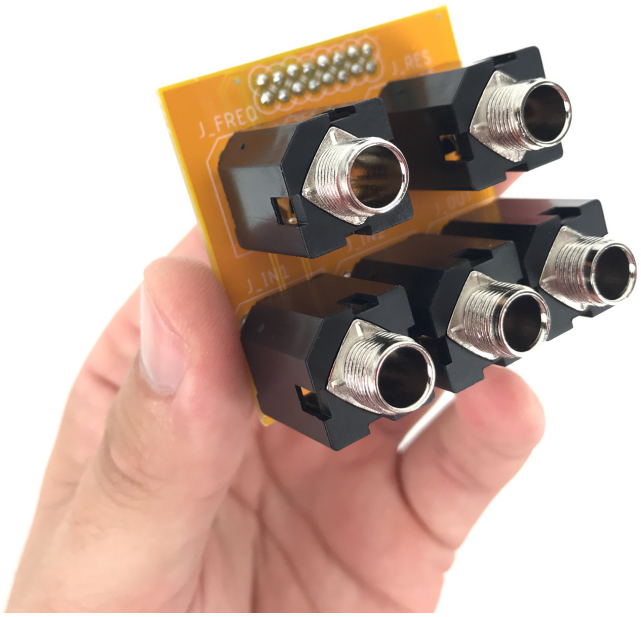
4. Jacks and Pots



Populate the PCB with the 6 10k Potentiometers. They should be seated onto the top side of the Top PCB (easily verified by the boxes indicating the "M-10K-B pots).

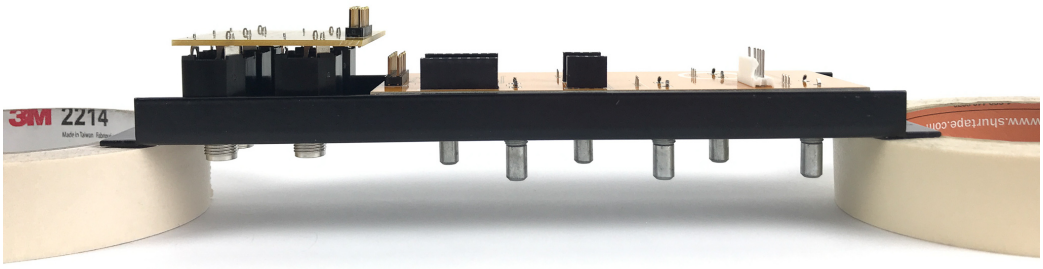


Populate the additional PCB with the 5 MU Jacks. They should be seated onto the top side of the PCB (easily verified by box shapes around where the jacks will be placed).



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 45 solder joints to hit on the bottom side of the PCB.

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.


2144
LPF
FREQ
RES
F-AMT
R-AMT
IN 1
IN 2
FREQ
RES
IN1
IN2
OUT


2144
LPF
FREQ
RES
F-AMT
R-AMT
IN 1
IN 2
FREQ
RES
IN1
IN2
OUT

Attach the link cable aligning the red stripe to the white indicator on both pcb's

You're done! Enjoy!

Test

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

Attach the power cable to the Electrosmith 2144 LPF.

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 Electrosmith 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.