



BEAST-TEK
INSTRUMENTS

DOUBLE DRAGON V1.6

BUILD GUIDE

www.beast-tek.com

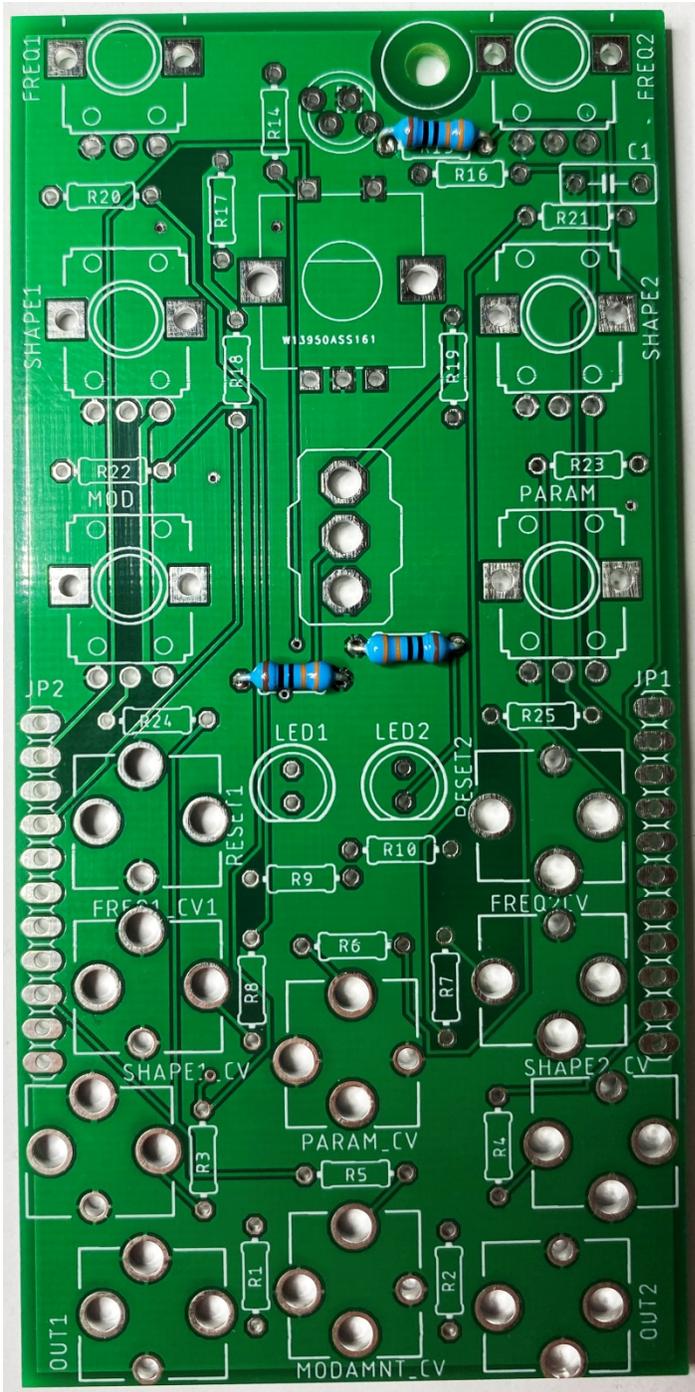


Double Dragon IO Board BOM			
Shape1 , Shape2	9mm T18 shaft 10KB Potentiometer		2
Freq1, Freq2, Mod, Param	9mm Round shaft 10KB Potentiometer		4
ALG Encoder	ALPS Quadrature Encoder		1
SYNC Switch	SPDT Switch		1
LED1, LED2	3mm Bi-Color Led		2
RGB Led	5mm RGB Led Common Cathode		1
JP1, JP2	11 Way Pin Header Single Row MALE		2
R1, R2, R9, R10	1K Ohm Resistor 1%	Brown-Black-Black-Brown-Brown	4
R3, R4, R5, R6, R7, R8	200K Ohm Resistor 1%	Red-Black-Black-Orange-Brown	6
R20, R21, R22, R23, R24, R25	100K Ohm Resistor 1%	Brown-Black-Black-Orange-Brown	6
R17, R18, R19	10K Ohm Resistor 1%	Brown-Black-Black-Red-Brown	3
R14, R16	220 Ohm Resistor 1%	Red-Red-Black-Black-Brown	2
R12, R13, R15	330 Ohm Resistor 1%	Orange-Orange-Black-Black-Brown	3
C1	100nf Blue Monolithic Capacitor	104	1
	PJ301BM "Erthenvar" 3.5mm Mono Jack		10

Double Dragon Main (CPU) Board BOM			
F1, F2	Axial Ferrite Beads	N/A	2
D1, D2	1N4004 Power Diode	1N4004	2
D3	1N4148 Signal Diode	1N4148	1
L1	100uH Inductor R.F. Choke		1
IC1	74HC165N	74HC165N	1
IC2	74HC595N	74HC595N	1
IC3	dsPIC33f128FJ128GP802-I/SP		1
IC5	LD1117V33 3.3v Linear Regulator	LD1117V33	1
IC7	79L05 100MA -5v Regulator	79L05	1
IC4, IC6, IC8, IC9, IC10	MCP602/MCP6022 High precision op-amp		5
IC11, IC12	TL072		2
C3	10uf Tantalum Capacitor	10uf	1
C1, C2, C4, C7, C8, C9, C11, C12, C13, C14, C15, C17	100nf Blue Monolithic Capacitor	104	12
C10, C16, C19, C20	100uf Electrolytic Capacitor 25+v	100uf	4
R27, R28	100K 25 Turn Bourns Trimmer	104	2
R9, R10, R11, R12, R13, R14, R19	10K Ohm Resistor 1%	Brown-Black-Black-Red-Brown	7
R3, R4, R7, R8	22K Ohm Resistor 1%	Red-Red-Black-Red-Brown	4
R15, R16, R17, R18, R20, R21, R22, R23, R24, R25, R26, R30,	100K Ohm Resistor 1%	Brown-Black-Black-Orange-Brown	12
R29, R31, R32, R33, R34, R35	150K Ohm Resistor 1%	Brown-Green-Black-Orange-Brown	6
R5, R6	200K Ohm Resistor 1%	Red-Black-Black-Orange-Brown	2
R1, R2	1M Ohm Resistor 1%	Brown-Black-Black-Yellow-Brown	2
POWER	Shrouded 10pin (2x5) IDC Header (Eurorack Power)		1
JP1	11 Way Pin Header Single Row FEMALE		1
JP2	11 Way Pin Header Single Row FEMALE		1
JP5	6 Way Pin Header Single Row MALE	ISCP Header for PicKit3 Firmware Updates	1
JP3	6 Way Pin Header DUAL Row MALE	Expander Header	1

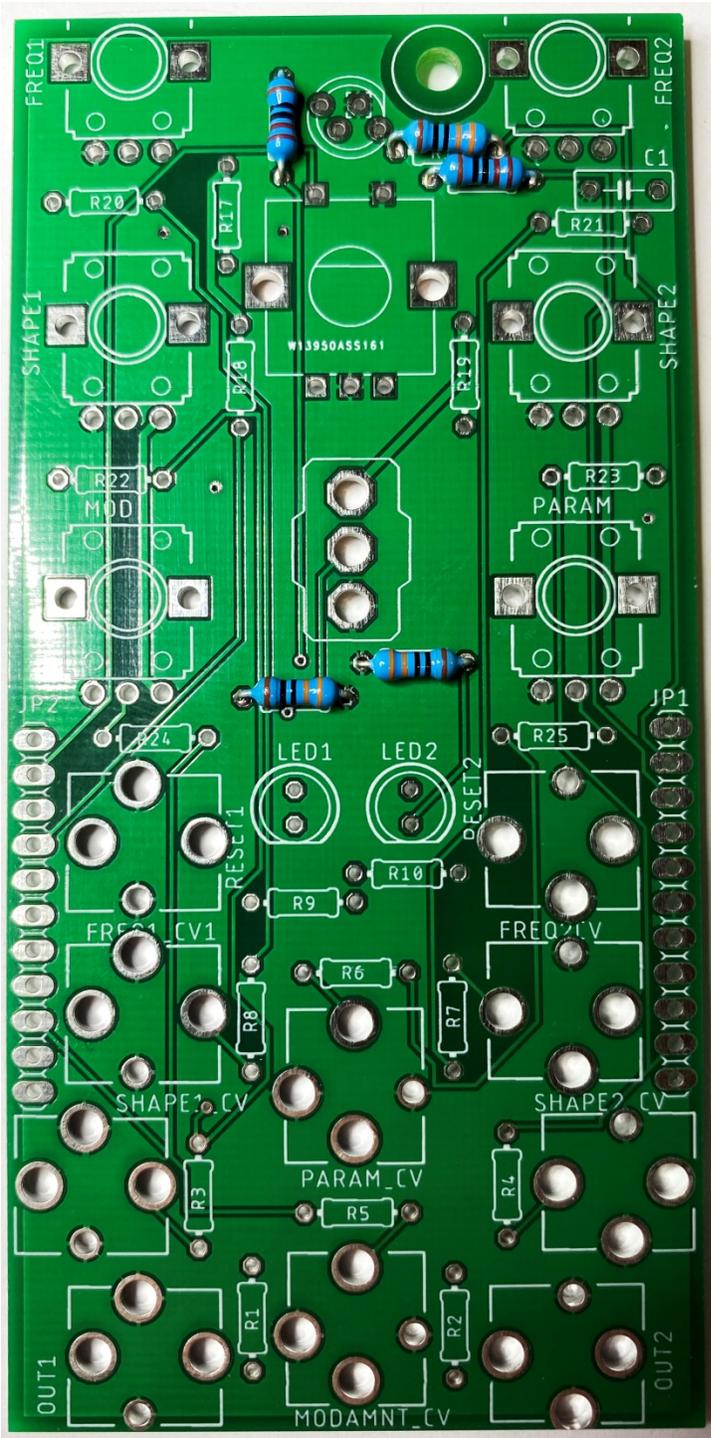
IO Board – Step 1

Install and solder the three 330R resistors R12, R13 and R15



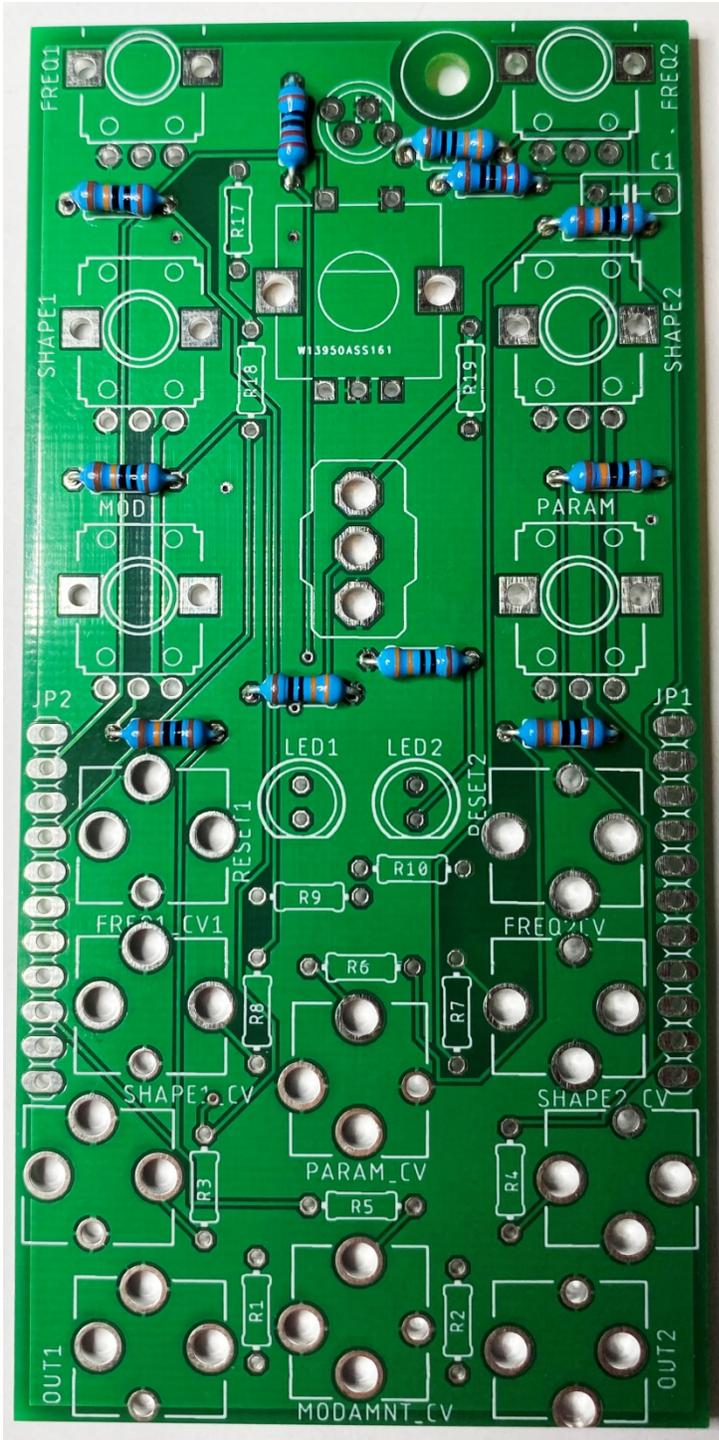
IO Board – Step 2

Install and solder the two 220R resistors – R14 and R16



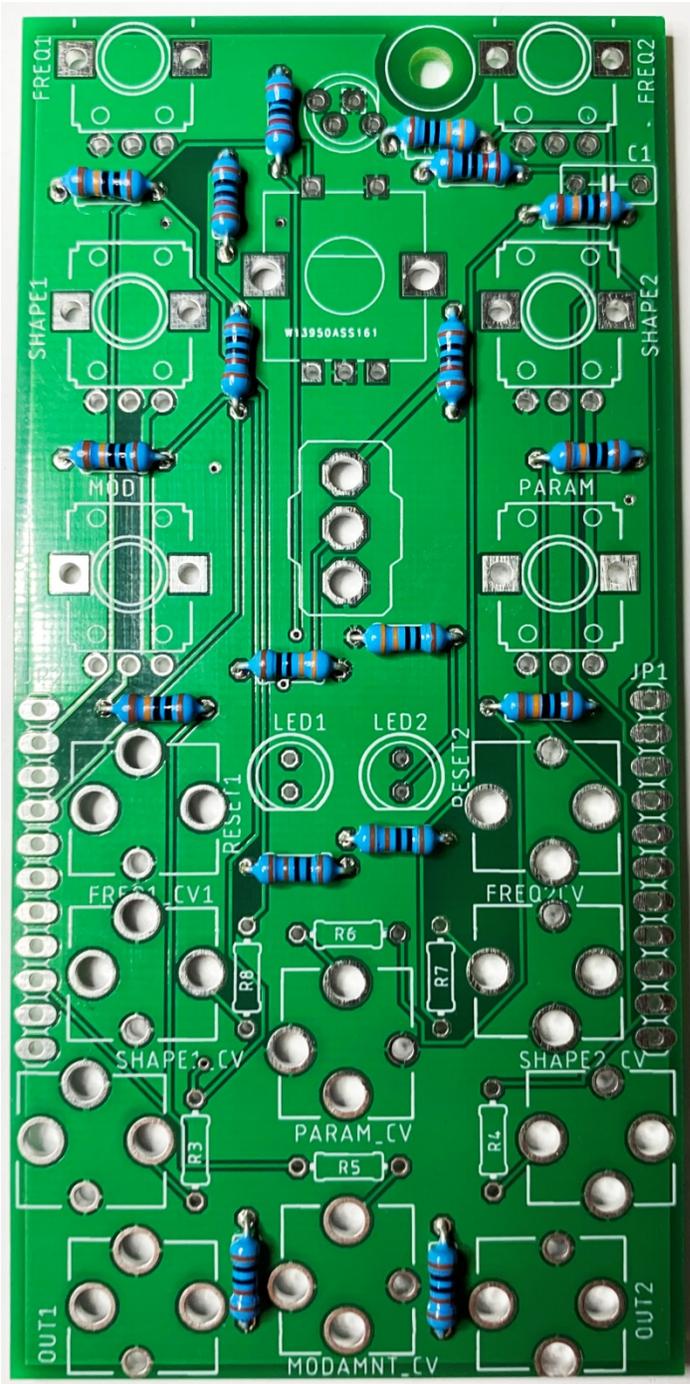
IO Board – Step 3

Install and solder the six 100K resistors R20, R21, R22, R23, R24 and R25



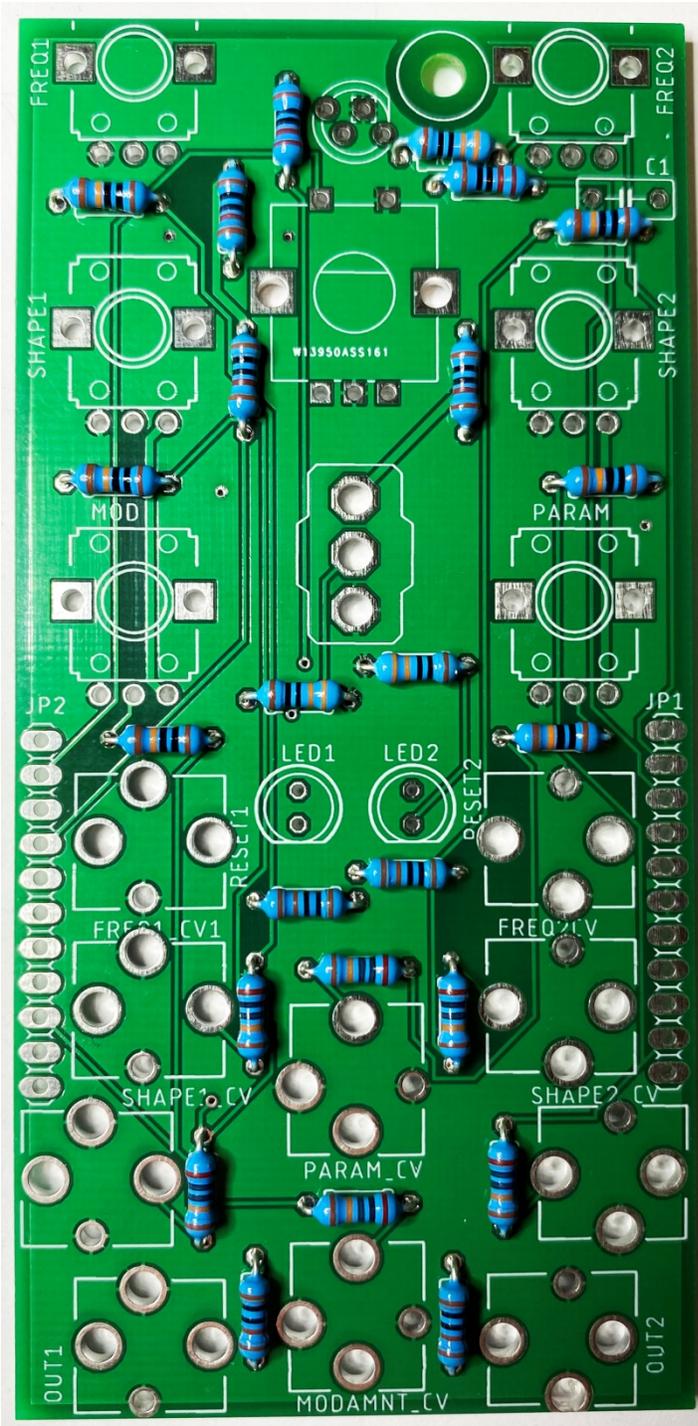
IO Board – Step 5

Install and solder the four 1K resistors R1, R2, R9 and R10



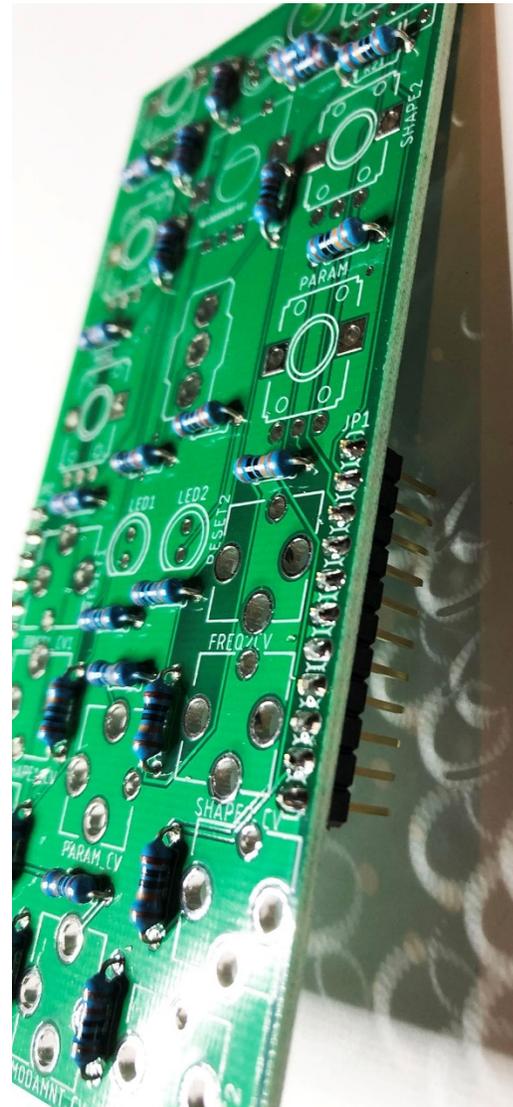
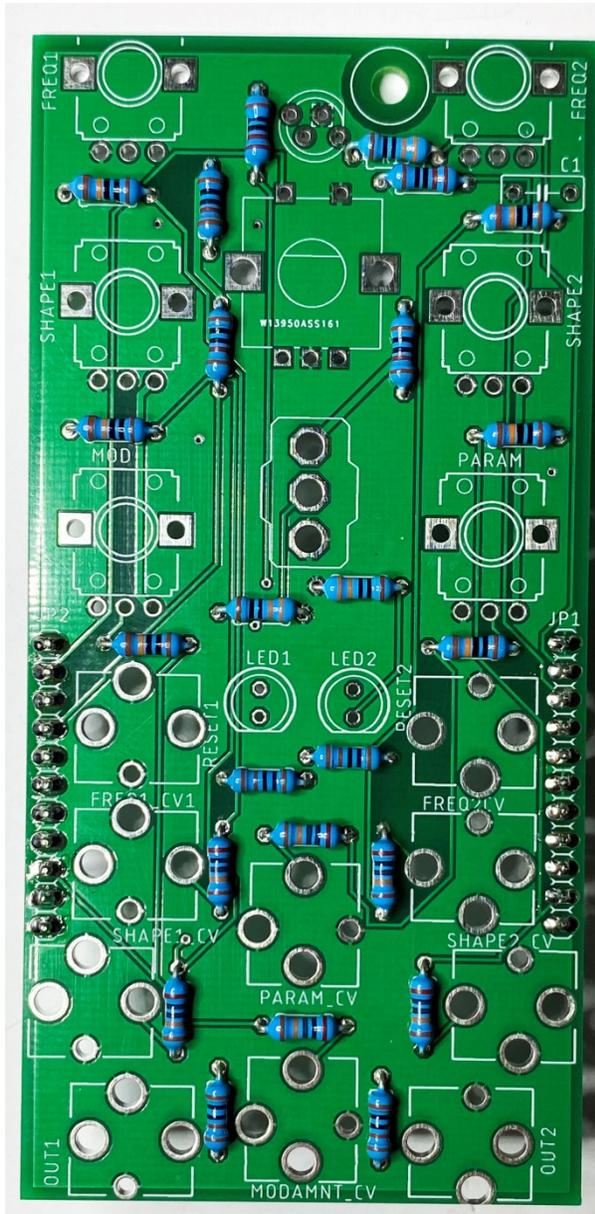
IO Board – Step 6

Install and solder the six 200K resistors R3, R4, R5, R6, R7 and R8



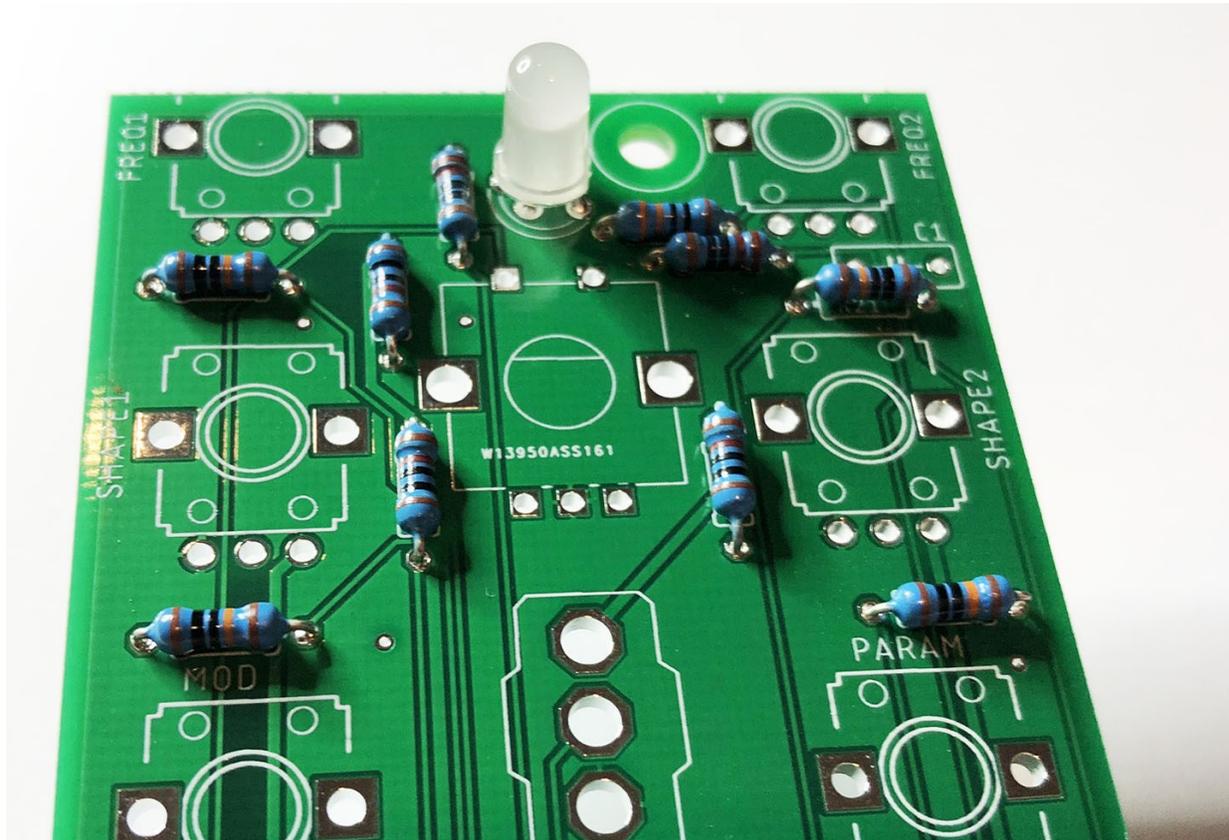
IO Board – Step 7

Cut the header pin strips to size (11 pins in length) using side cutters or pliers. Install and solder making sure they are at right angles to the board.



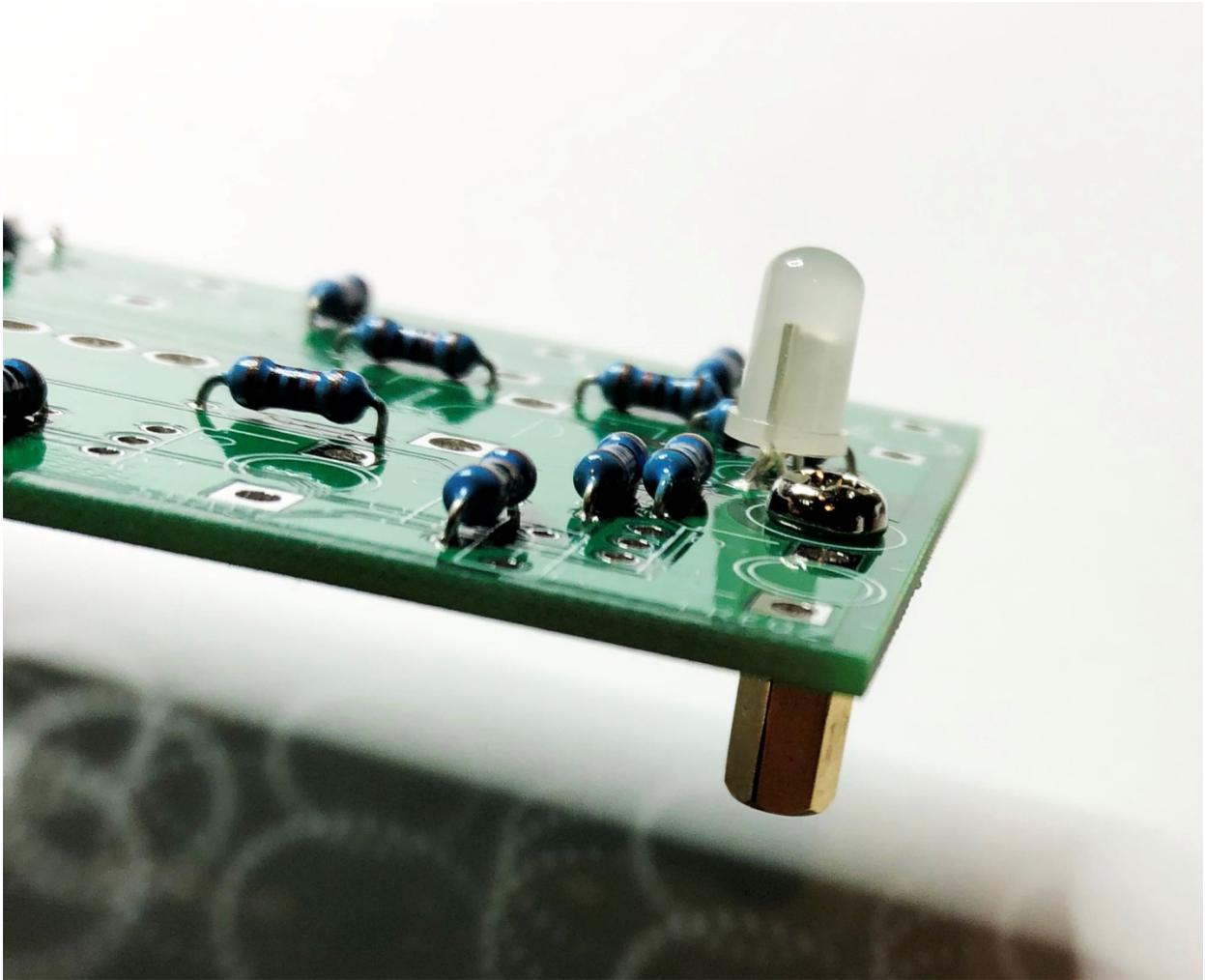
IO Board – Step 8

Install and solder the RGB LED. Make sure that the flat side of the LED aligns with the silk screen. The longer pin is the cathode and is marked on the silk screen with a square. Make sure the LED is as close to the board as possible – this requires applying a little bit of GENTLE force, but not so much that you bend the LED. If you do bend the LED, straighten it and make sure no pins are touching.



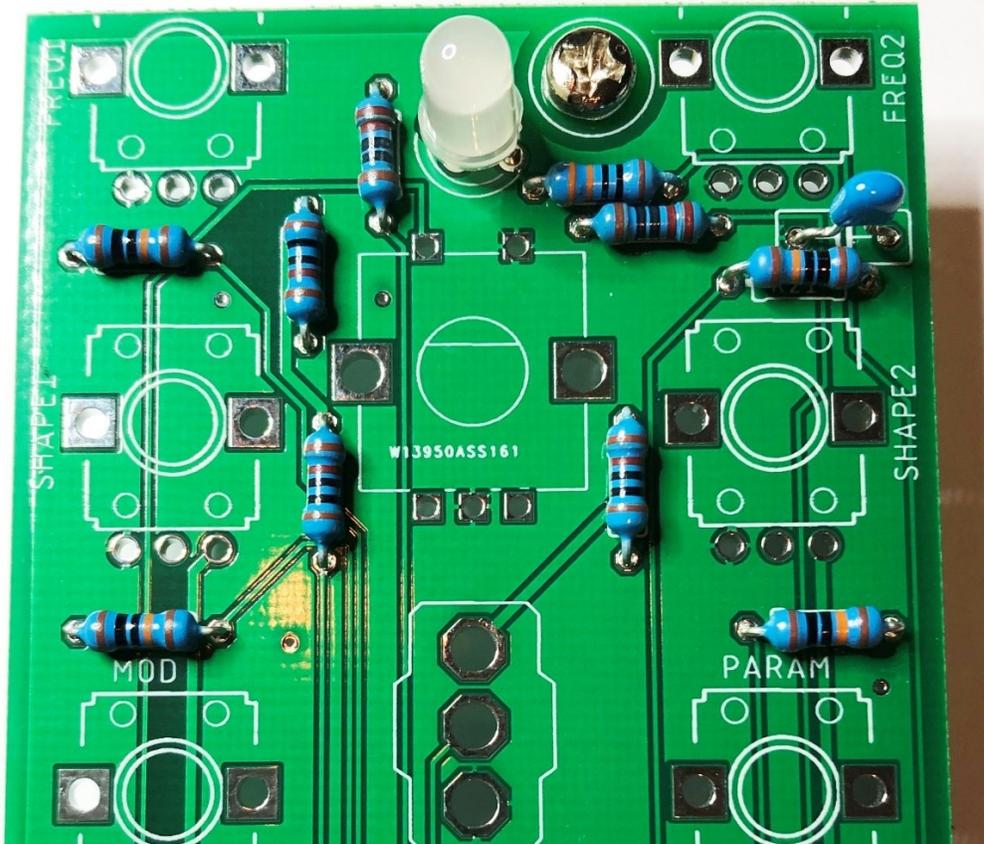
IO Board – Step 9

Install the brass stand off using the 6mm M3 screw.



IO Board – Step 10

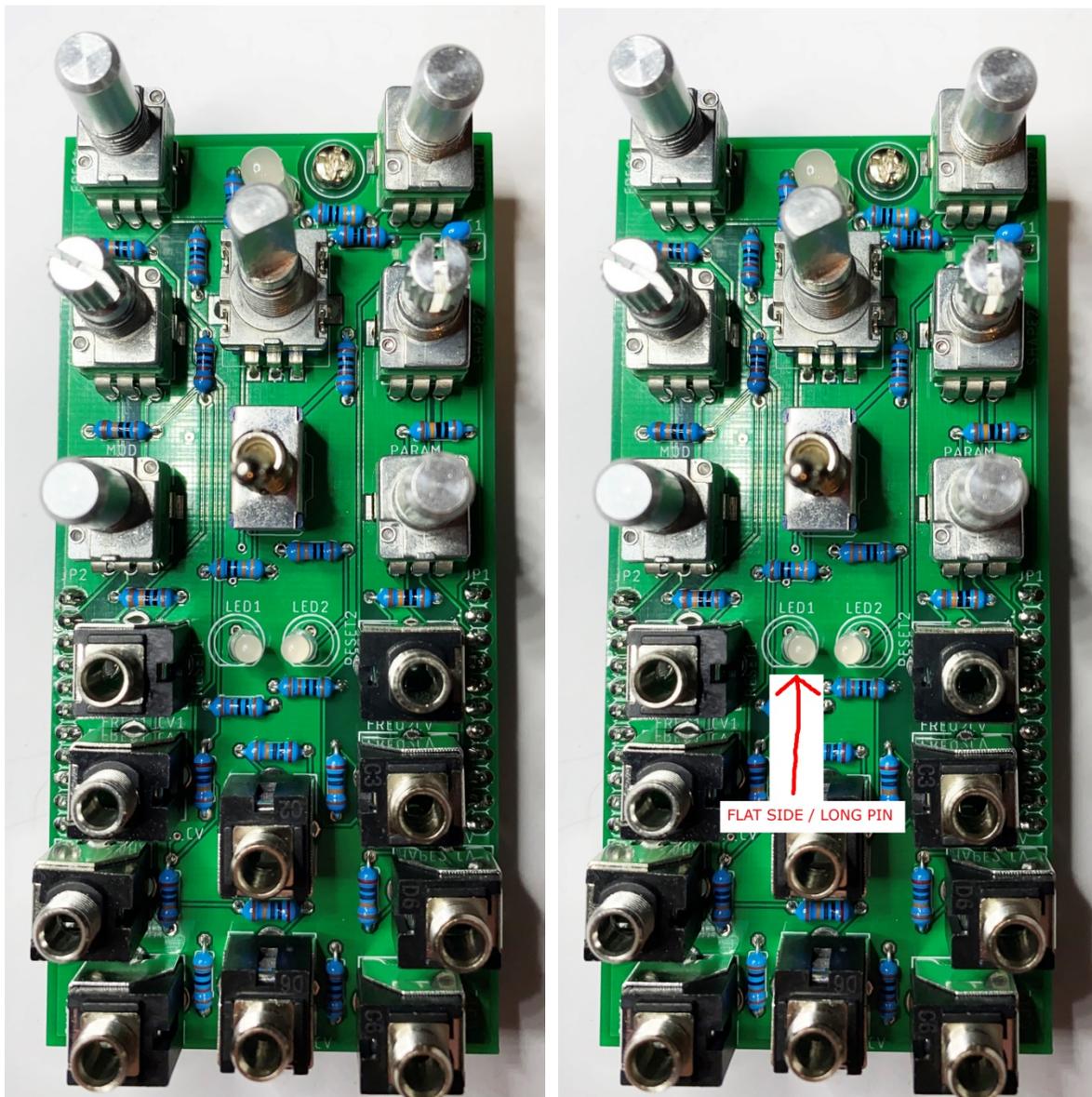
Install and solder the 100nf capacitor C1



IO Board – Step 11

Seat the encoder, pots and switch followed by the jacks and LED's. DO NOT SOLDER ANYTHING ... yet!! NOTE: there is a nut on the encoder to act as a spacer between the panel. Put the nut on before seating as its very fiddley doing it once its on the PCB with all the other parts.

NOTE: The bi-color LEDs have a longer negative/cathode pin (which is opposite to regular LEDs) which is marked with a flat side on the body. Make sure the flat side of the LED aligns with the silk screen.



IO Board – Step 12

Gently place the front panel over the pots, jacks etc – go slow and take your time. If you bump some of the parts out of place take a deep breath and try again.



IO Board – Step 13

Place the nut on the switch, washer and nut on the encoder and two knurled nuts on two of the jacks. Finger tighten the encoder nut and firmly tighten the switch and jack nuts. This should be enough to hold things together so you can flip it over and solder everything in place. For me this was very firm and things were not falling apart. Its possible that you may have to install more knurled jack nuts or washers+nuts on the pots to keep things together.

IO Board – Step 14

When you are confident things are secure enough, flip it over and solder **one lead** of each component. Flip it back over and inspect that everything is seated correctly and evenly. Adjust the LED's so that they are sitting flush prior to soldering.

When you are happy that everything is sitting well, flip it back over and solder the rest of the leads on all parts/components.

IO Board – Step 15

Take a moment to inspect and check for cold joints, bridges and shorts. When you are confident is clean as a whistle, flip it back over and install the remaining nuts and washers.



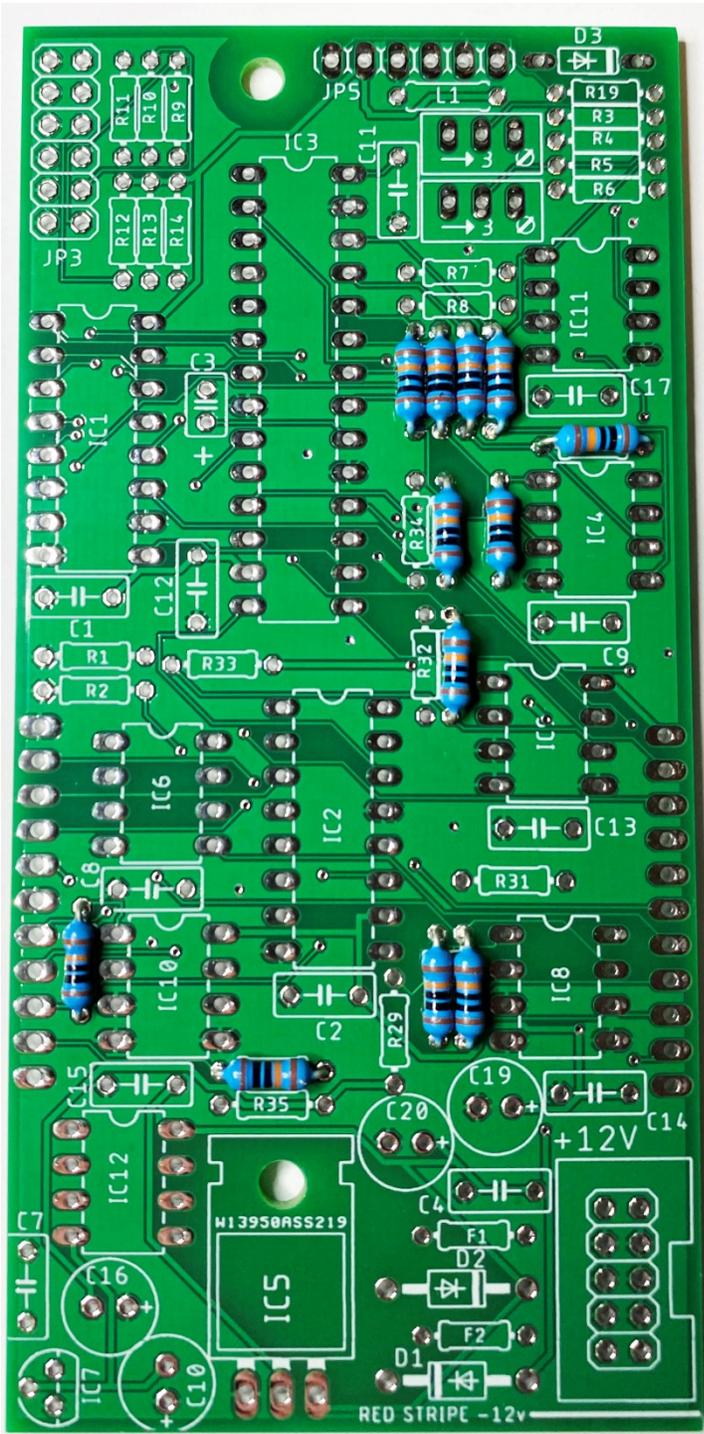
IO Board – Step 16

Install the knobs.



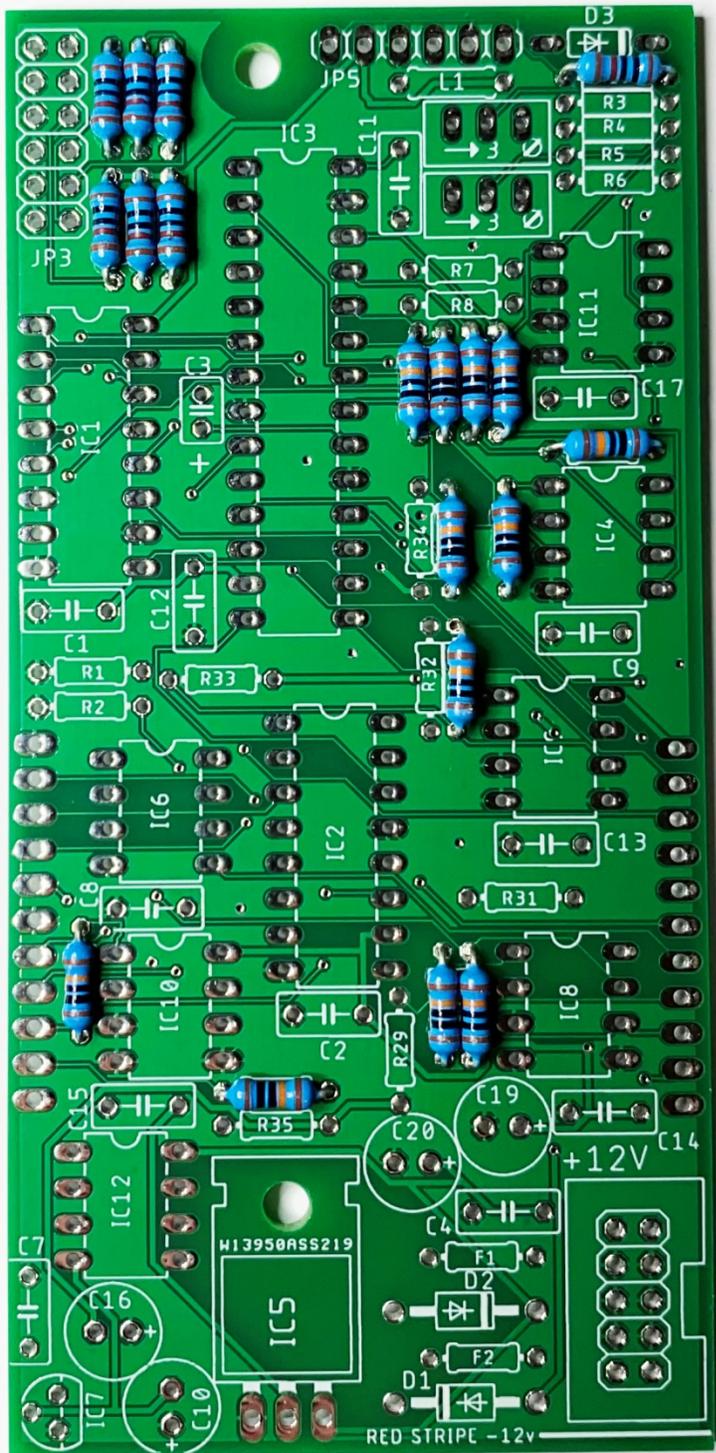
Main Board – Step 1

Install and solder the twelve 100k resistors R15, R16, R17, R18, R20, R21, R22, R23, R24, R25, R26 and R30



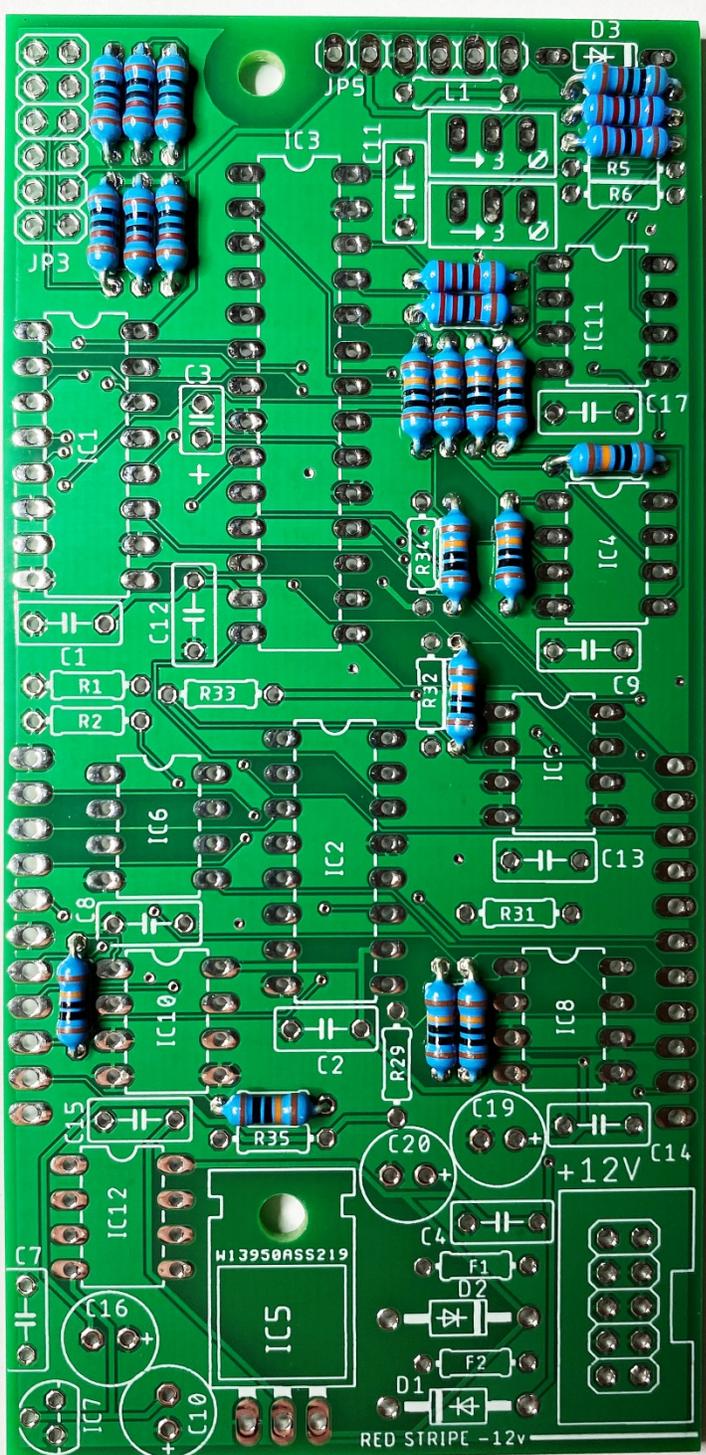
Main Board – Step 2

Install and solder the seven 10K resistors R9, R10, R11, R12, R13, R14 and R19



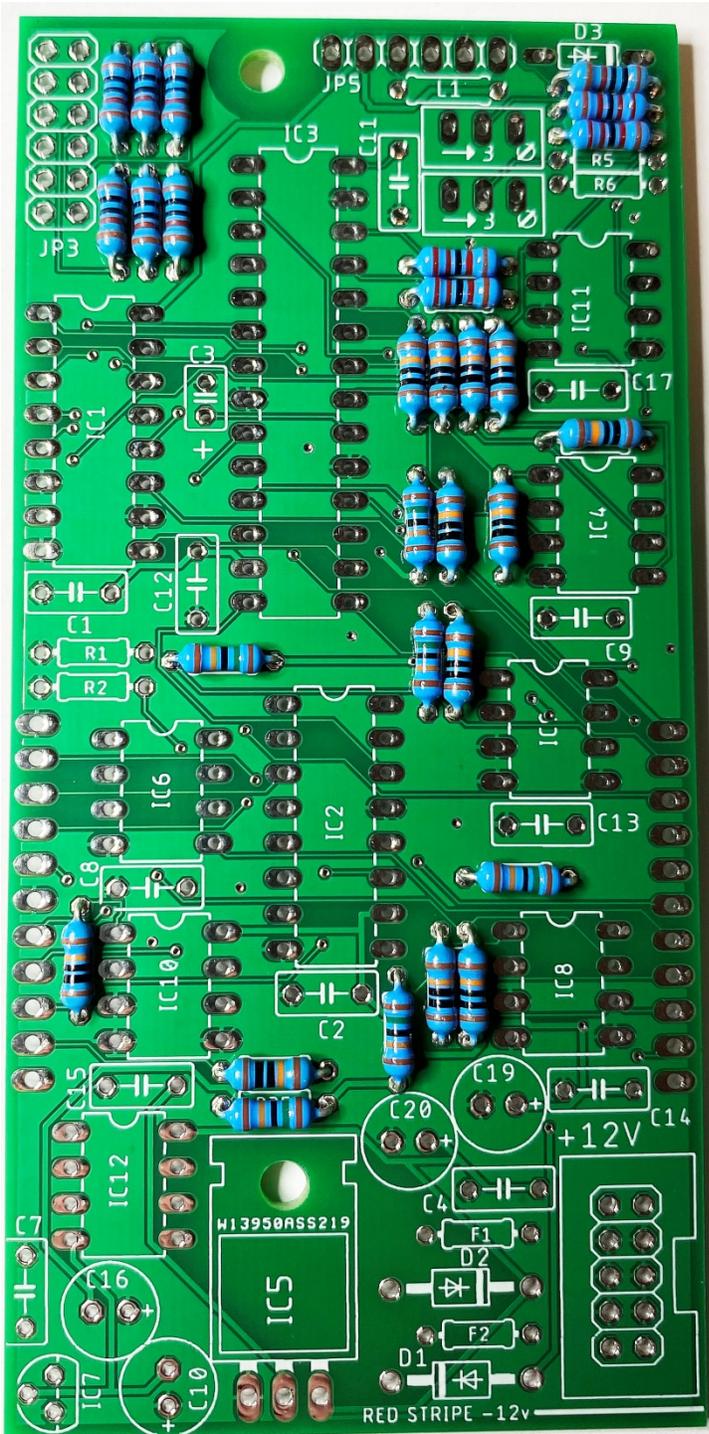
Main Board – Step 3

Install and solder the four 22K resistors R3, R4, R7 and R8



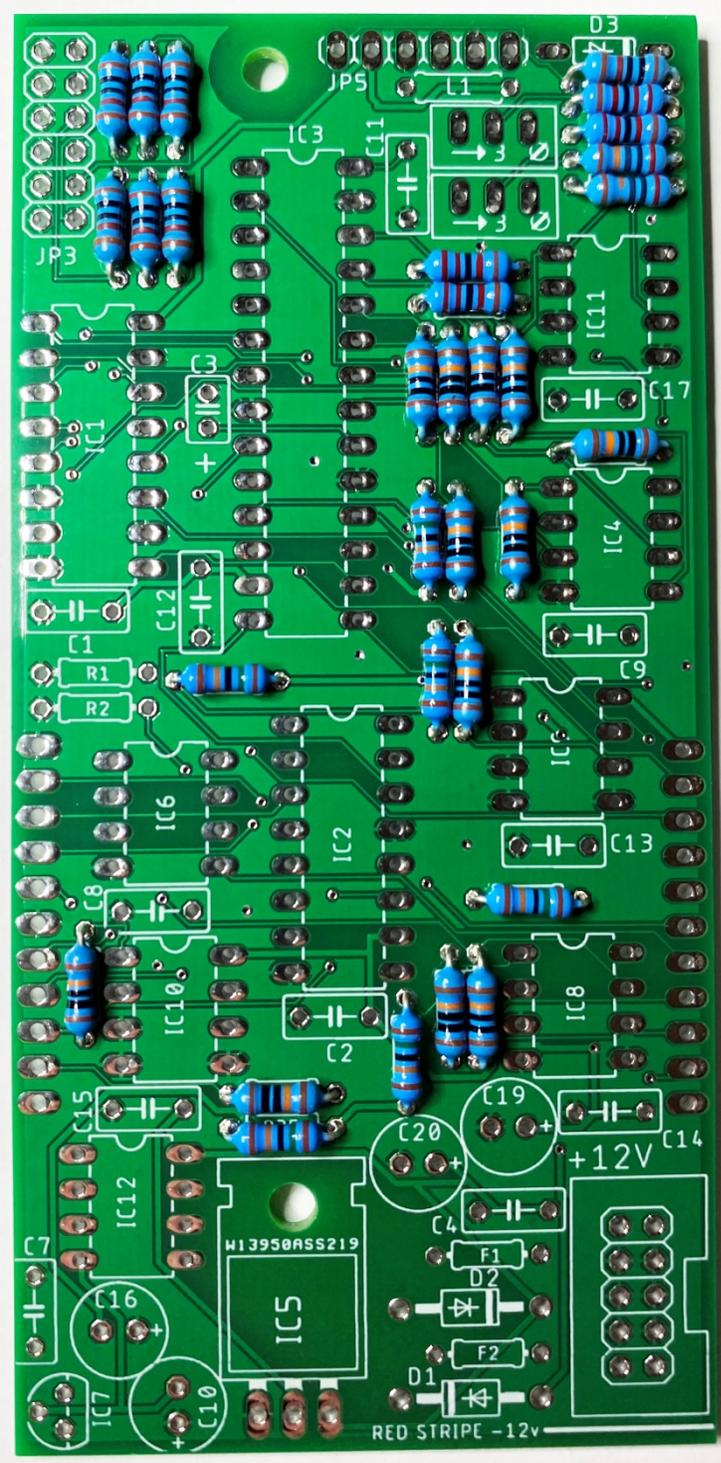
Main Board – Step 4

Install and solder the six 150K resistors R29, R31, R32, R33, R34 and R35



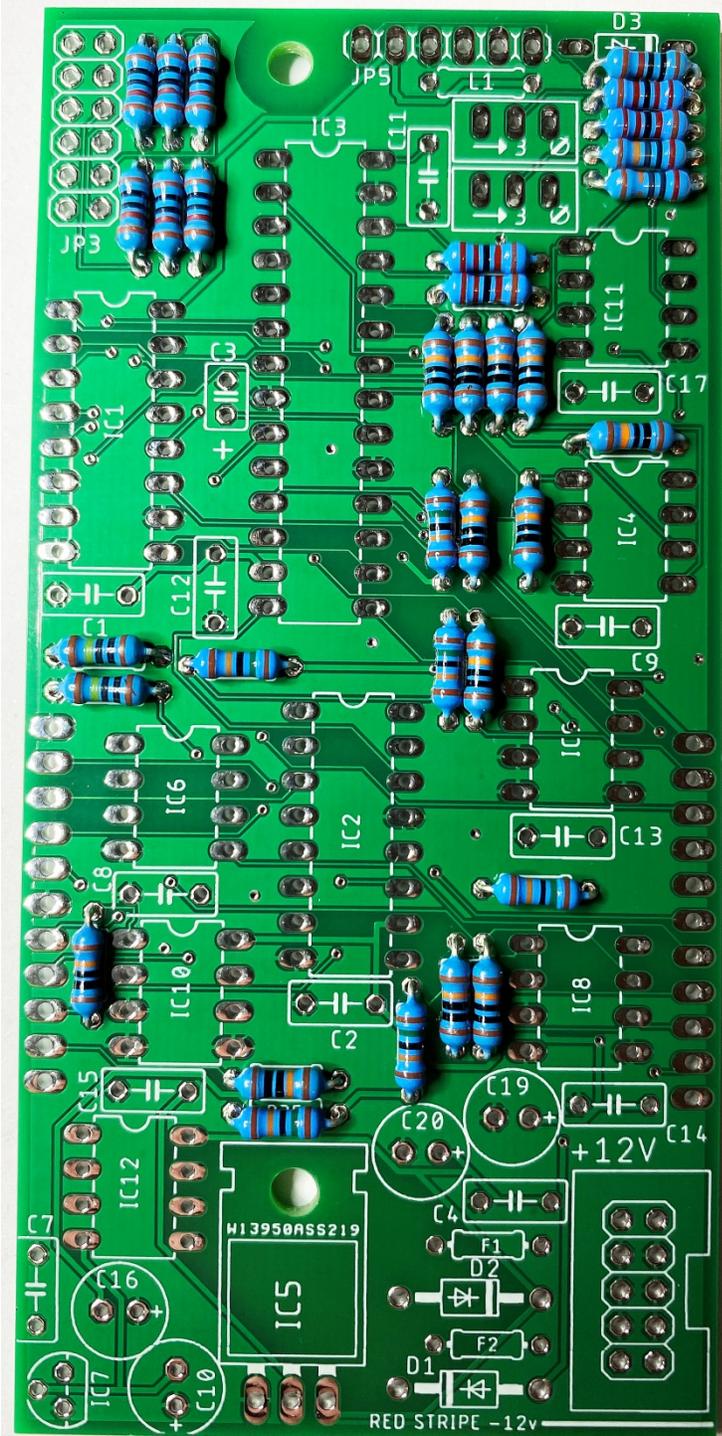
Main Board – Step 5

Install and solder the two 200K resistors R5 and R6



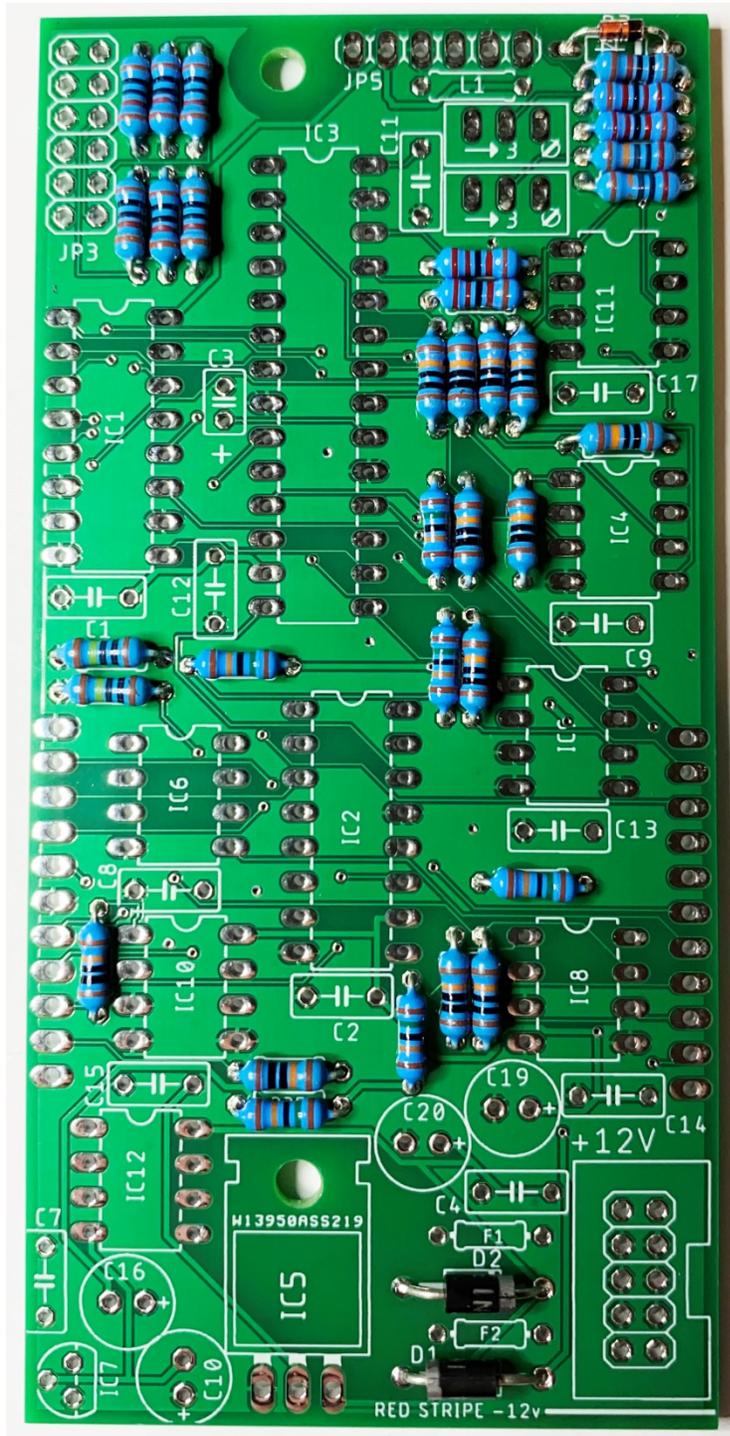
Main Board – Step 6

Install and solder the two 1M resistors R1 and R2



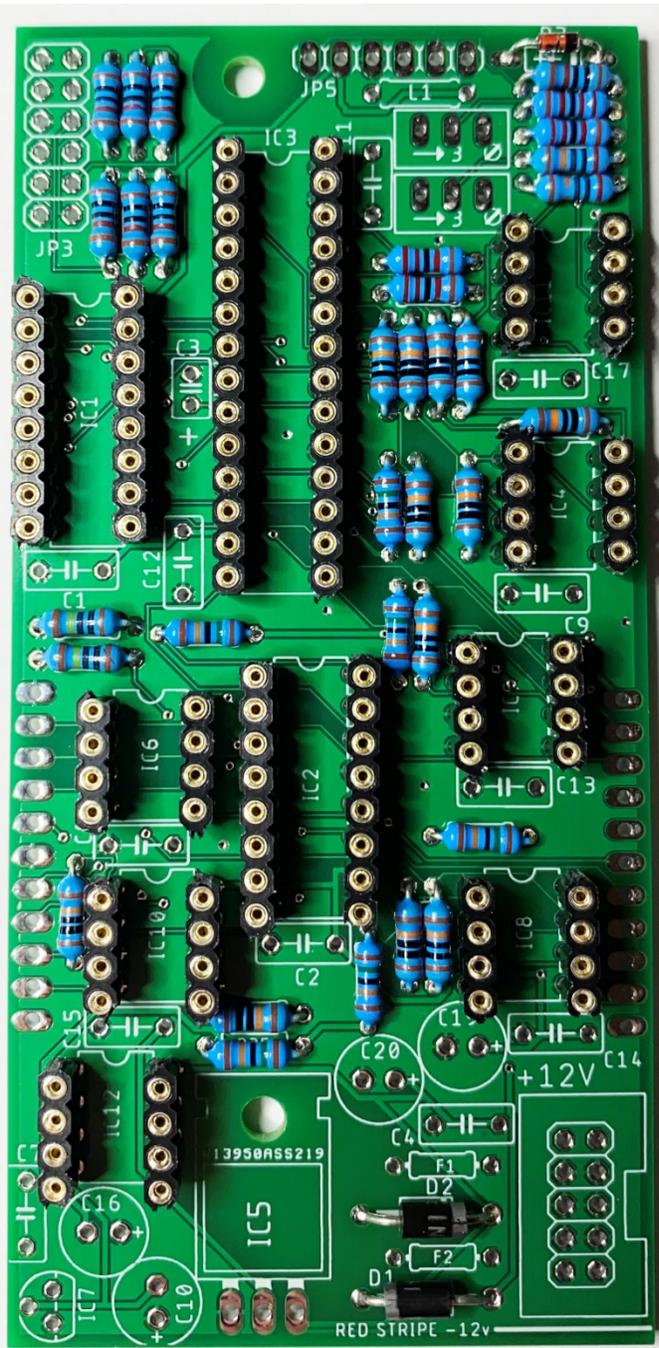
Main Board – Step 7

Install and solder the two 1N4004 diodes D1, D2 and the 1N4148 diode D3 – paying attention to the band on the diode and the silkscreen on the board.



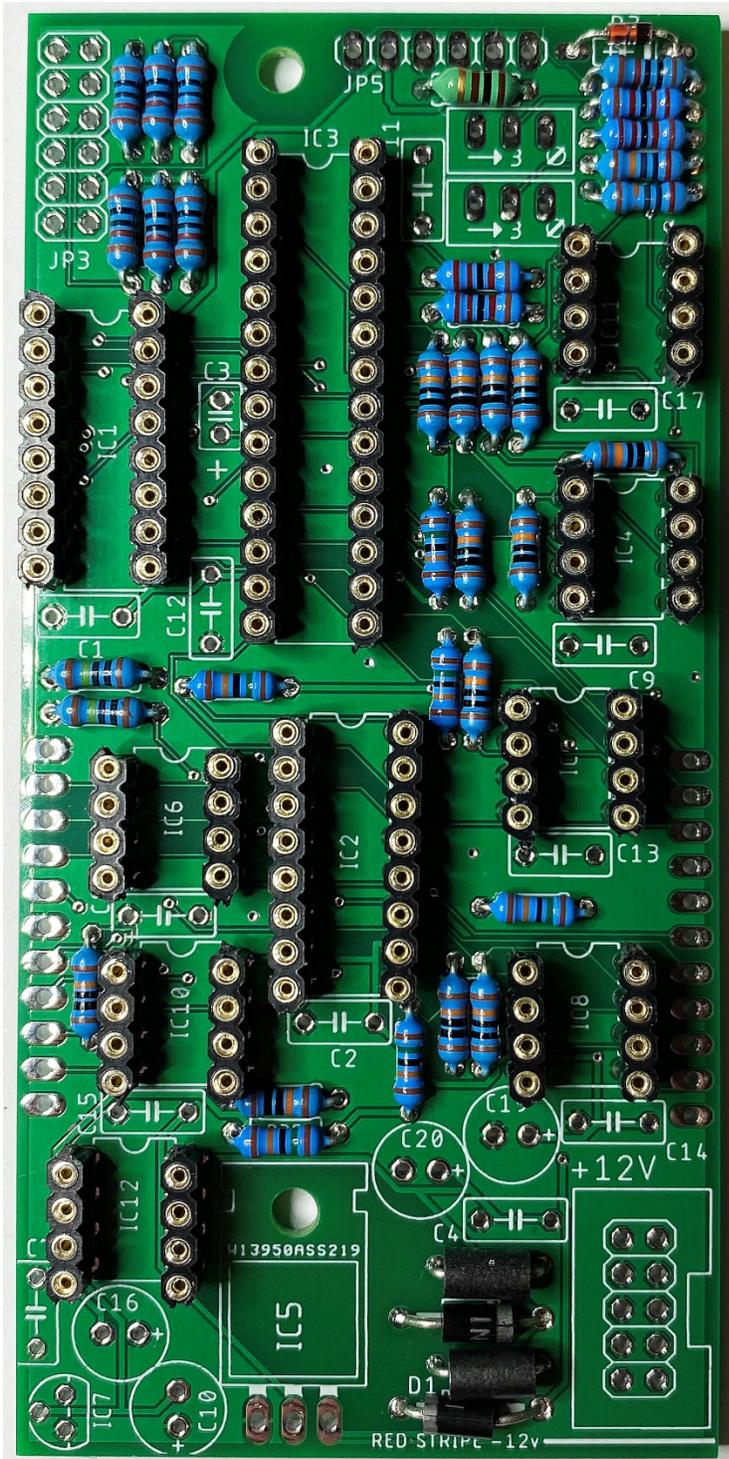
Main Board – Step 8

Cut the IC socket strips to the appropriate lengths, install and solder. A book or stiff piece of cardboard or aluminum sheet etc can help during the flip over process to keep the strips in place.



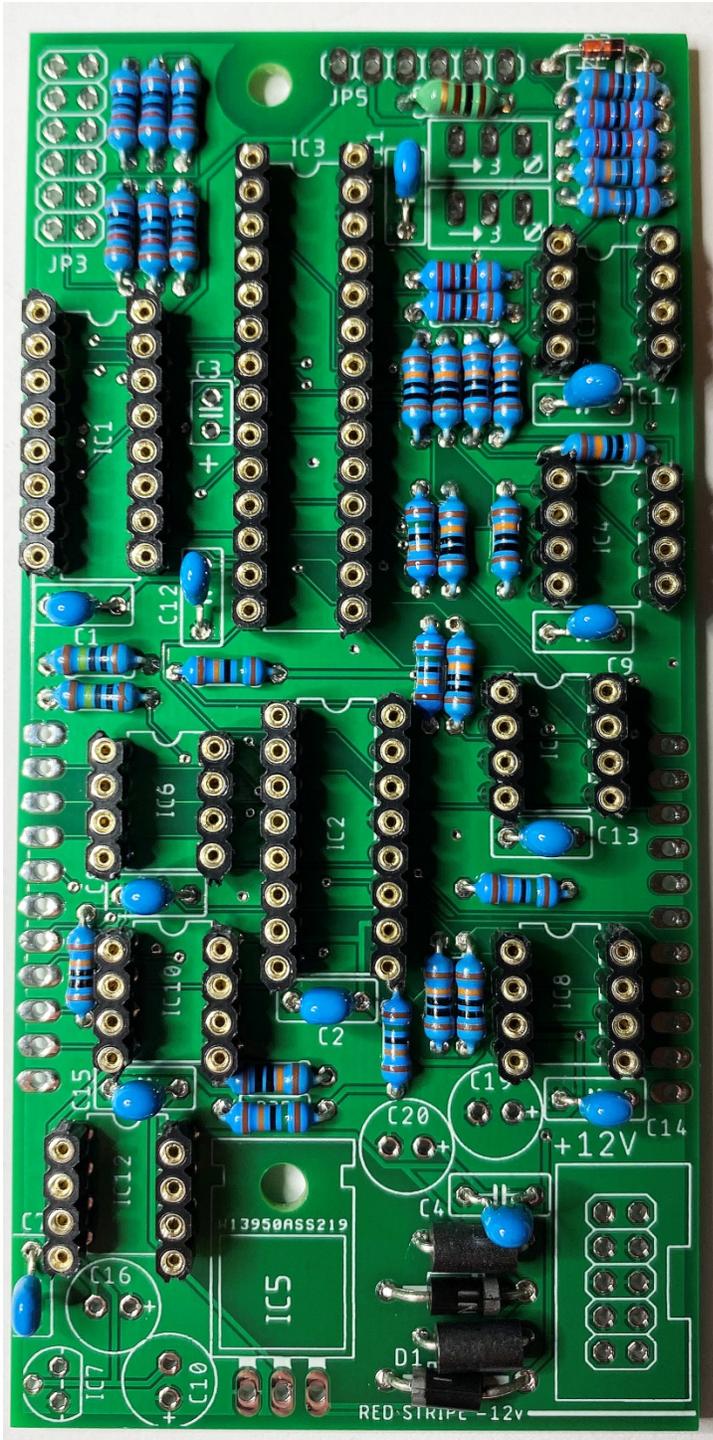
Main Board – Step 9

Install and solder the two axial ferrite beads F1, F2 and the inductor L1



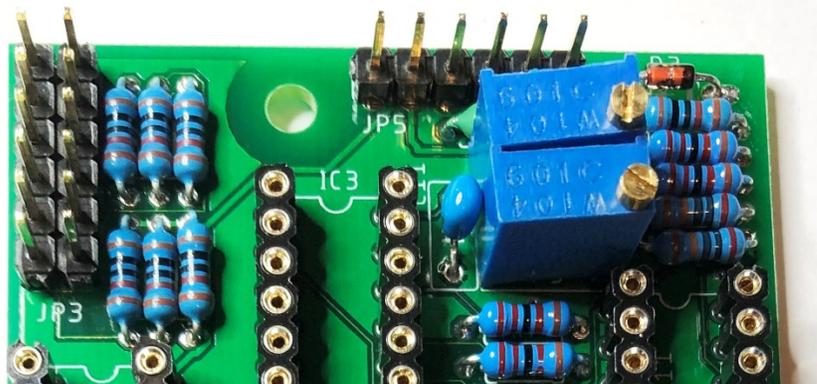
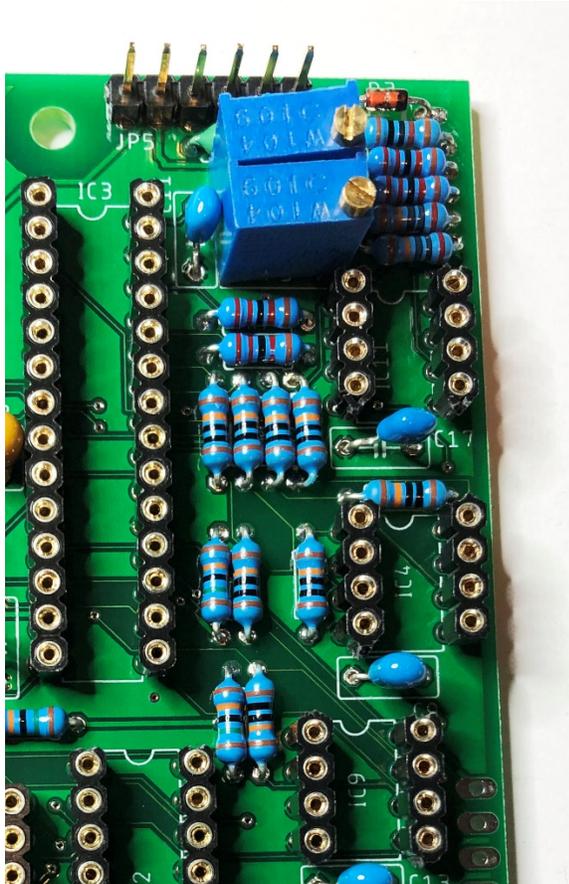
Main Board – Step 10

Install and solder the twelve 100nf capacitors



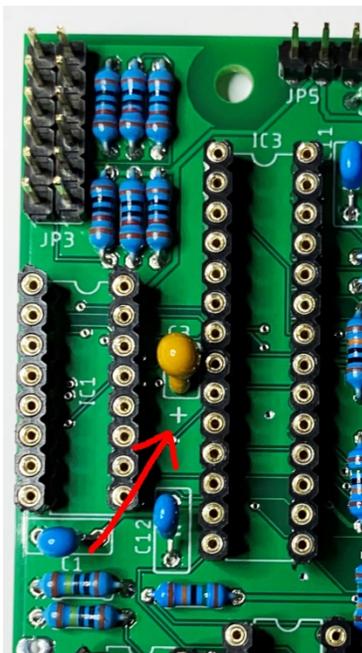
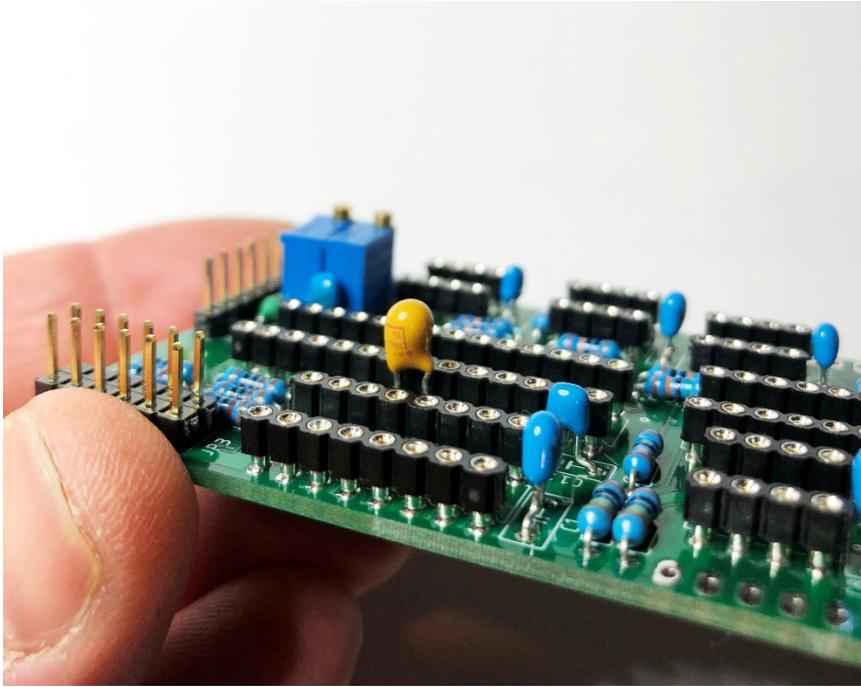
Main Board – Step 11

Cut the remaining male pin header into three 6 pin pieces and install and solder them into JP3 and JP5. AFTER installing the pin header, Install and solder the two 100K 25-turn trimmers.



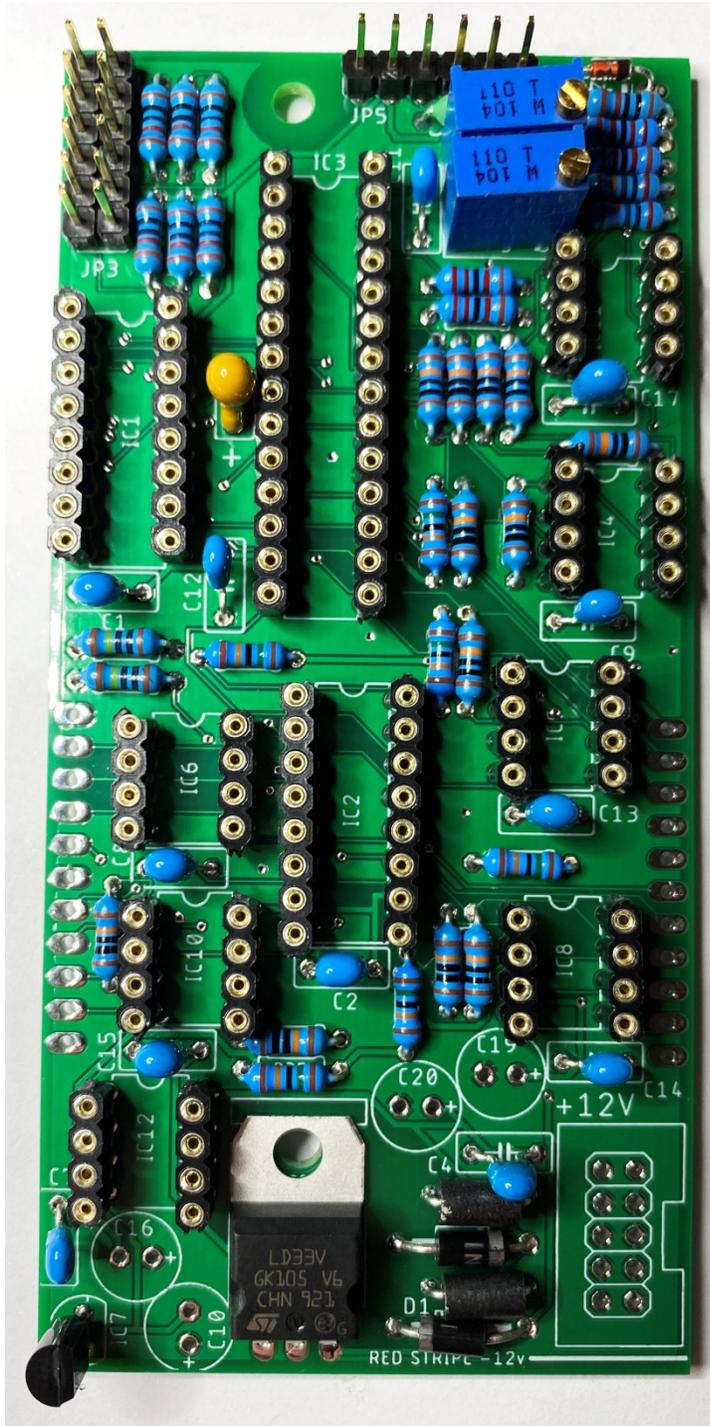
Main Board – Step 12

Install and solder the 10uf tantalum capacitor paying attention to the orientation of the positive pin as per the photos below. The longer lead marked with a + is the positive pin.



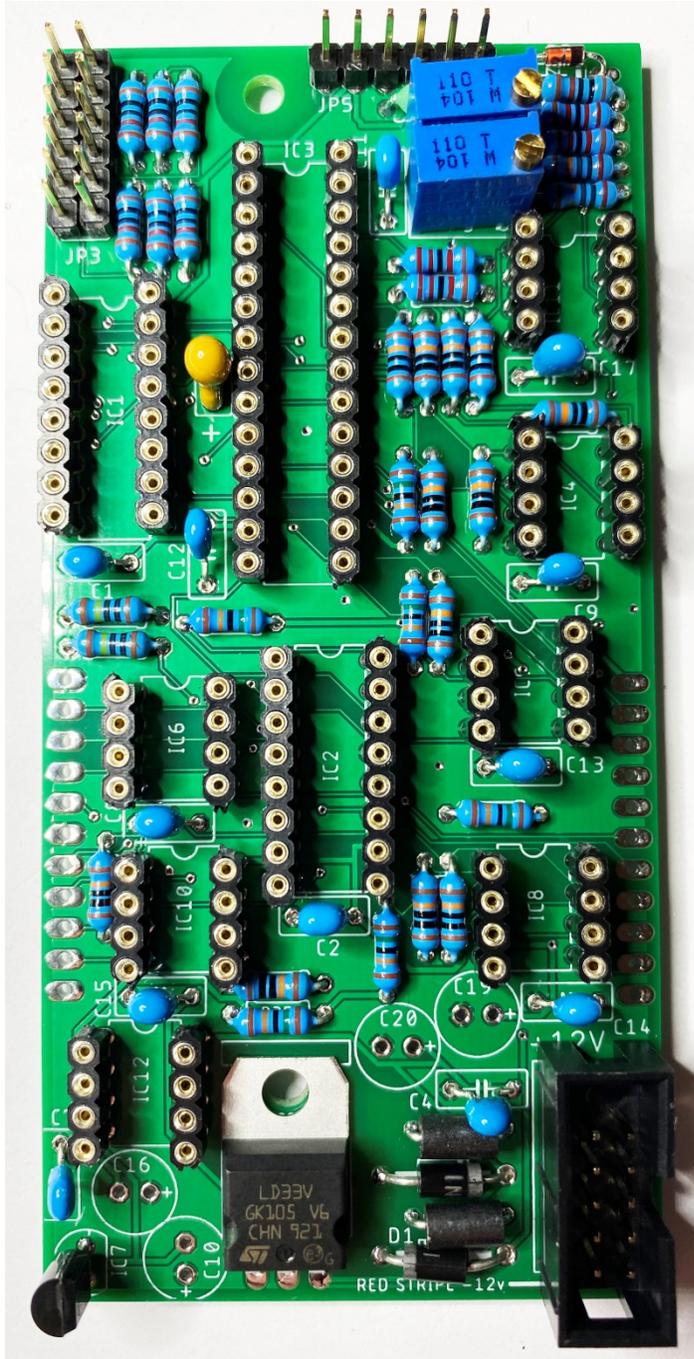
Main Board – Step 13

Install the two voltage regulators IC5 and IC7



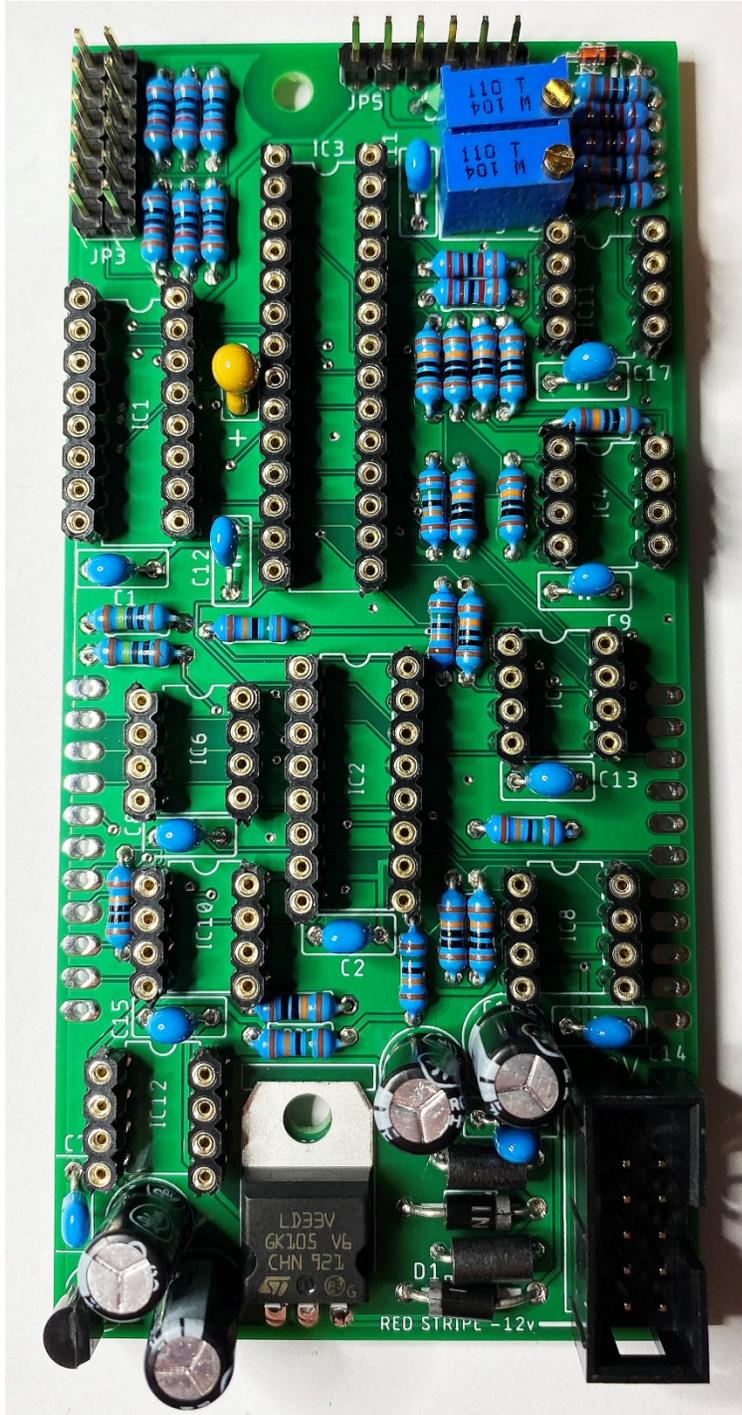
Main Board – Step 14

Install and solder the power header making sure the “notch” in the shrouded header matches the orientation on the PCB silk screen.



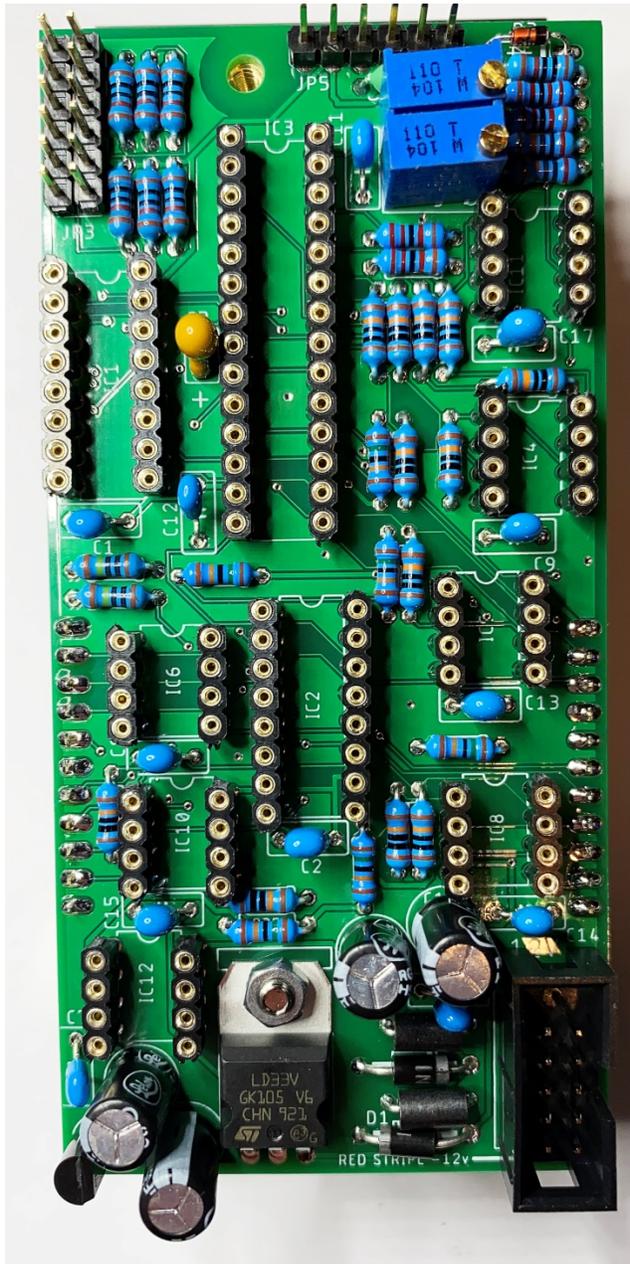
Main Board – Step 15

Install the four 100uf electrolytic capacitors C10, C16, C19 and C20 paying attention to the polarity (long pin is positive, stripe on the capacitor is negative).



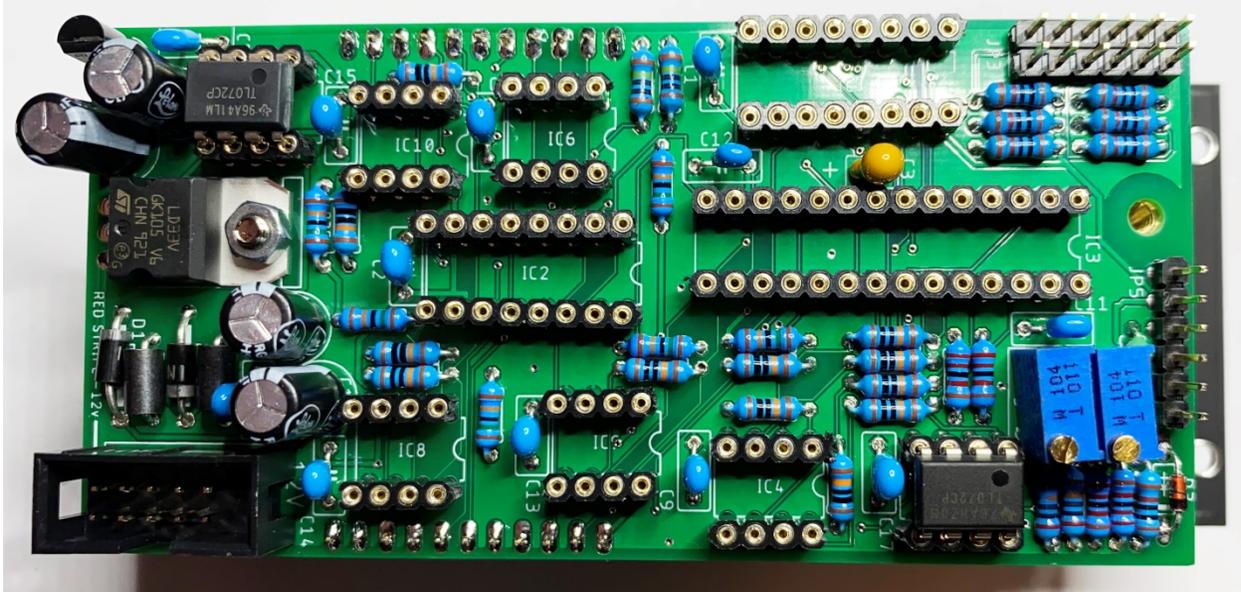
Main Board – Step 16

Using an M3 nut and 6mm M3 screw, attach the LD33V voltage regulator to the PCB ensuring the heatsink of the regulator is flush with the PCB. Next cut the female header strip into two 11pin pieces and install and solder them on the back of the board to connect to the IO board.



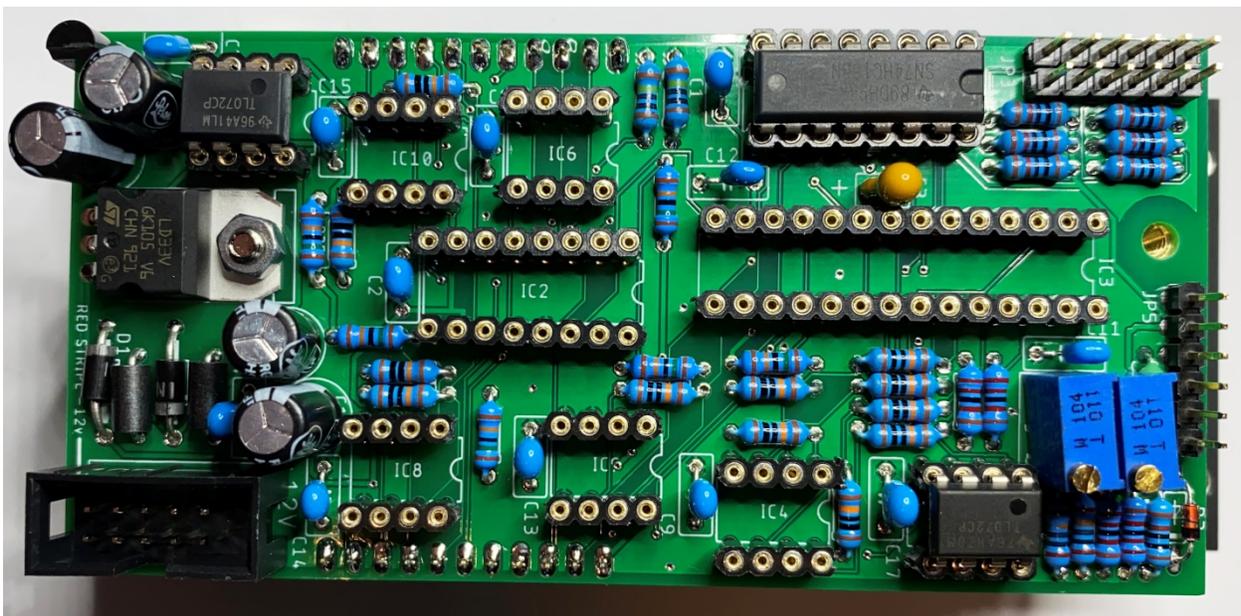
Main Board – Step 17

Install the two TL072 ICs into IC11 and IC12



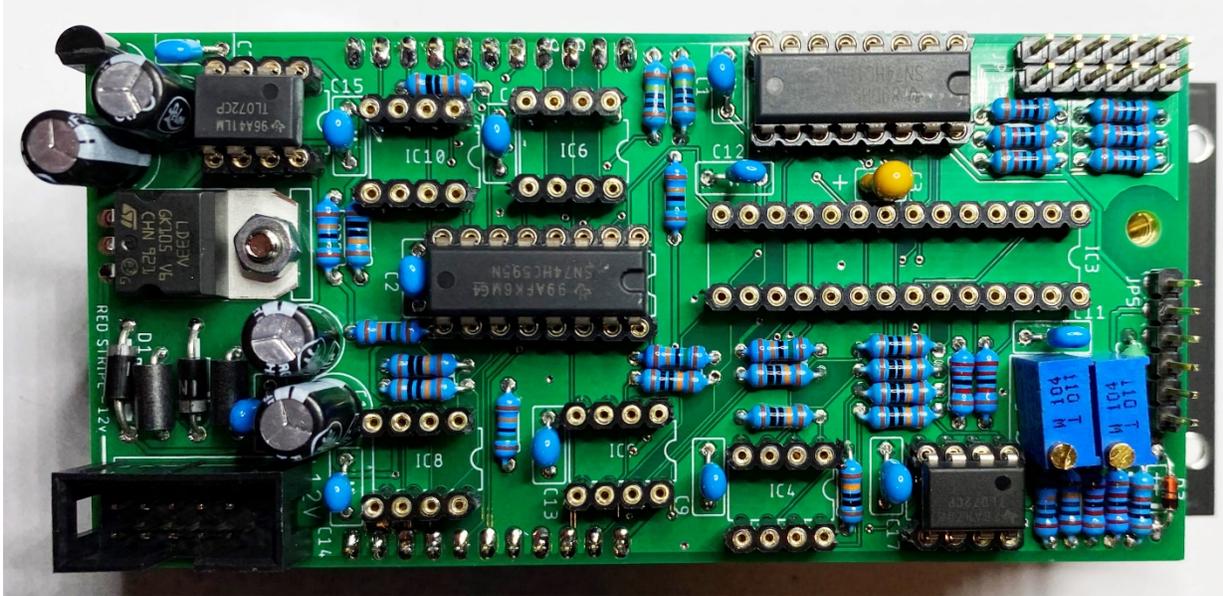
Main Board – Step 18

Install the 74HC165 into IC1



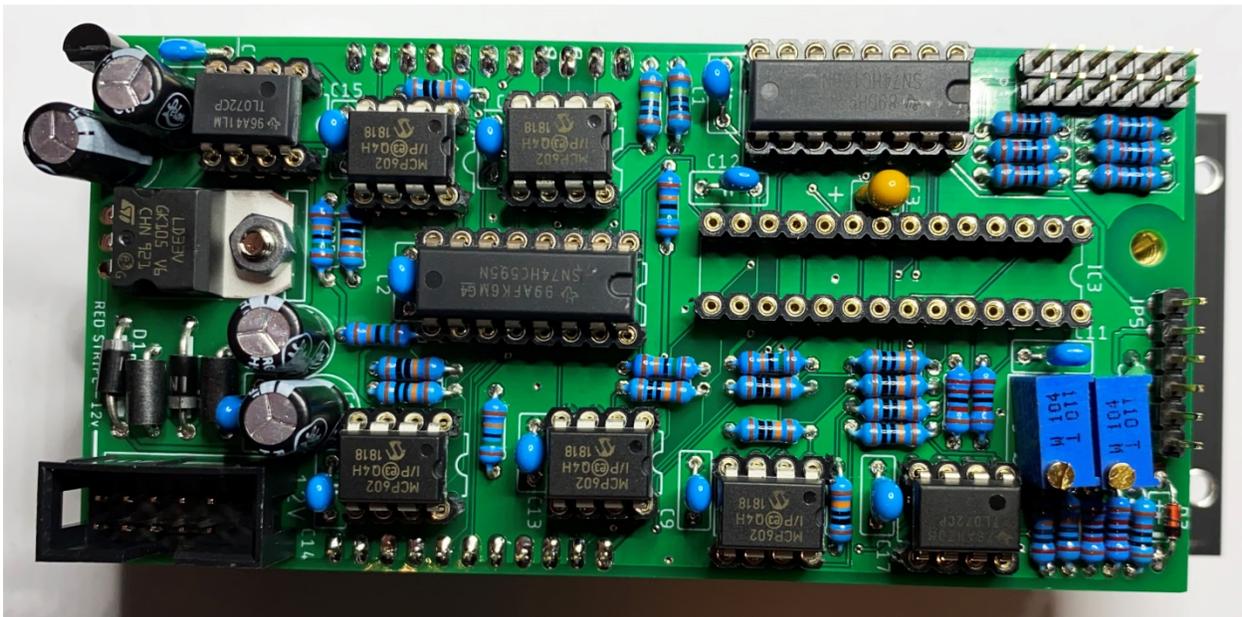
Main Board – Step 19

Install the 74HC595 into IC2



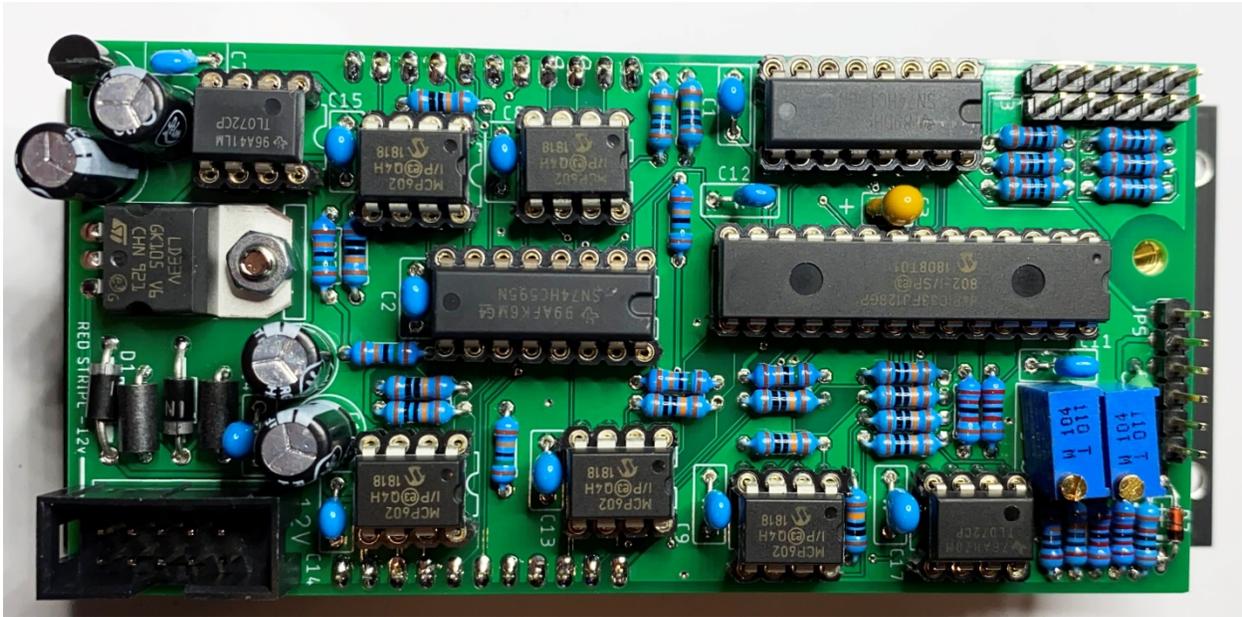
Main Board – Step 20

Install the five MCP602 ICs into IC4, IC6, IC8, IC9 and IC 10



Main Board – Step 21

Install the dsPic33F chip into IC3

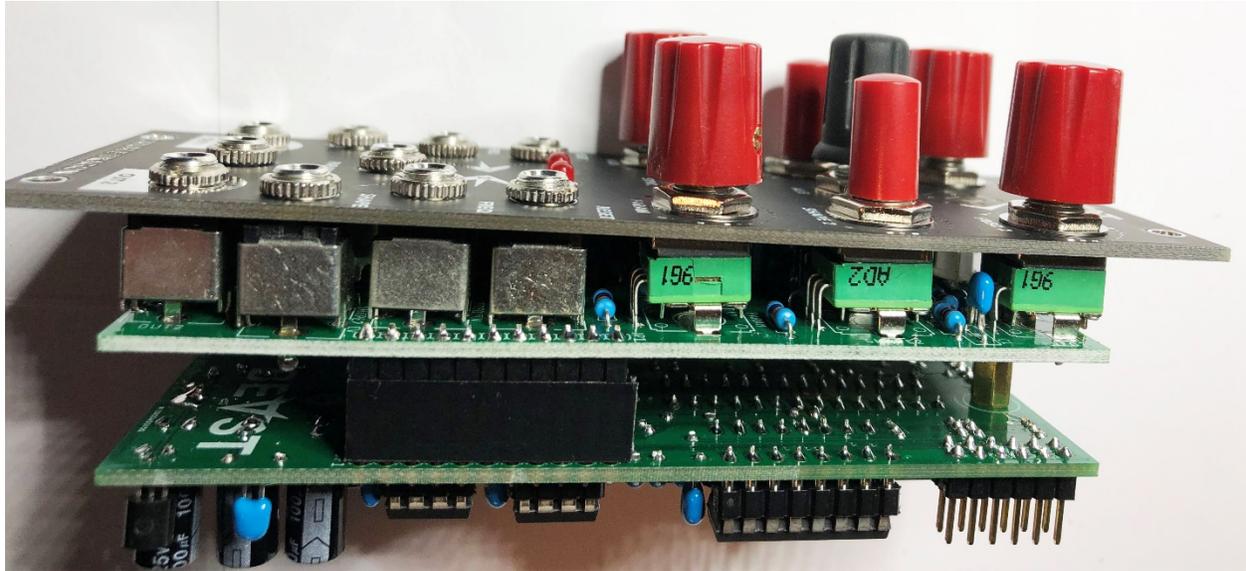


Main Board – Step 22

Double check all of the components and solder joints for bad/dry joints and shorts. If everything looks good continue.

Main Board – Step 23

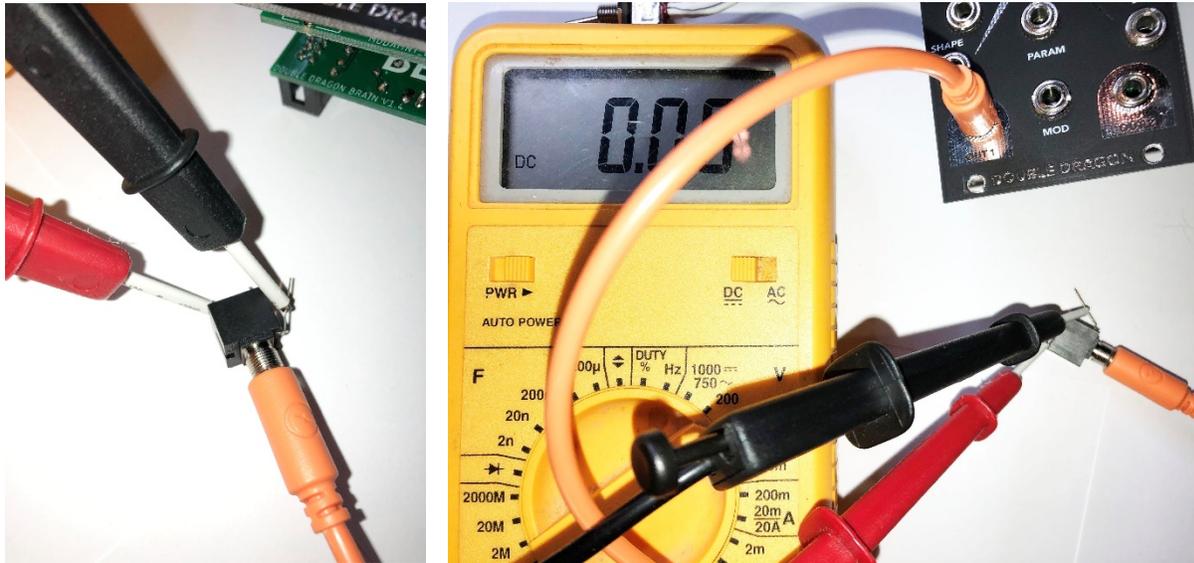
Connect the two boards together via the pin headers and secure together with an M3 x 6mm screw.



CALIBRATION TIME !!

Hold the encoder push button down whilst powering on the module. The “Dragon Eye” should rapidly change between colours like a rainbow to indicate you are in calibration mode.

Insert a patch lead into OUT1 and connect the other end of the patch lead to a multimeter (a jack can help).



The trimmer closest to the top of the module adjusts the zero offset for OUT 1 and the trimmer closest to the bottom of the module adjusts the zero offset for OUT2.

Starting with OUT 1, turn the 25 turn trimmer at closest to the top of the module until you get a reading of exactly 0.00V

Take the patch cable and plug it into OUT 2, repeating the process this time with the trimmer closest to the bottom of the module.

NOTE: For the best performance it is better if the zero point is slightly positive (e.g. 0.001V) instead of slightly negative (e.g. -0.001V)

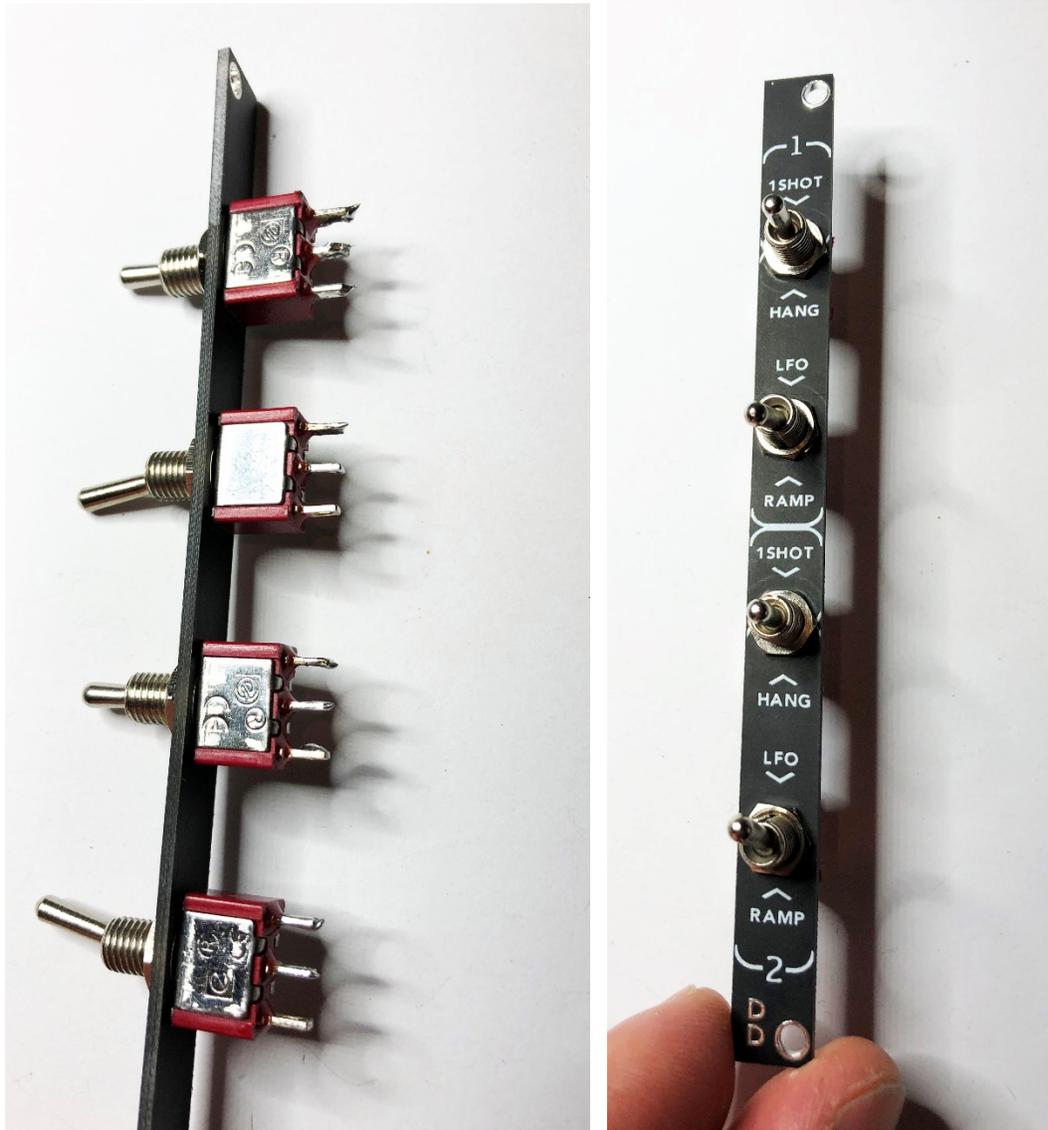
Double Dragon Expander (Available separately)



Step 1

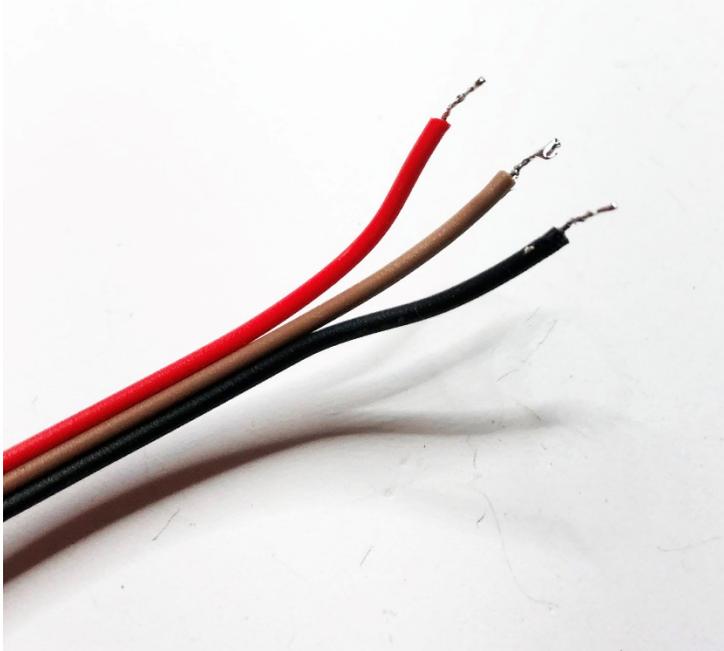
Install the 4 toggle switches onto the panel. The SPDT (ON-ON) switches are for the LFO/RAMP option and the SP3T (ON-OFF-ON) switches are for the 1-SHOT/CYCLE/HANG option.

Apply a very small amount of solder to the lugs of the switches.



Step 2

A 3-wire and 2-wire dupont connector are provided. Cut these wires in the middle to make four separate wires. Strip the ends of the wires and tin them with solder.



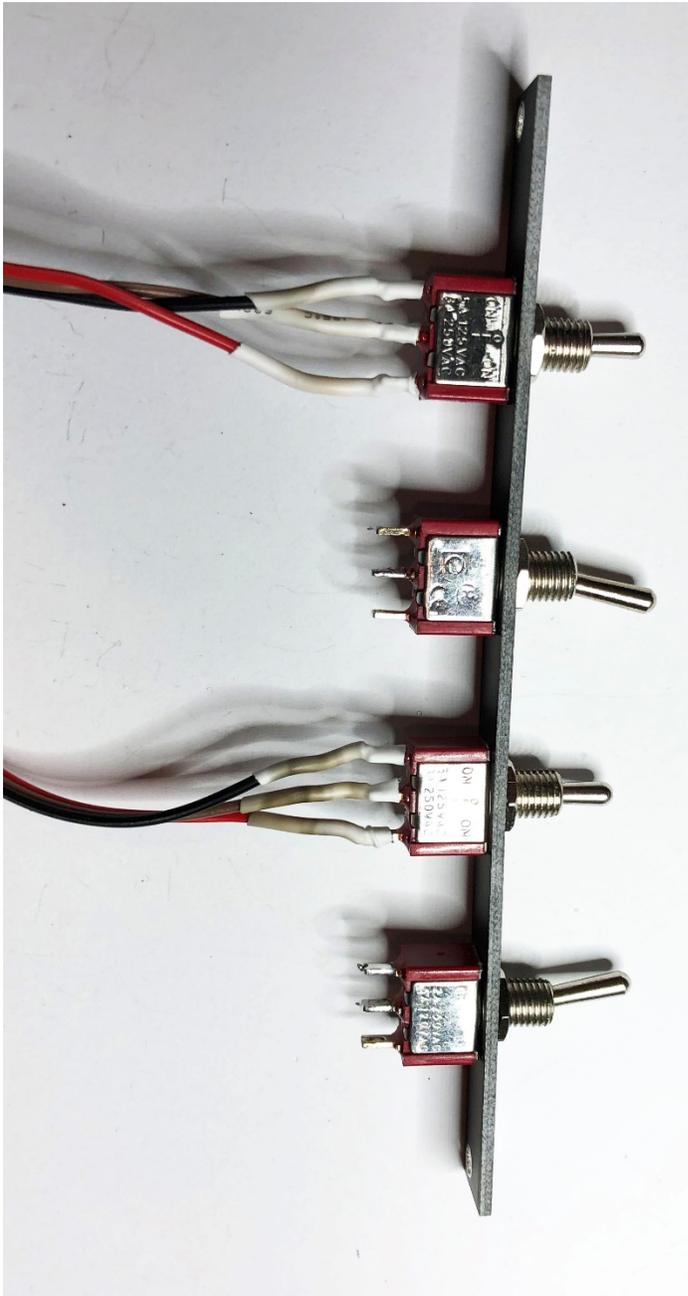
Step 3

Cut the heatshrink tubing into 10 pieces approx. 15-20mm in length each. Thread these over each wire once tinned, leaving approx. 10-20mm of wire exposed.

Step 4

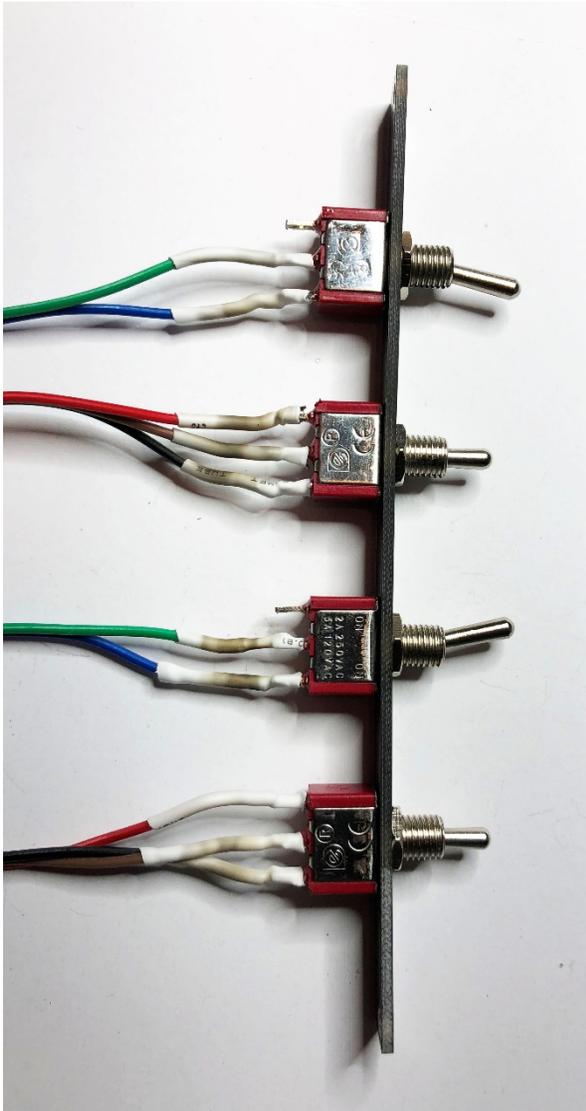
Solder the 3-wire pieces onto the ON-OFF-ON switches (1-Shot/Cycle/Hang). Make sure to use the same colour wires on the same lugs of each switch to make connection easier.

Once soldered, slide the heat-shrink tubing down over the lug. Use a cigarette lighter or heat gun to shrink the tubing into place and insulate the wire and lug.



Step 5

Repeat the same process for the 2-wire pieces, this time connecting them to the center and the bottom lug of the ON-ON switches (LFO/Ramp selector). Be sure to use the same colours on the same lugs to make connection easier.



Step 6

Finished!! For connection instructions please see the user guide!