Transmuter V1.5

BUILD GUIDE

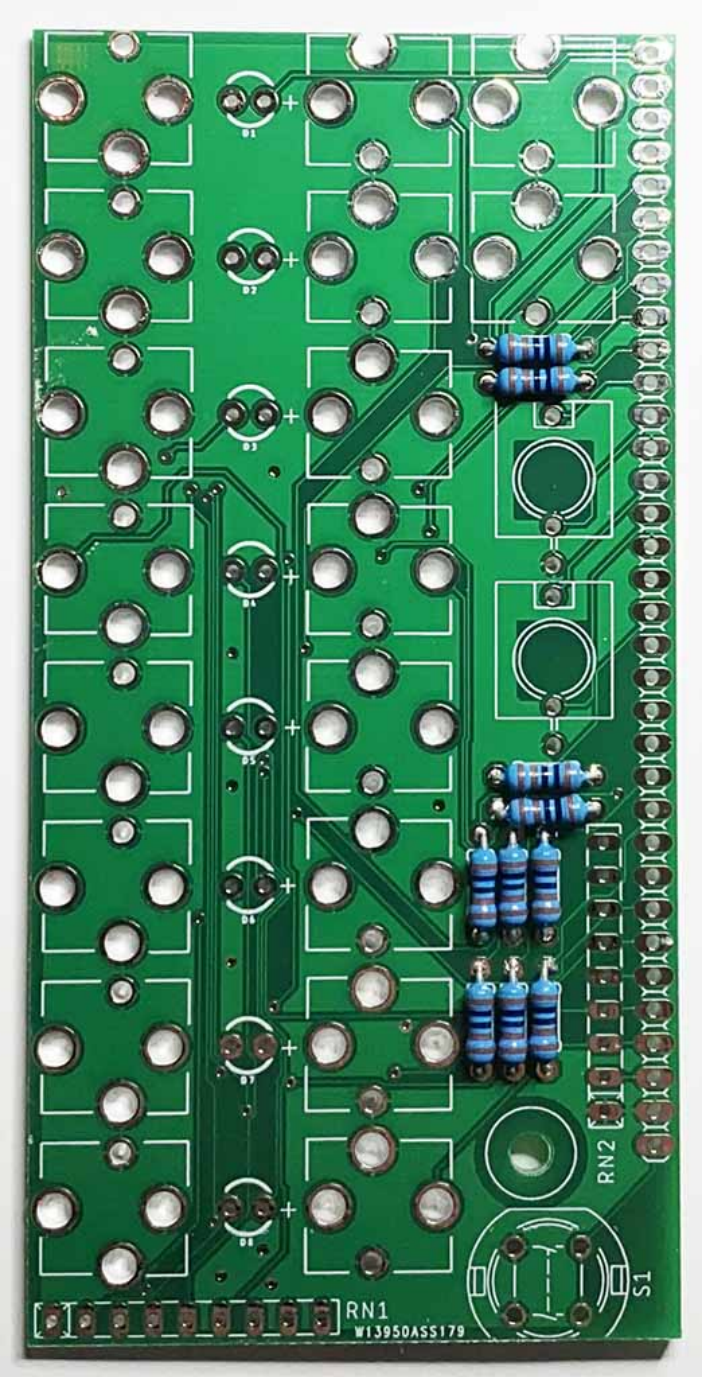
www.beast-tek.com

Transmuter IO Board BOM			
RN1	220R 9 pin 8 resistor network/array	9X-1-221LF	1
RN2	1M 9 pin 8 resistor network/array	9X-1-105LF	1
D1, D2 , D3, D4 , D5, D6, D7, D8	3MM Red LED		8
R1, R2, R3, R4, R5, R6, R7, R8, R23, R24	1K Ohm Resistor 1%	Brown-Black-Black-Brown-Brown	10
S1	DT-6 Bush Button Switch		1
JP1	34 Way Pin Header Single Row MALE		1
	PJ301BM "Erthenvar" 3.5mm Mono Jack		18
	Stereo Thonkiconn Jack		2

Transmuter Main (CPU) Board BOM			
IC1, IC2	74HC595		2
IC6	ATMEGA328P-PU		1
IC3, IC4, IC5, IC7	MCP602/MCP6022 High precision op-amp		4
IC8	MCP4802 Dual 8 bit DAC		1
IC9	TL072		1
IC10	7805 5v 1A Voltage Regulator		1
OK1	6N138 Optocoupler		1
Q1	20mhz Crystal		1
C22, C23	22pf Ceramic Capacitor	22	2
D1, D2	IN4004 Power Diode	IN4004	2
D9	1N4148 Signal Diode	1N4148	1
C1, C2, C3, C4, C5, C6, C7, C14, C15, C16, C17, C18, C24	100nf Blue Monolithic Capacitor	104	13
C20, C21	100uf Electrolytic Capacitor	100uf	2
R21, R25, R28, R29	220 Ohm Resistor 1%	Red-Red-Black-Black-Brown	4
R27	1K Ohm Resistor 1%	Brown-Black-Black-Brown-Brown	1
R26	4.7K Ohm Resistor 1%	Yellow-Violet-Black-Brown-Brown	1
R20	10K Ohm Resistor 1%	Brown-Black-Black-Red-Brown	1
R17, R18	22K Ohm Resistor 1%	Red-Red-Black-Red-Brown	2
R19, R22	100K Ohm Resistor 1%	Brown-Black-Black-Orange-Brown	2
LED1	3MM Led		1
JP1	34 Way Pin Header Single Row FEMALE		1
ICSP	ICSP - do not populate		
POWER	Shrouded 10pin (2x5) IDC Header (Eurorack Power)		1
MIDIIN, MIDIOUT	3 Way Pin Header DUAL Row MALE		2

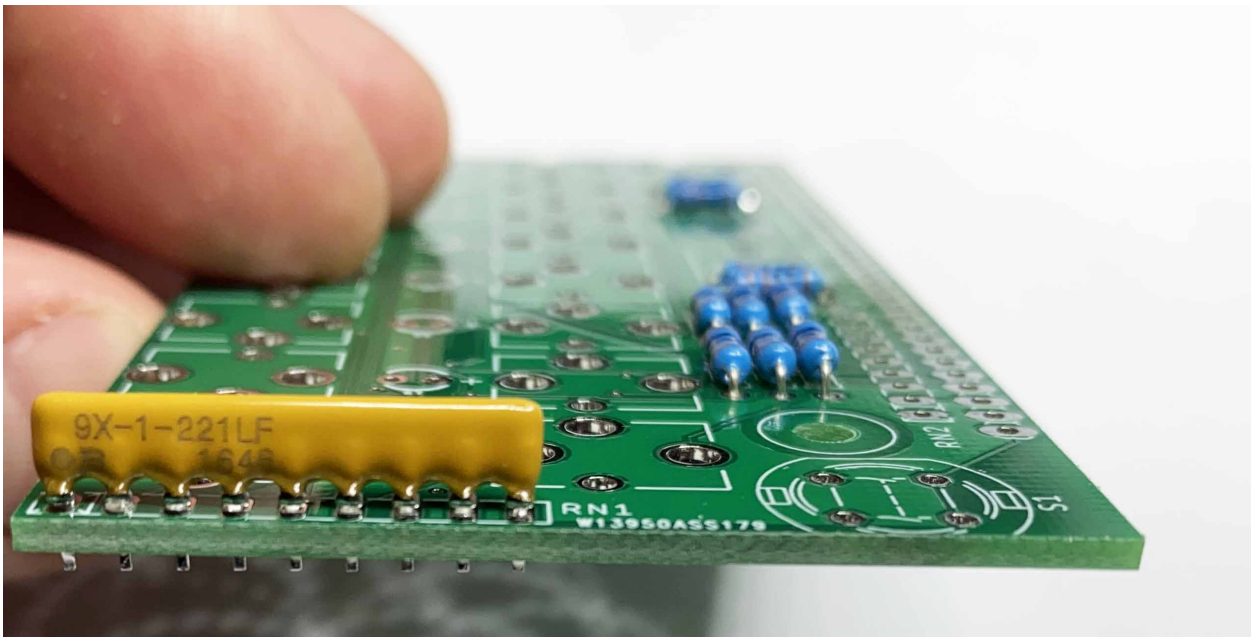
IO Board – Step 1

Install and solder the ten 1K resistors R1, R2, R3, R4, R5, R6, R7, R8, R23, R24



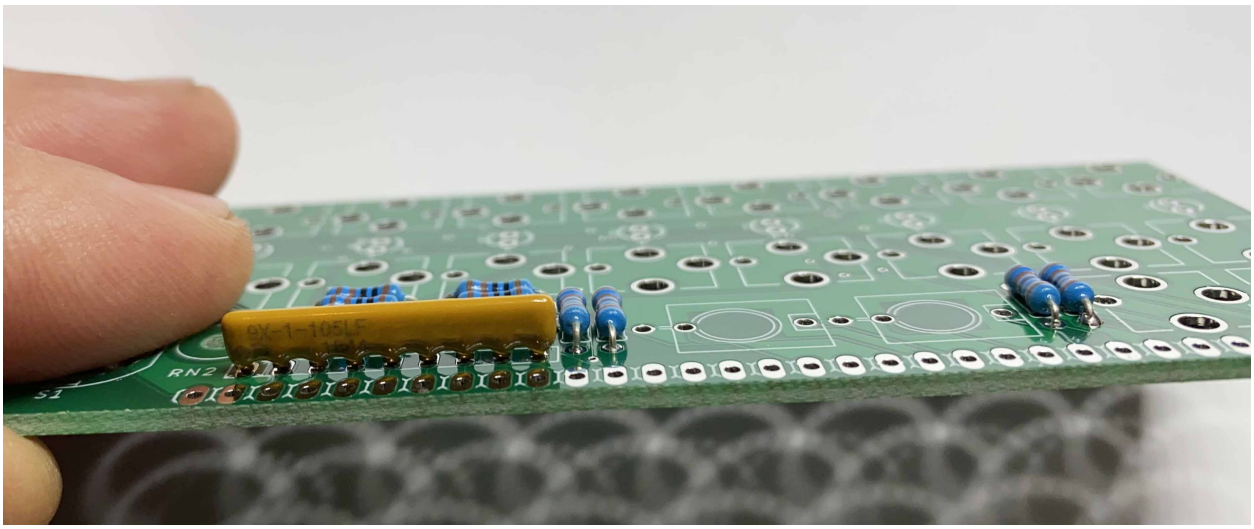
IO Board – Step 2

Install and solder 220R resistor network RN1. Note the orientation matters, there is a dot marking pin 1 as per the photo below. 220R is marked as “221”.



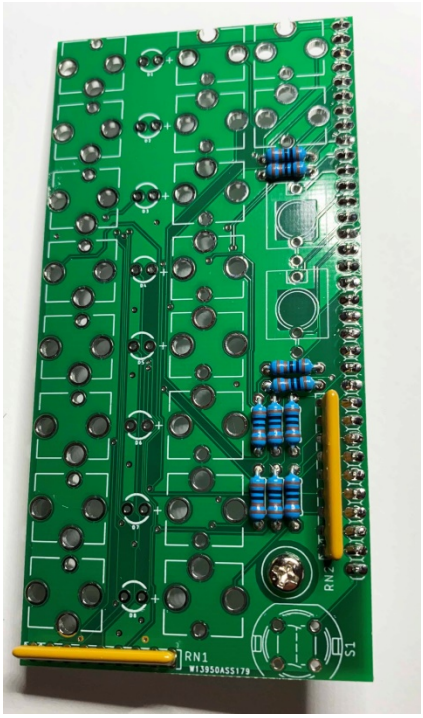
IO Board – Step 3

Install and solder 1M resistor network RN2. Note the orientation matters, there is a dot marking pin 1 as per the photo below. 1M is marked as “105”.



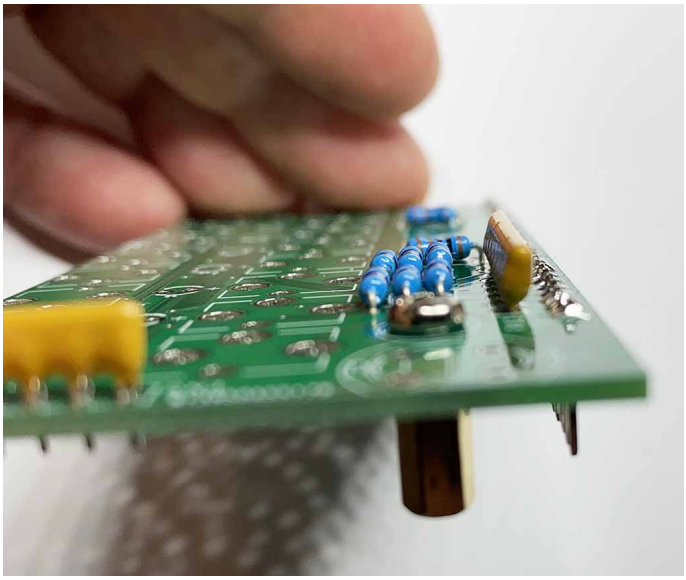
IO Board – Step 4

Cut the male pin header strip to size and install and solder into place. Solder one pin first so it can be easily reheated and adjusted so that it is sitting at a right angle. When its sitting neatly at a right angle, solder the remaining pins.



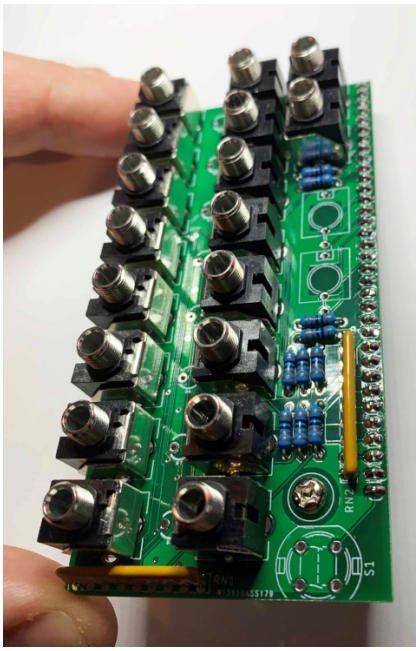
IO Board – Step 5

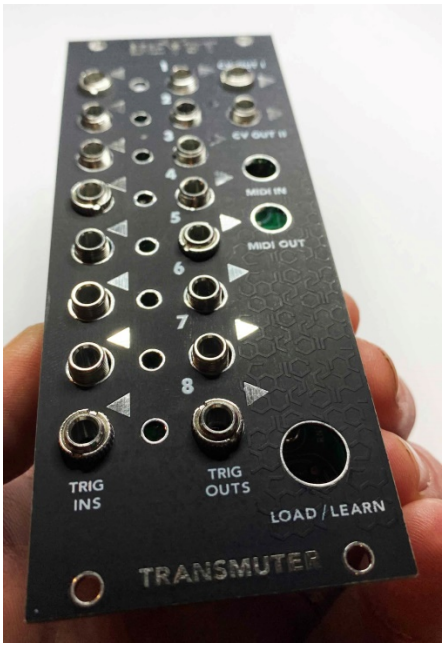
Next install the brass standoff using an M3 6mm screw.



IO Board – Step 6

Seat the eighteen MONO PJ301BM jacks (DO NOT SOLDER) then carefully slide the panel over the jacks. Carefully place 6 jack nuts at various locations to help stop it falling apart. Use a book, a piece of stiff cardboard or timber on top and carefully flip over. Solder ONE pine of each jack to secure them in place. Flip back over and remove the jack nuts and panel.

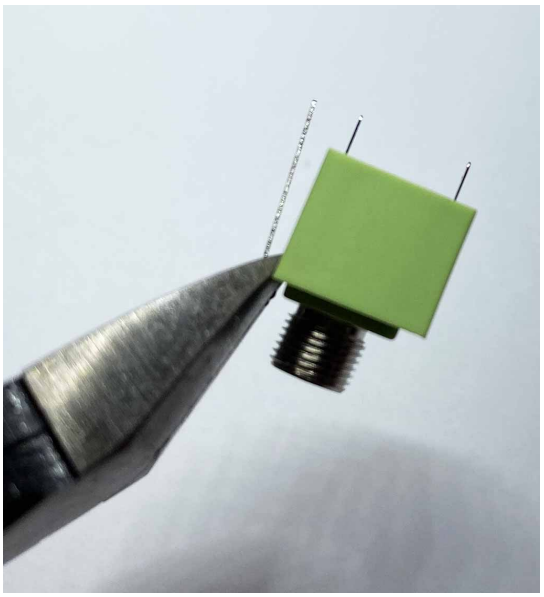


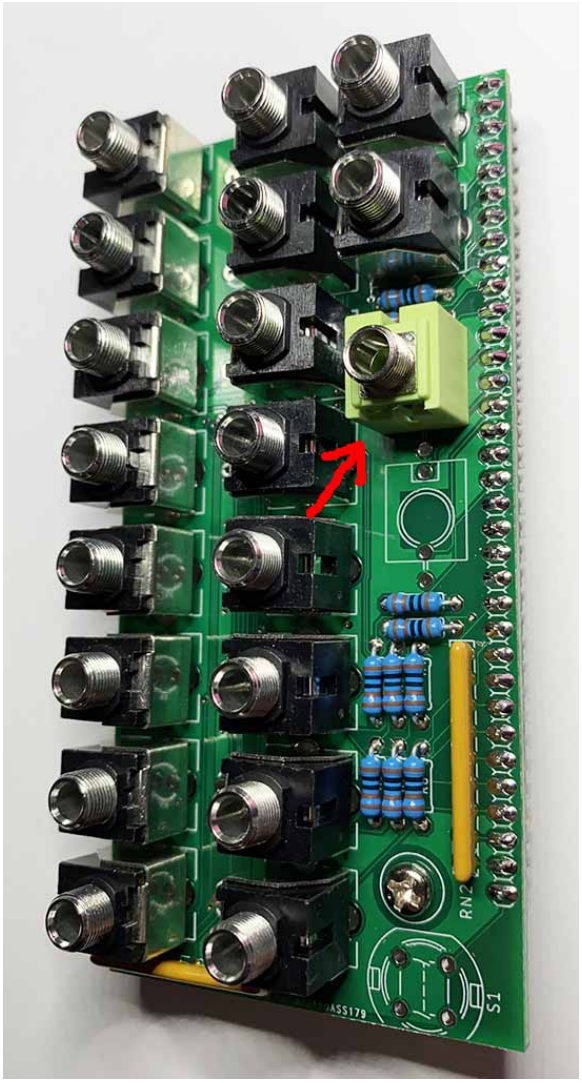


IO Board – Step 7

Cut the ground pin from **one** of the stereo thoniconn jacks – leave a small stub of the pin remaining so that it's possible to tell which side is the ground. This is required because MIDI IN should not be connected to ground to avoid ground loops. Seat the jack with the snipped ground pin oriented as per the red arrow below.

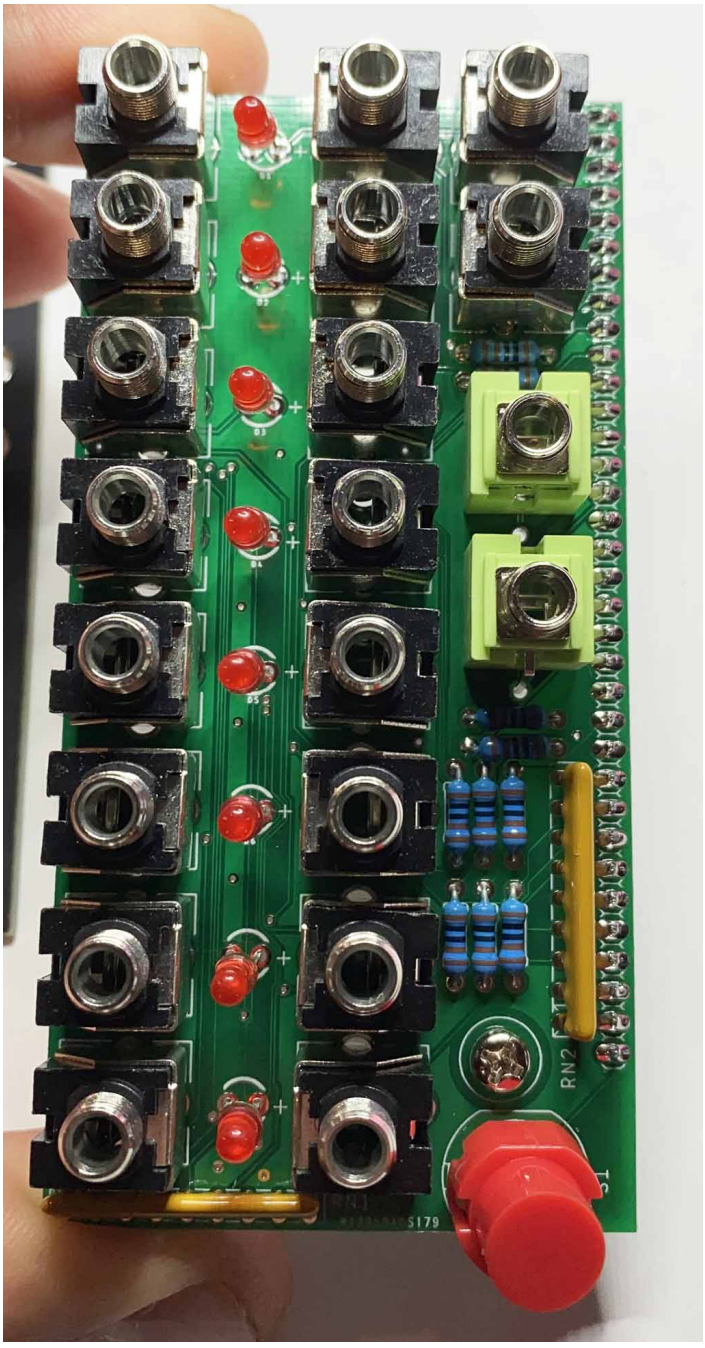
ONLY CUT THE GROUD PIN FROM ONE JACK !!! Its required on the second jack!!!





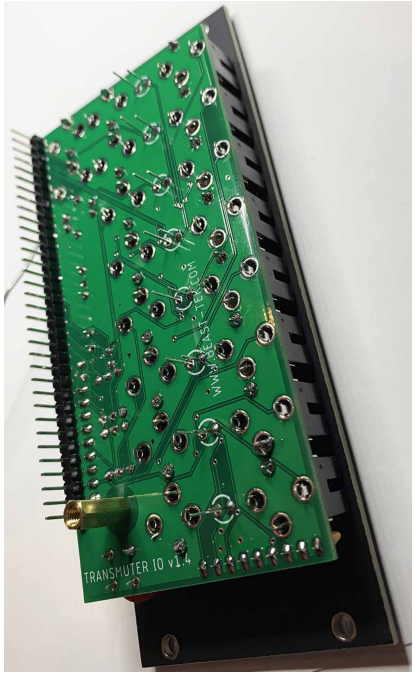
IO Board – Step 8

Seat the remaining stereo thoniconn jack with the ground pin in its place along with the red leds and the push button switch – paying close attention to the orientation marked on the PCB. Don't solder them just yet!



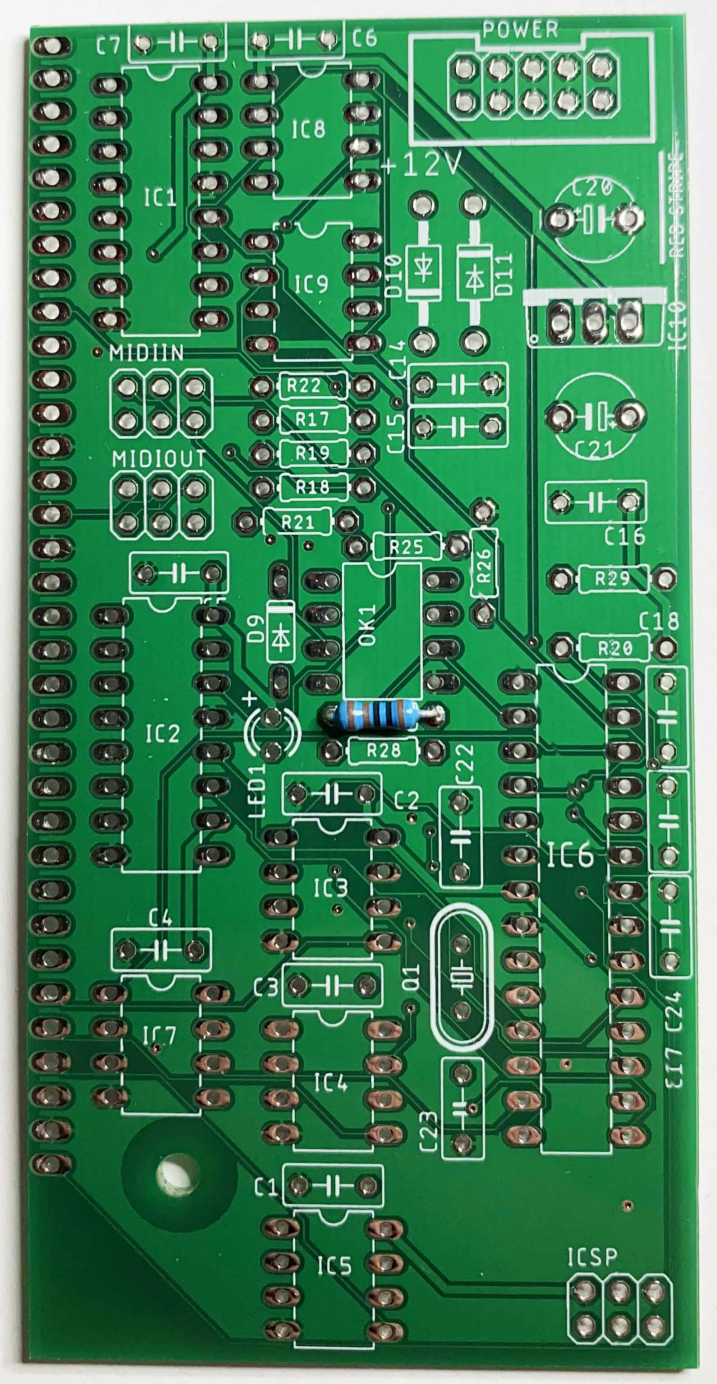
IO Board – Step 9

Carefully slide the panel over the components and again finger tighten about 6 or 7 washers. Flip the panel over and make sure the LEDs are pushed through the panel all the way. Make sure everything is seated nicely then solder one pin of the thonkiconn jacks, LEDs. You may need to push the push button switch back up so that its flush with the PCB – if it keeps falling out you can use a piece of sticky tape or blu-tack etc to hold it in place. Once one pin of each component is soldered to hold it in place, flip the panel over and finger tighten the remaining nuts. Make sure everything is seated nicely and when you are happy, solder the remaining joints then tighten the jack nuts with an appropriate tool.



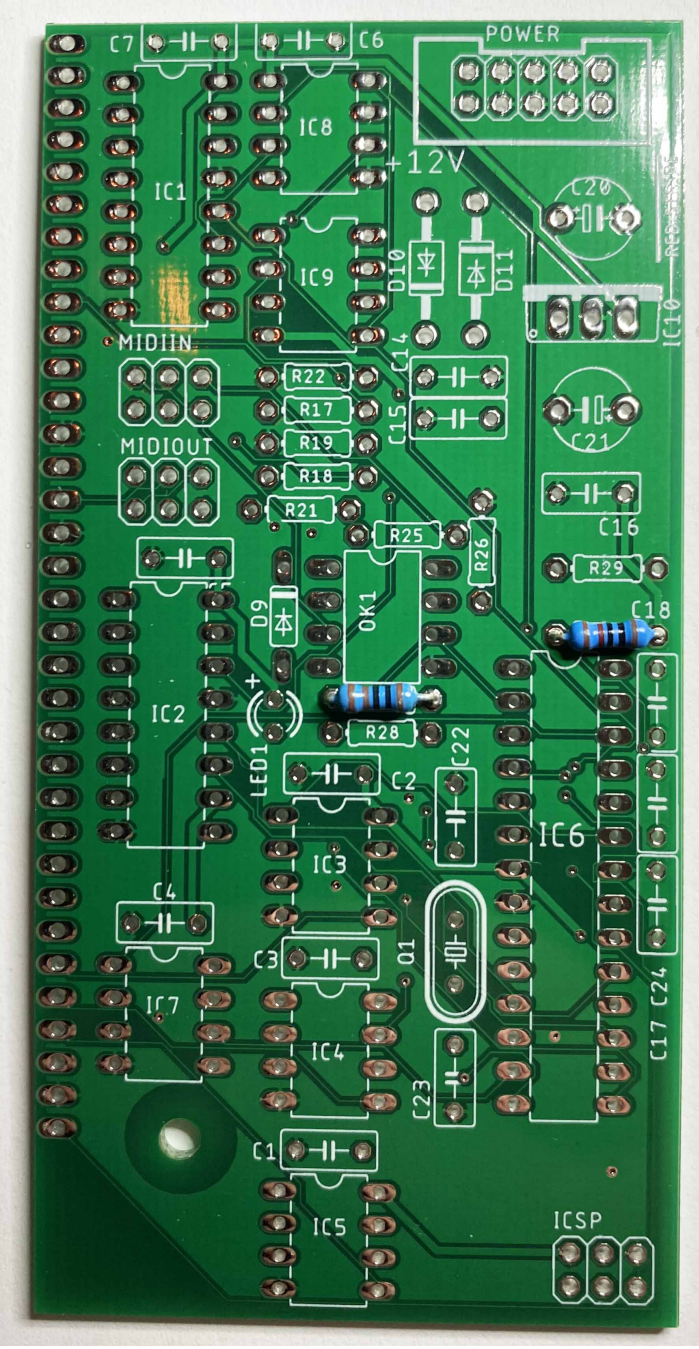
Main Board – Step 1

Install and solder the one 1K resistor R27.



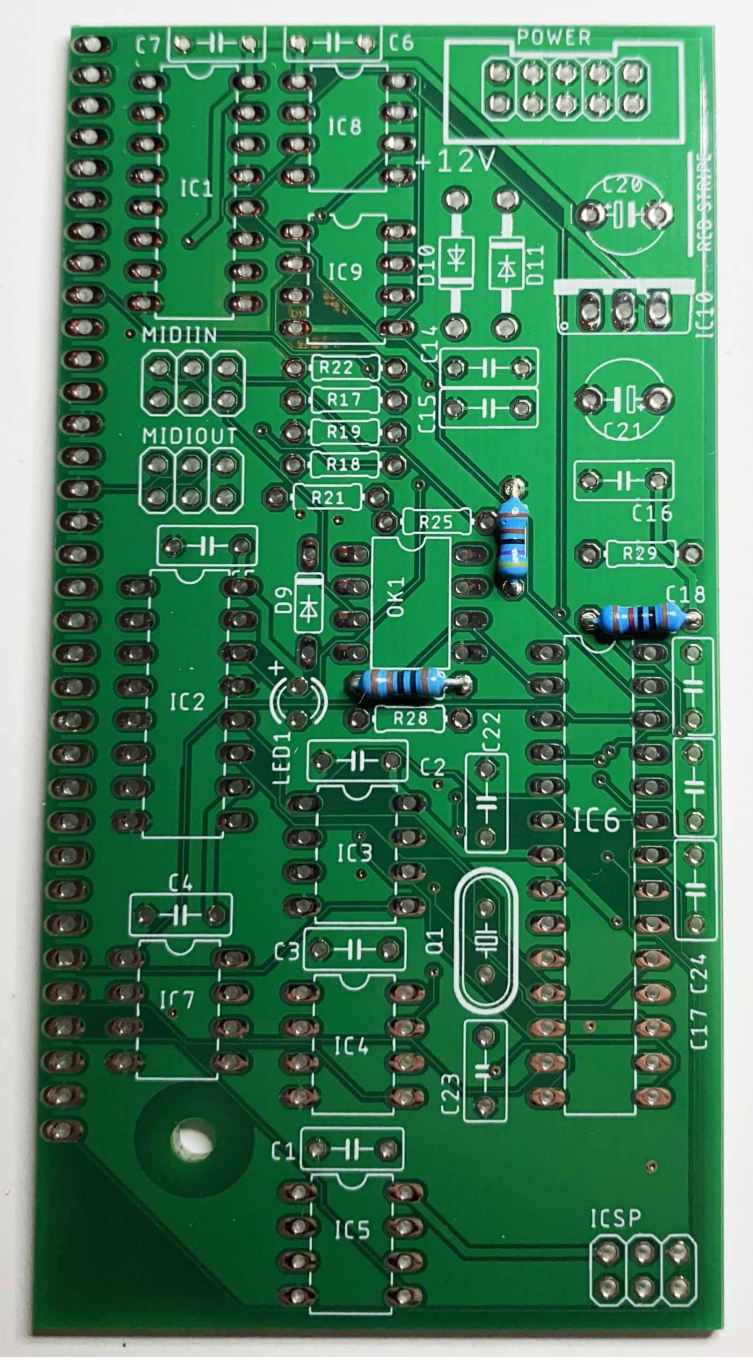
Main Board – Step 2

Install and solder the one 10K resistor R20.



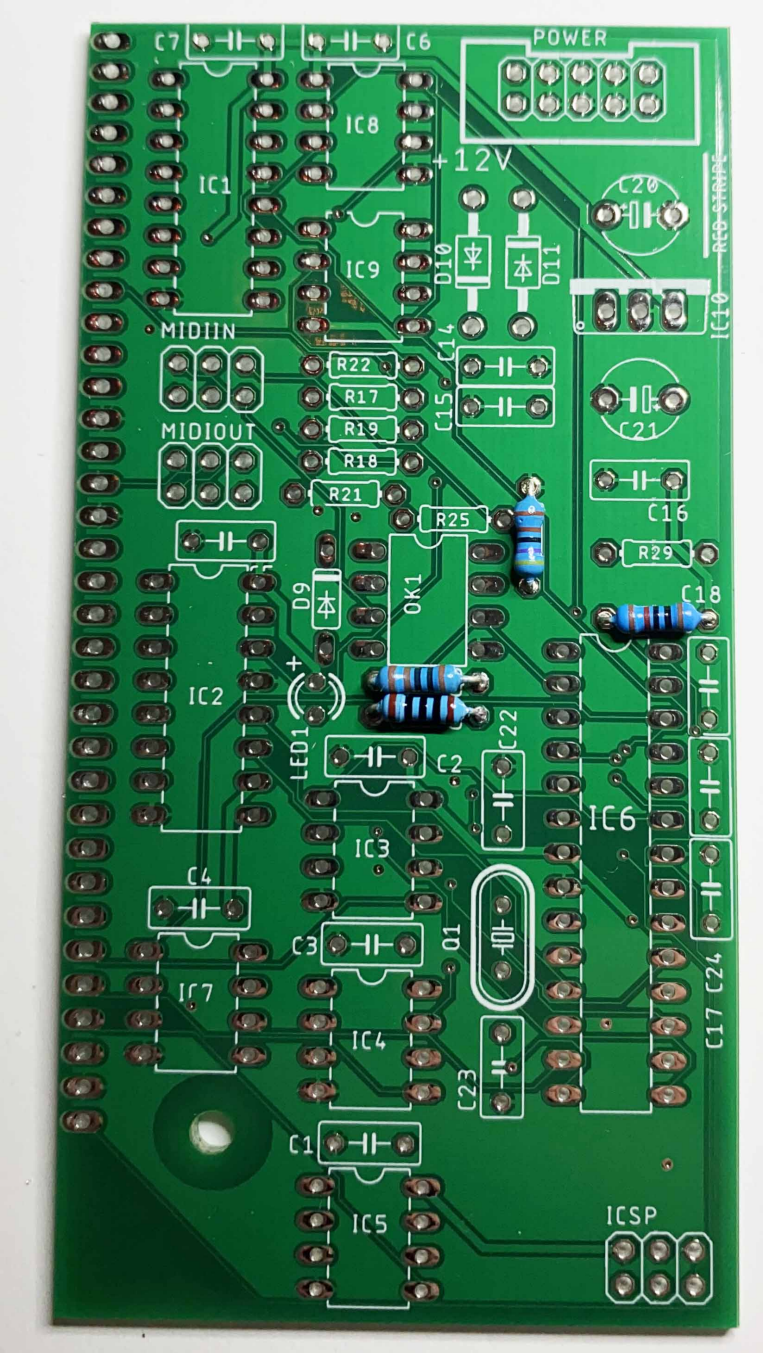
Main Board – Step 3

Install and solder the one 4.7K resistor R26.



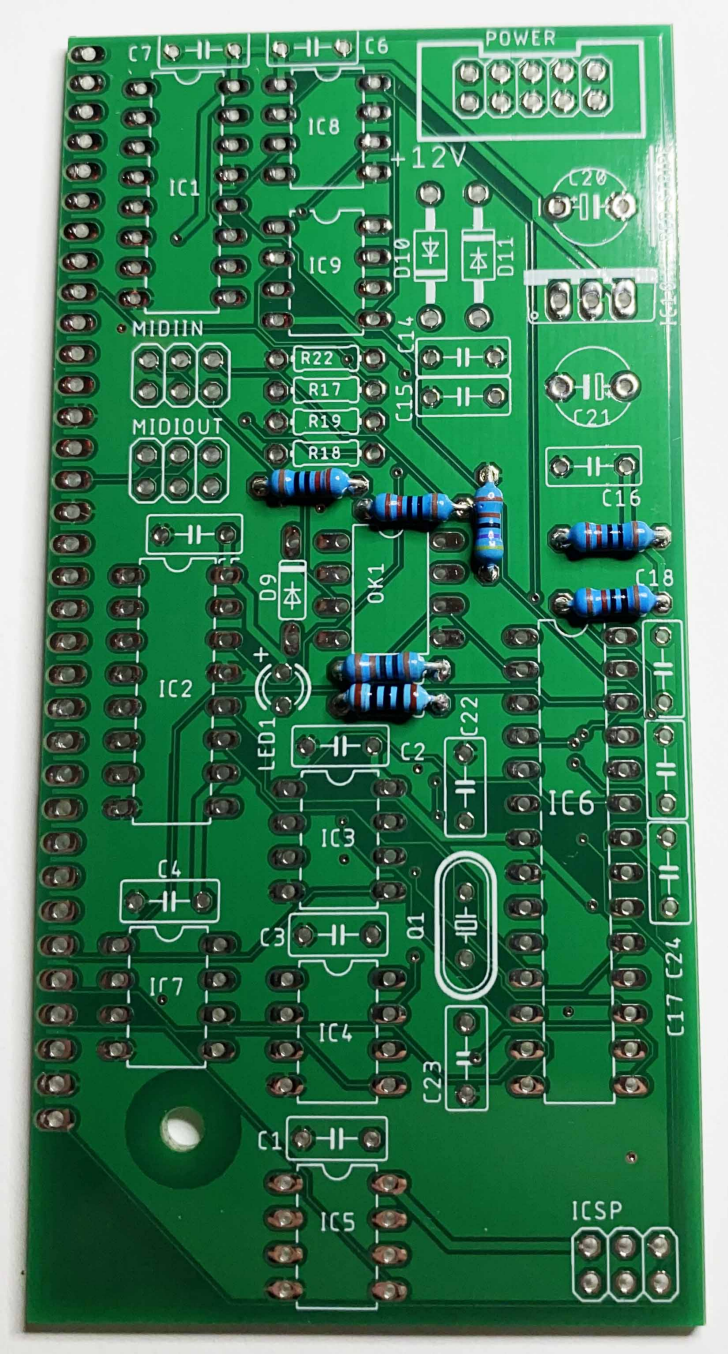
Main Board – Step 4

Install and solder the one 100R resistor R28.



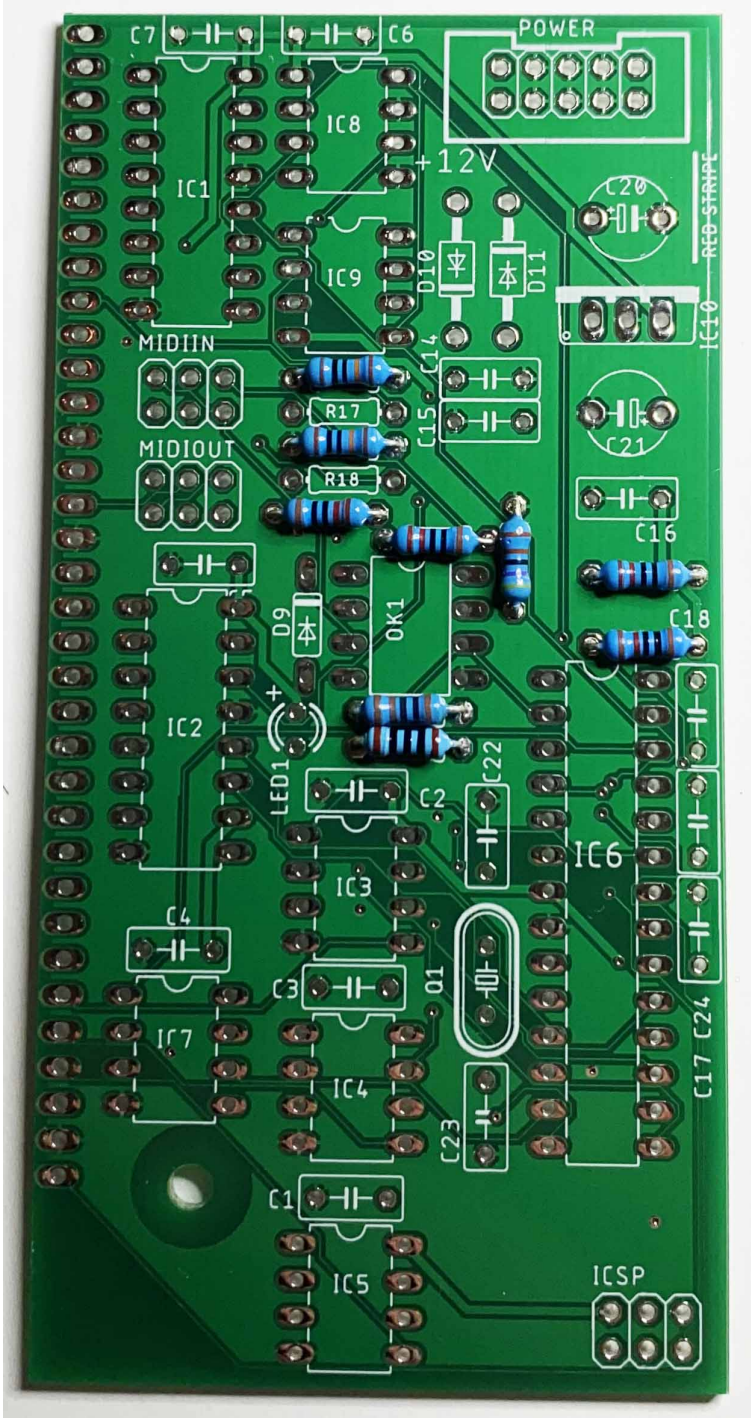
Main Board – Step 5

Install and solder the three 220R resistors R21, R25, R29.



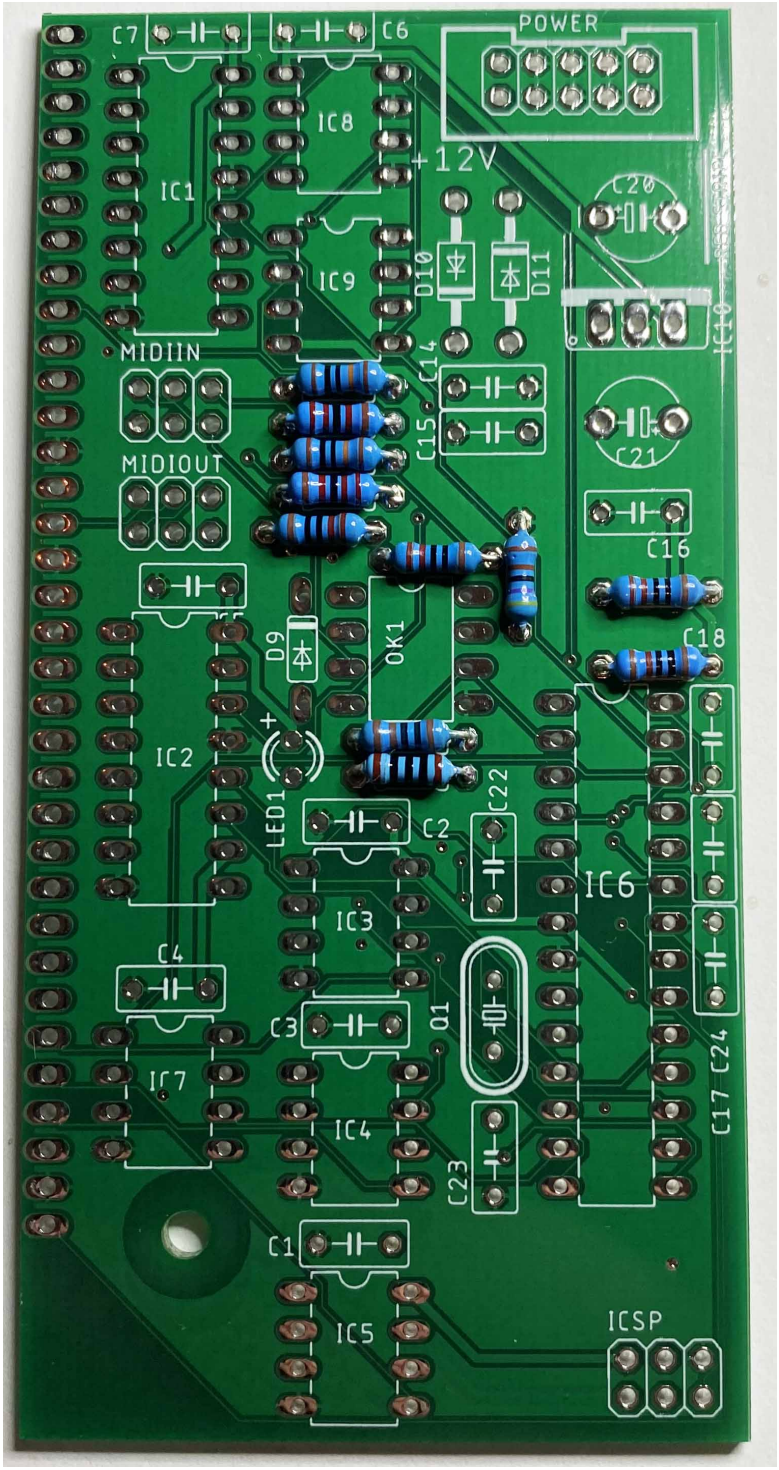
Main Board – Step 6

Install and solder the two 100K resistors R19 and R22.



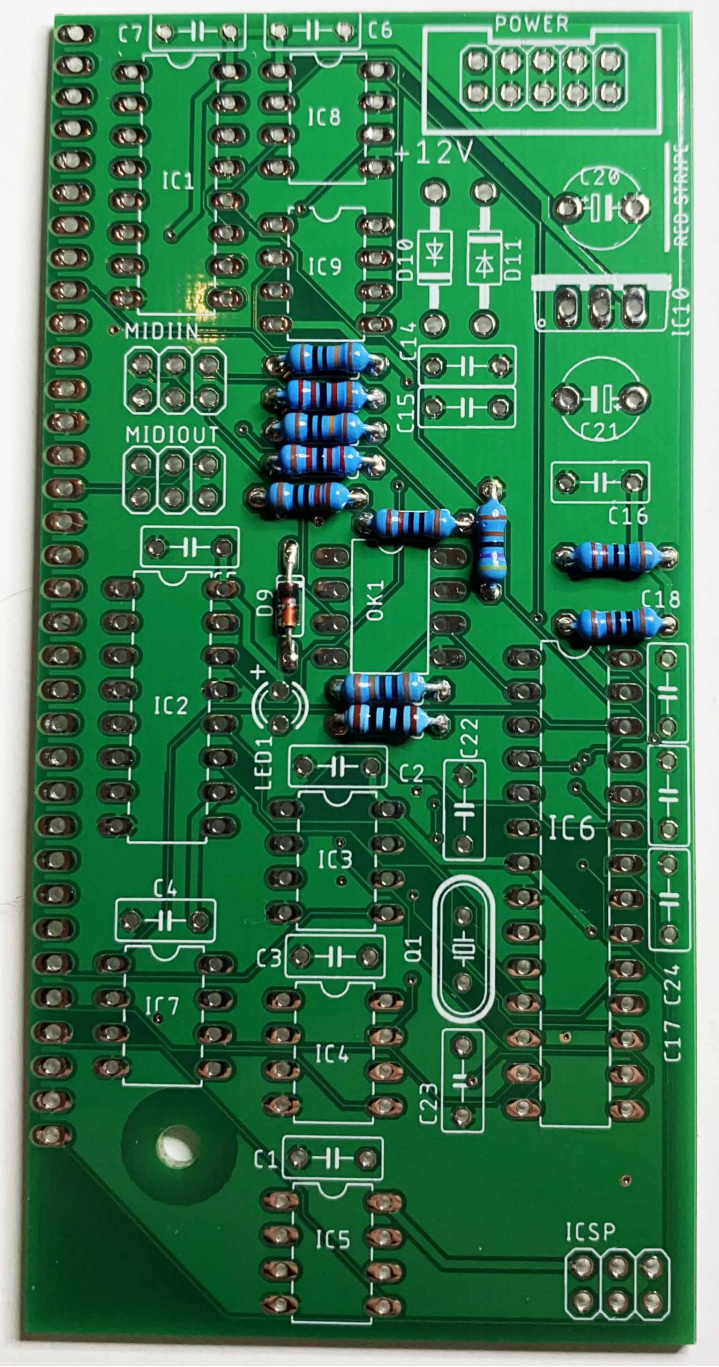
Main Board – Step 7

Install and solder the two 22K resistors R17 and R18.



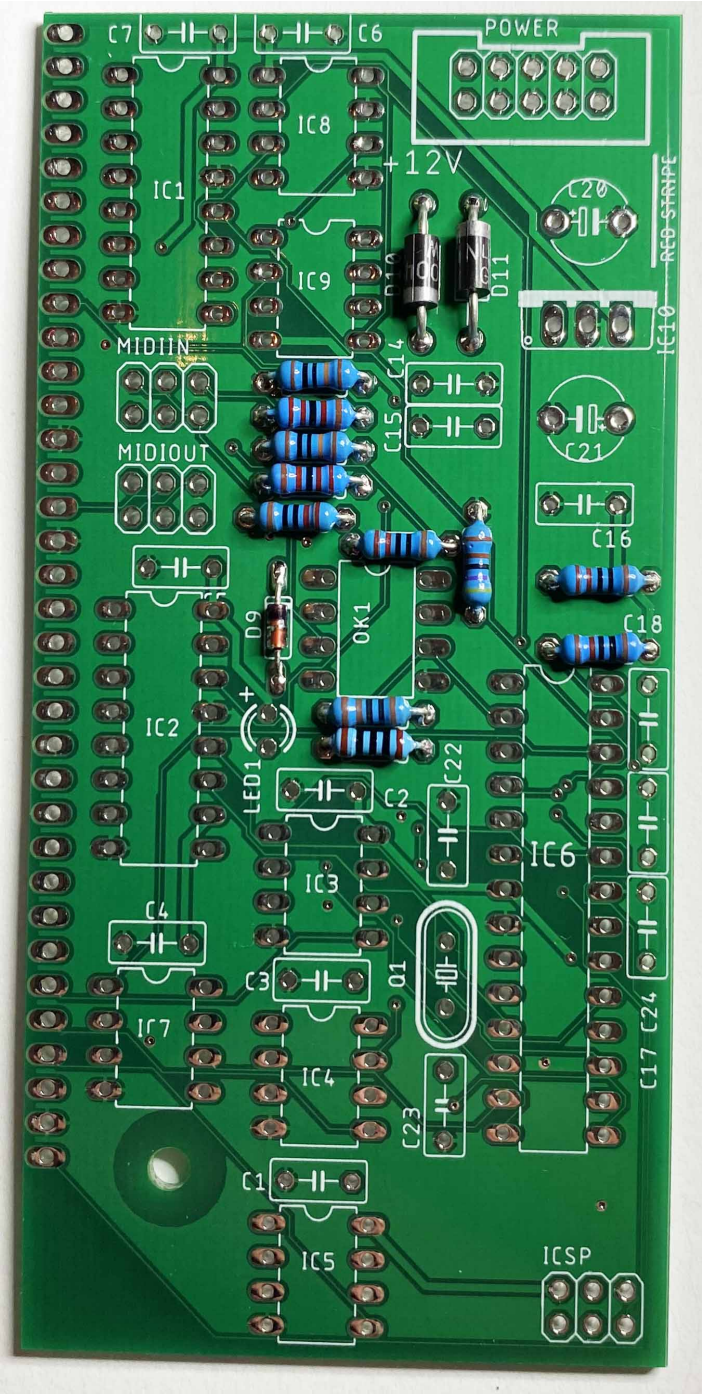
Main Board – Step 8

Install and solder the 1N4148 diode D9 making sure the band/stripe matches the orientation on the PCB silkscreen.



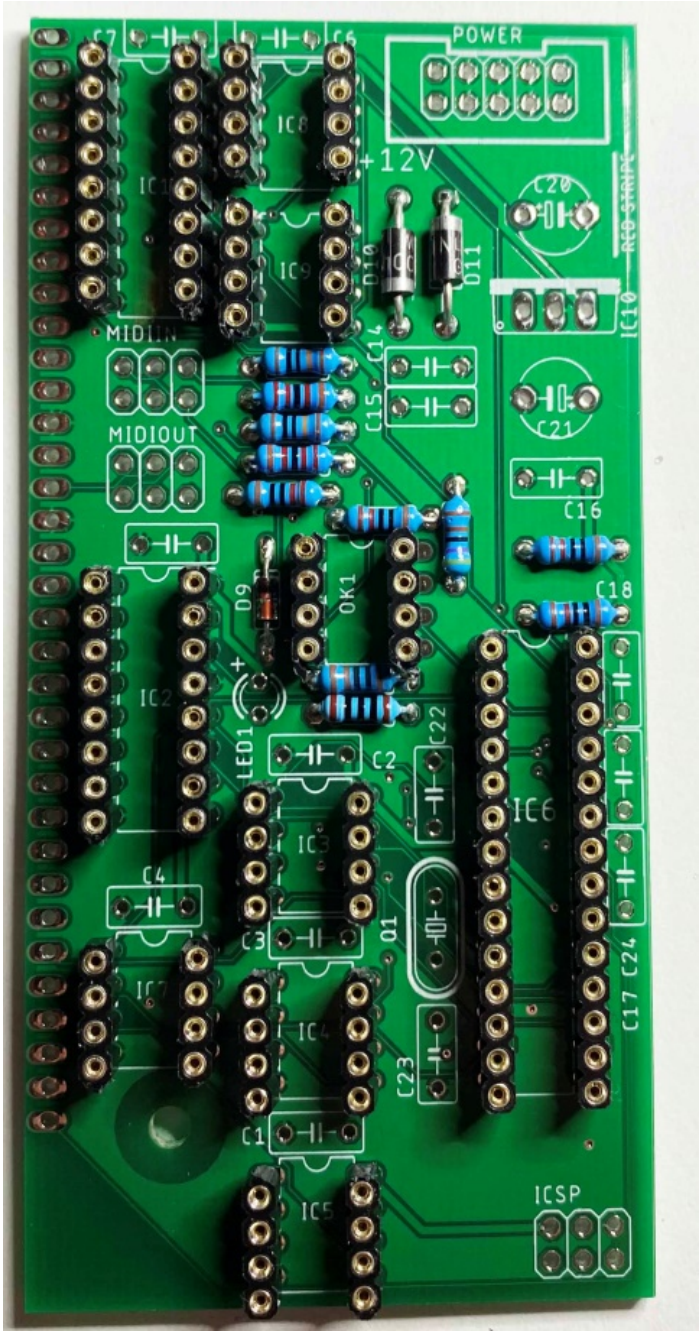
Main Board – Step 9

Install and solder the two 1N4004 power diodes D10 and D11 making sure the band/stripe matches the orientation on the PCB silkscreen.



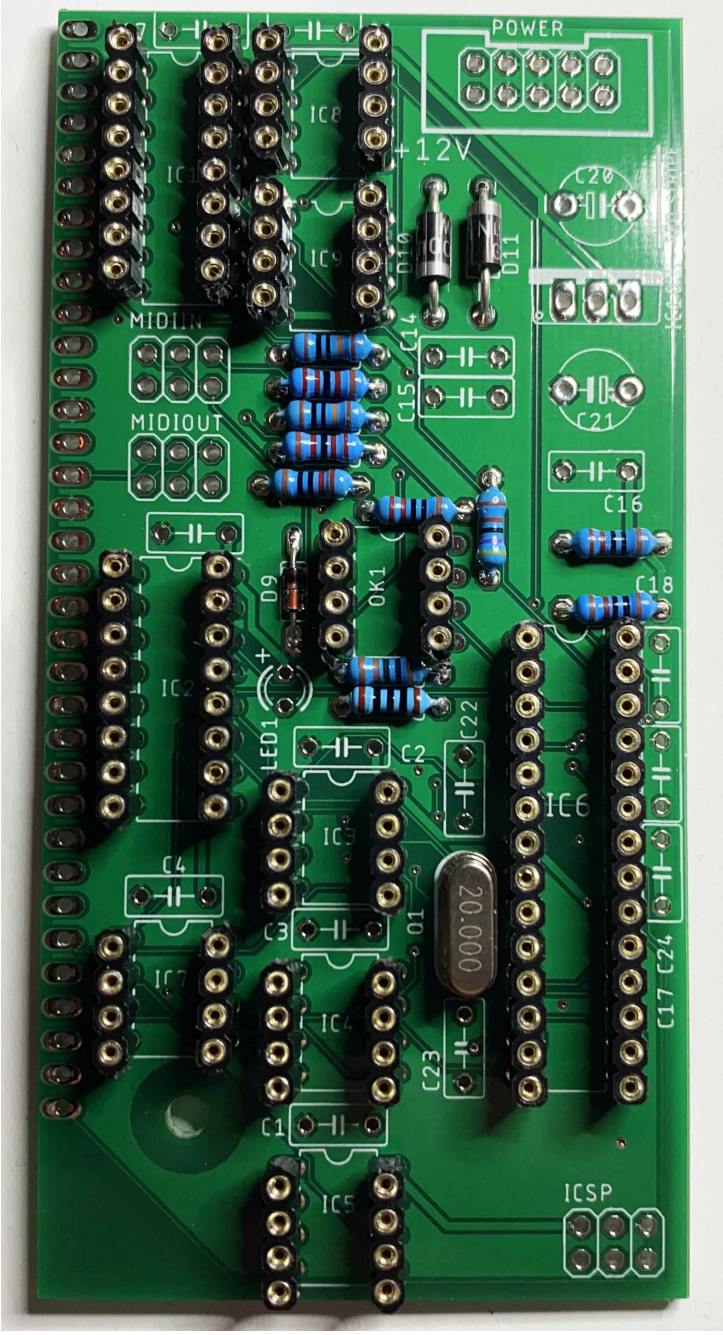
Main Board – Step 10

Cut the machine pin socket strips to the appropriate sizes. Install and solder in place. Use a book or firm piece of cardboard to hold the sockets in place while flipping over to solder.



Main Board – Step 11

Install and solder the 20mhz crystal Q1.

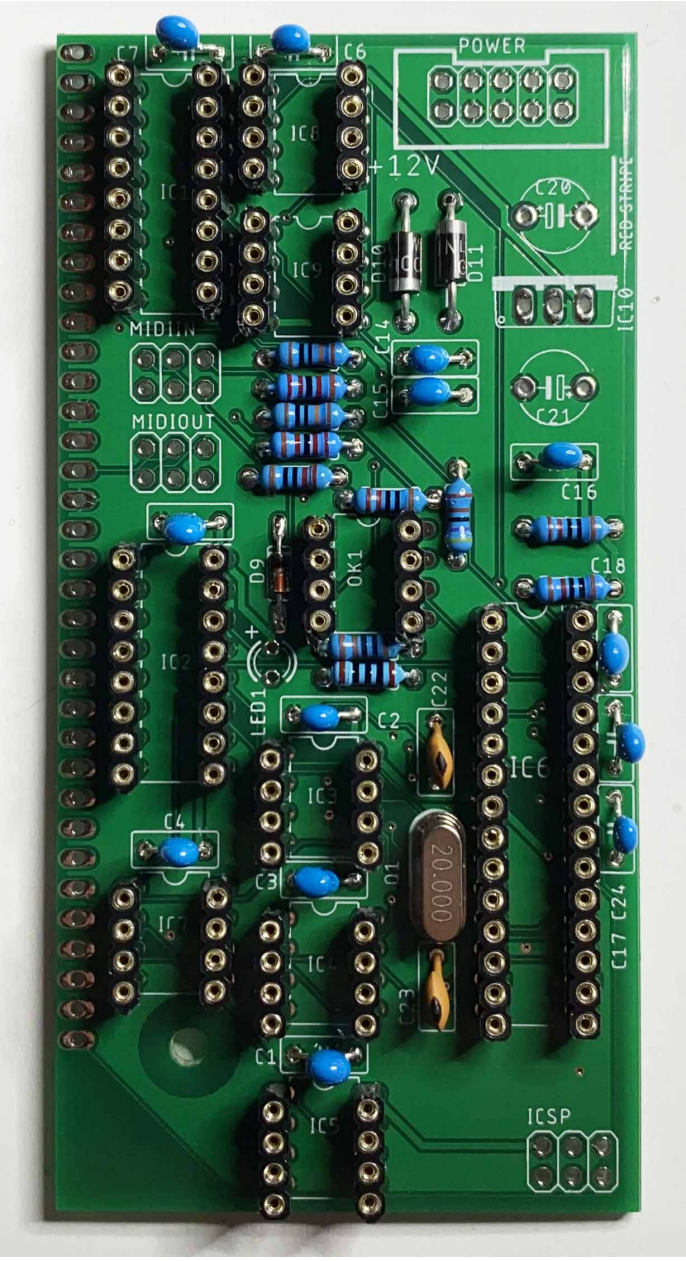


Main Board – Step 12

Install and solder the two 22pf capacitors C22 and C23.

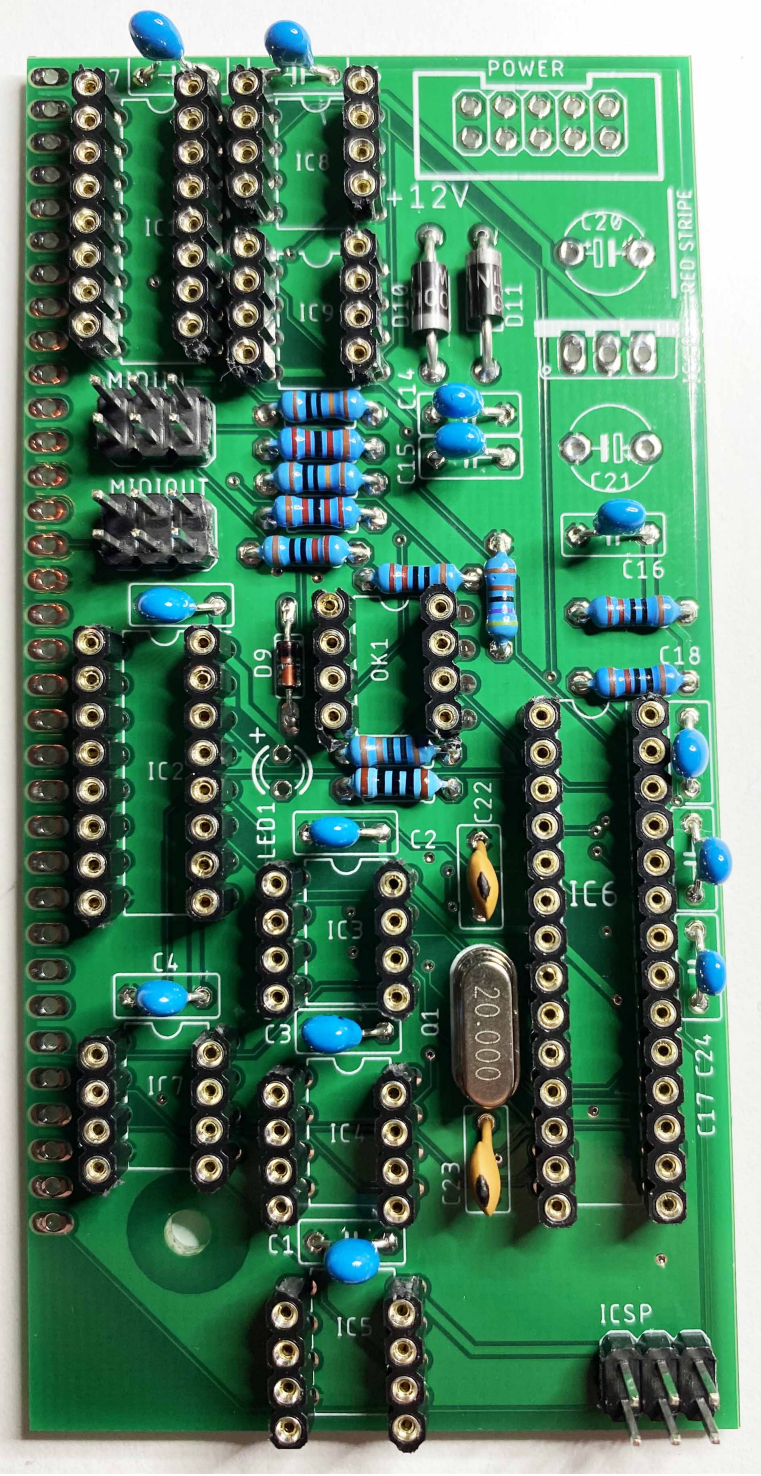
Main Board – Step 13

Install and solder the thirteen 100nf capacitors C1, C2, C3, C4, C5, C6, C7, C14, C15, C16, C17, C18, C24.



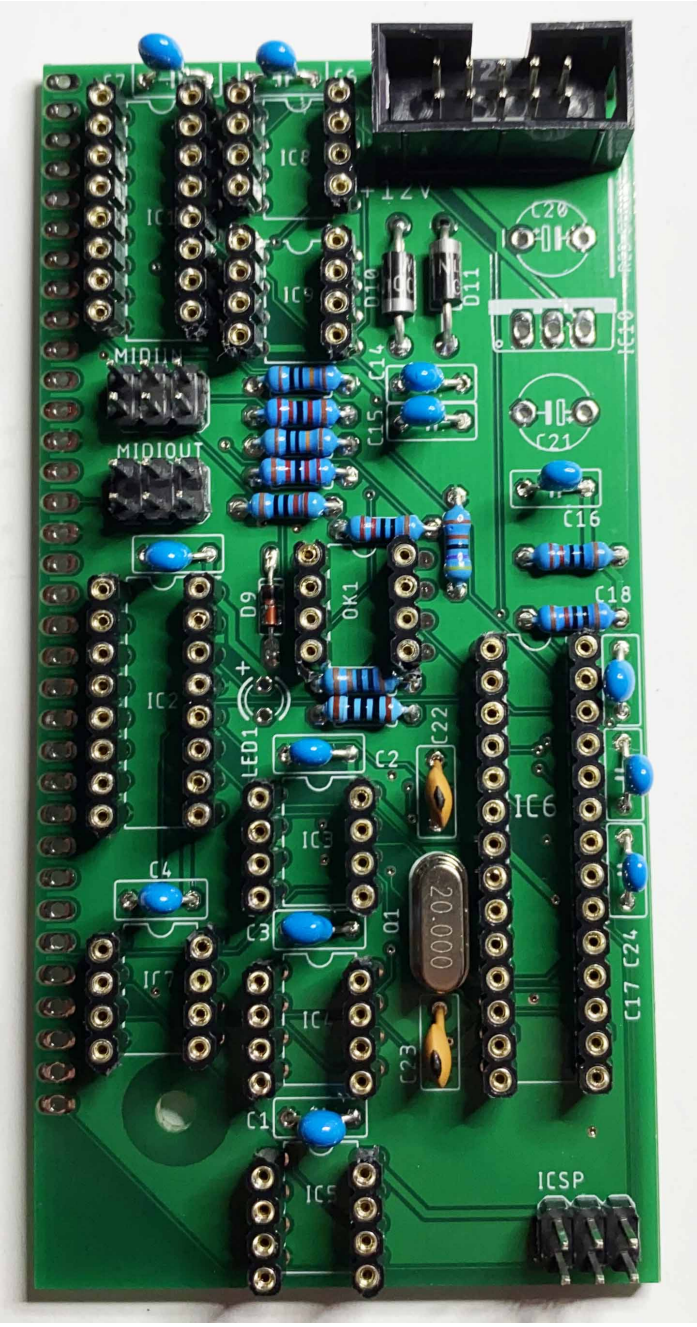
Main Board – Step 14

Cut three pieces of 2x3 male pin headers and install and solder into ICSP, MIDIIN and MIDIOUT.



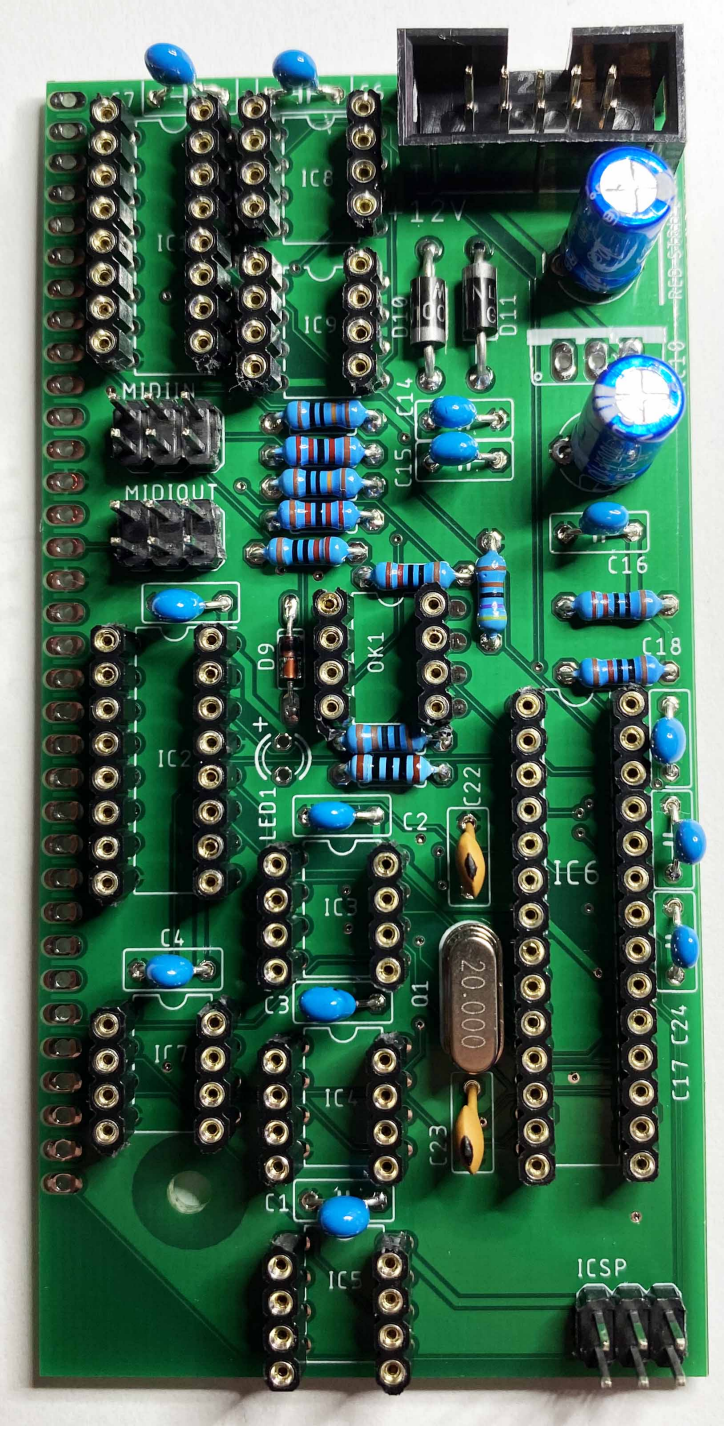
Main Board – Step 15

Install and solder the 2 x 5 pin shrouded IDC power header, paying attention to the location of the notch/"key".



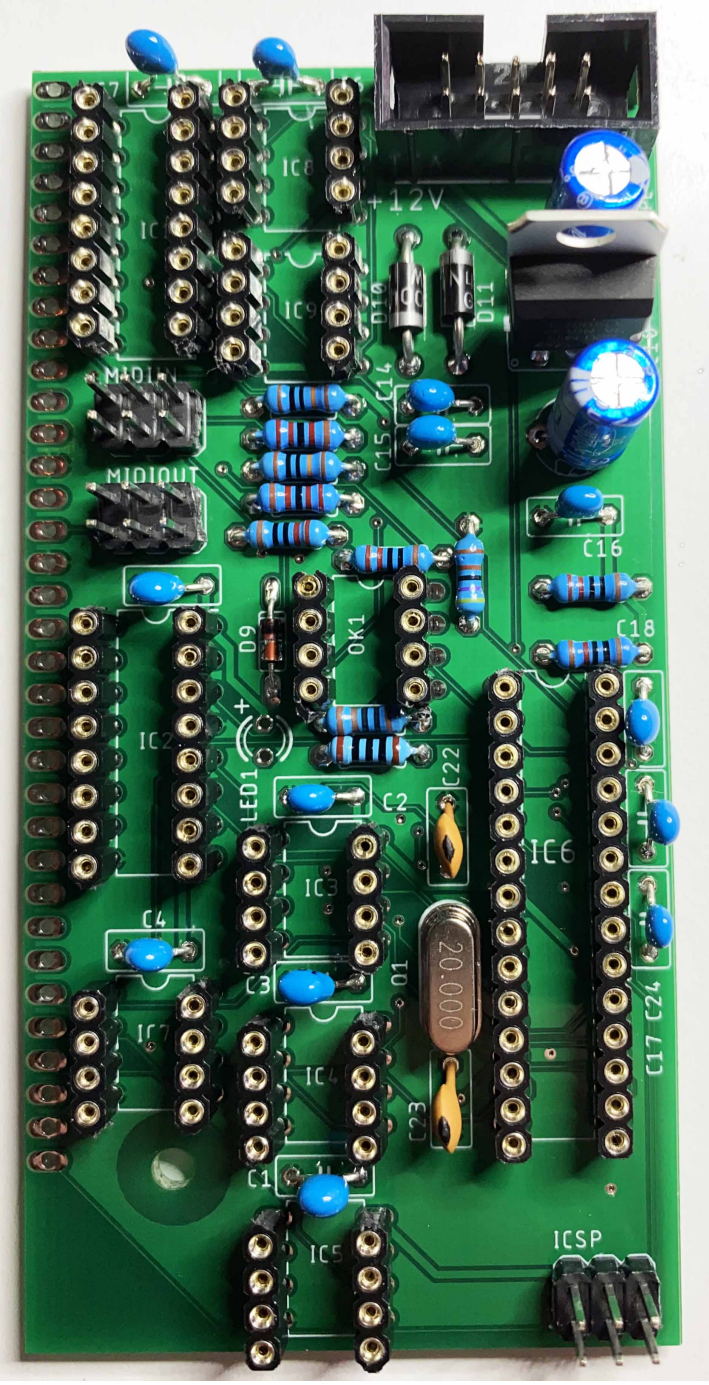
Main Board – Step 16

Install and solder the two 100uf capacitors C21 and C28.



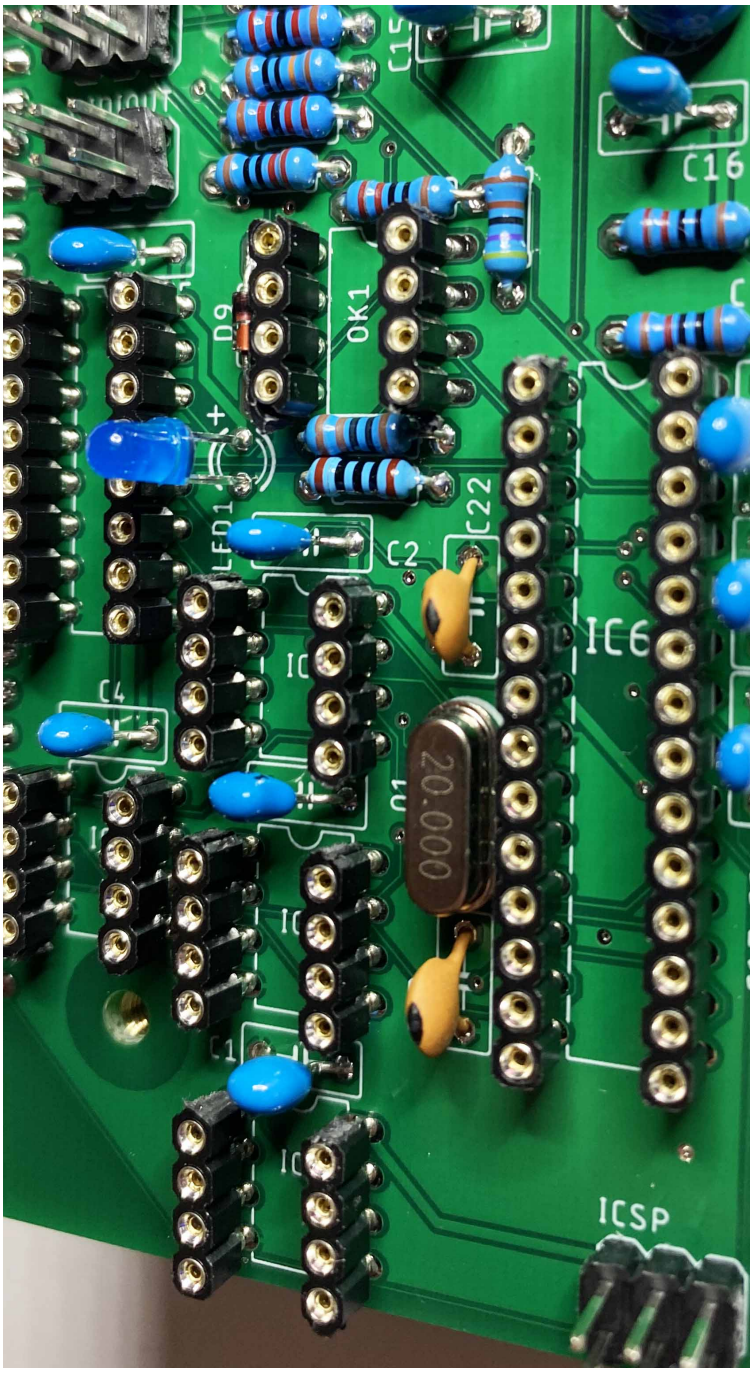
Main Board – Step 17

Install and solder the one 7805 voltage regulator into IC10.



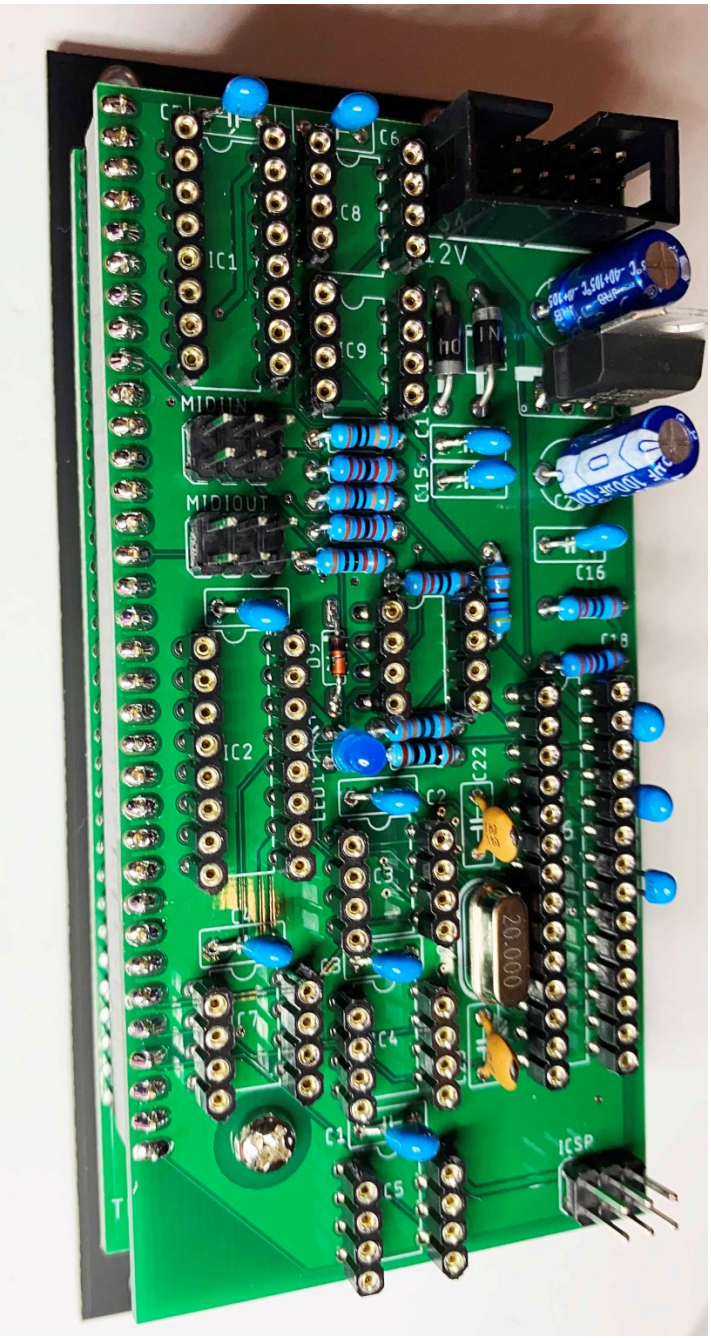
Main Board – Step 18

Install and solder LED1 paying attention to the + symbol on the PCB which is the long pin of the led.



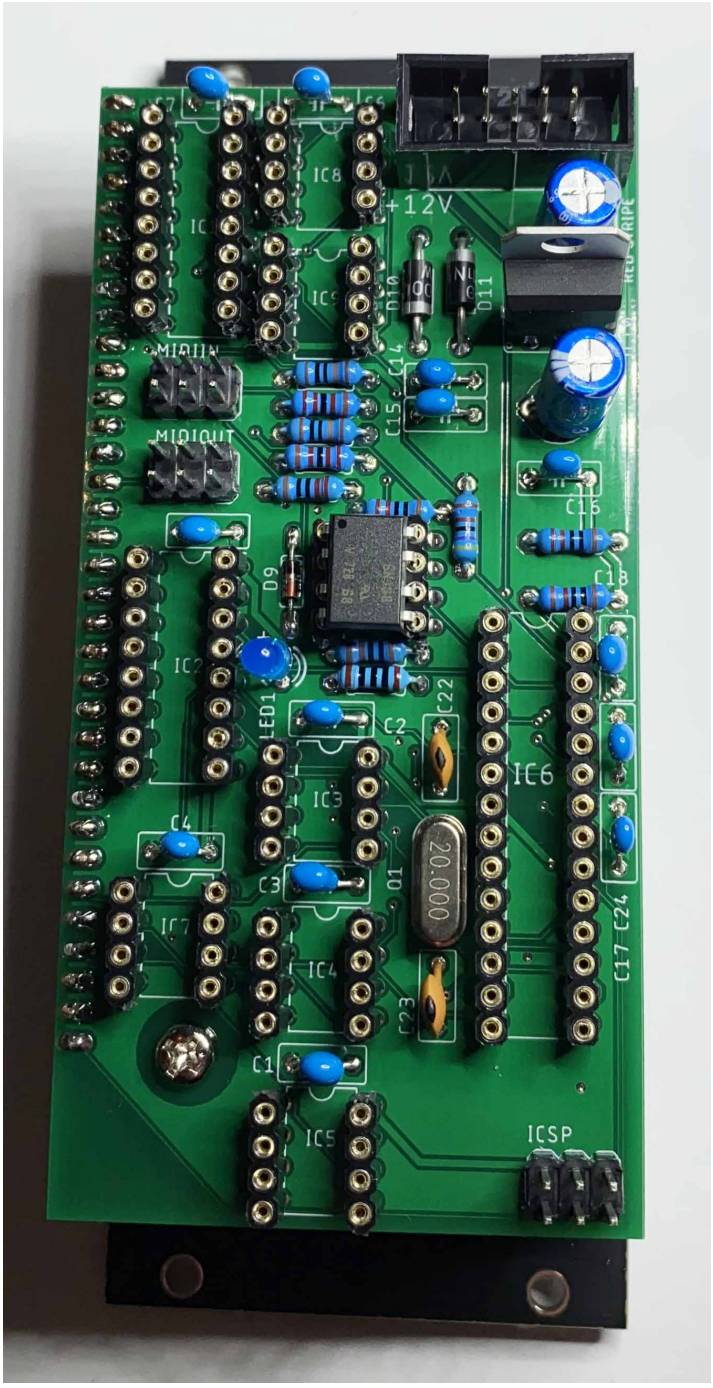
Main Board – Step 19

Cut the female pin header to size then install and solder into place. To make cutting easier a pin can be pulled out of the header at the location of the cut using pliers (prior to cutting) leaving an empty socket which can be cut cleanly.



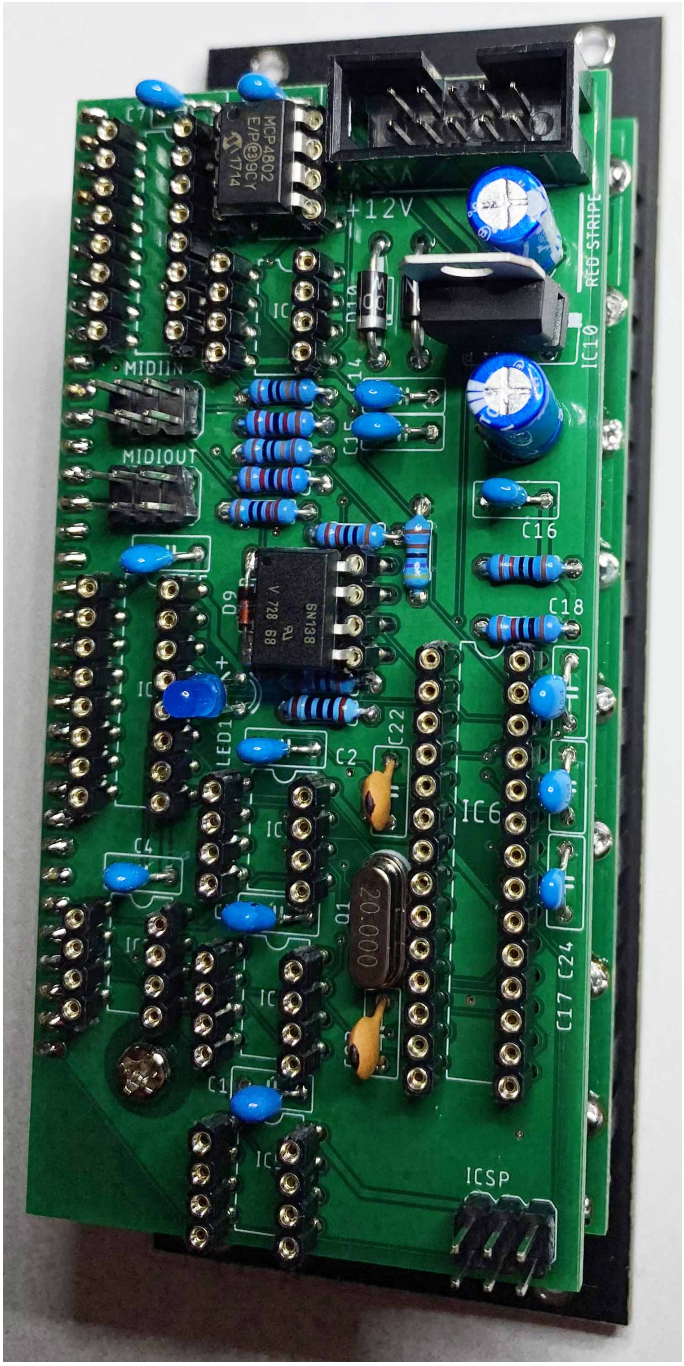
Main Board – Step 20

Install the 6N138 opto coupler into OK1.



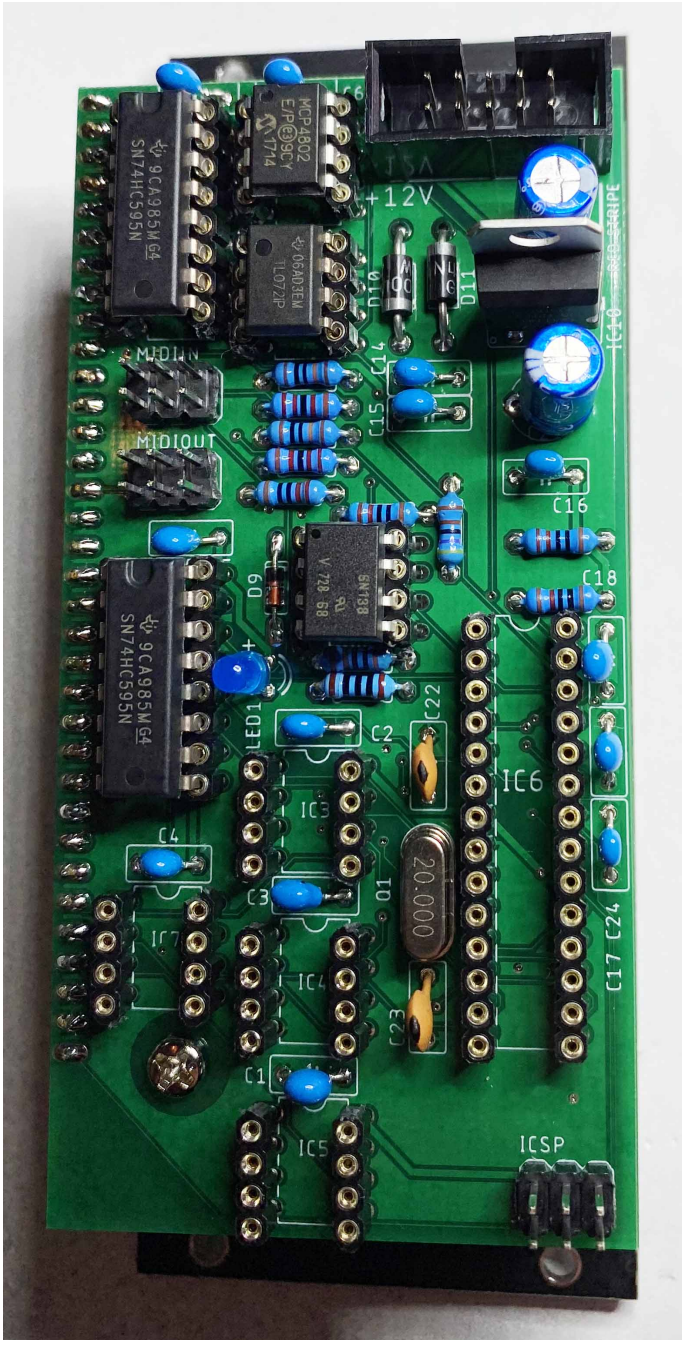
Main Board – Step 21

Install the MCP4822 DAC into IC8.



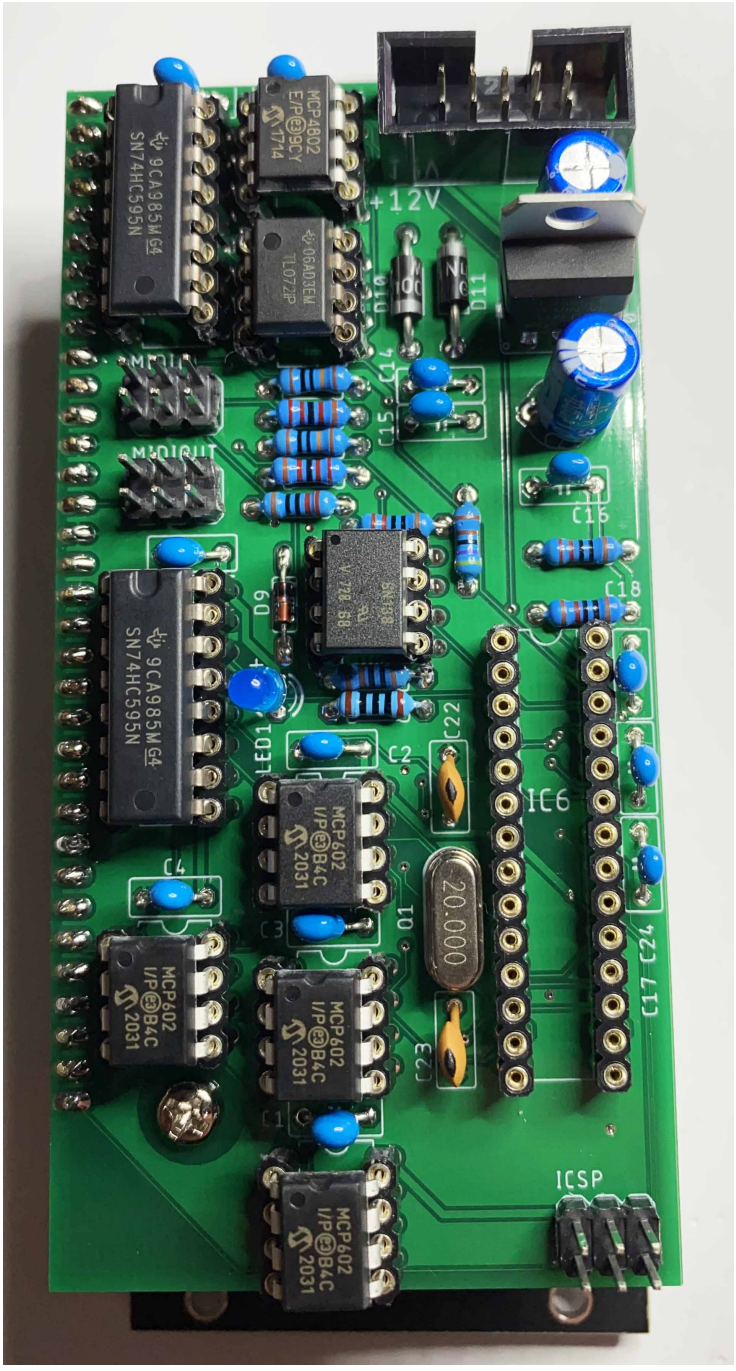
Main Board – Step 22

Install the TL072 IC into IC9 and the two 74HC595 ICs into IC1 and IC2.



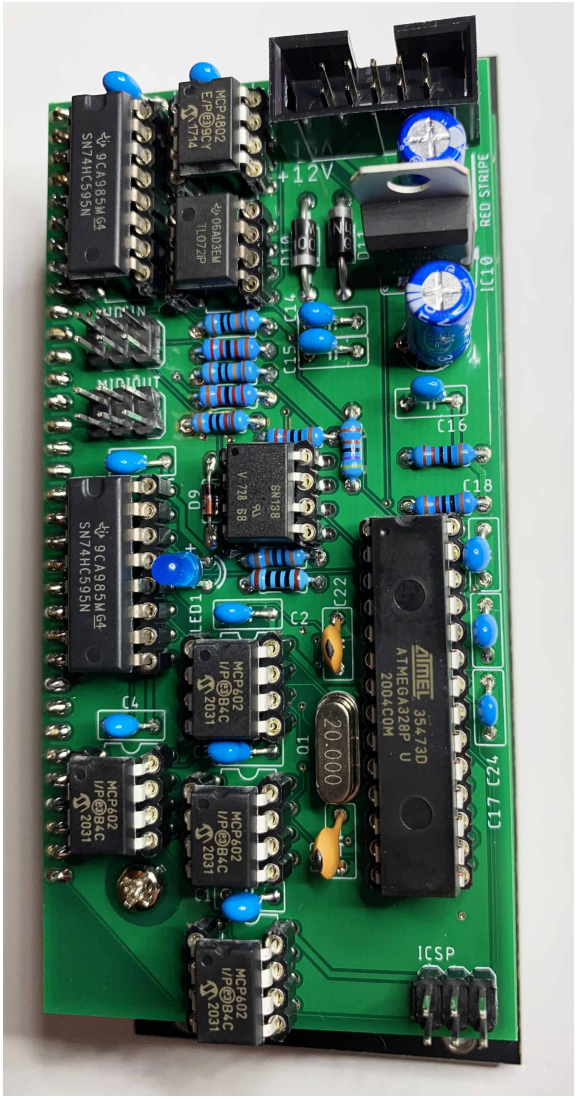
Main Board – Step 23

Install the four MCP602 ICs into IC3, IC4, IC5 and IC7.



Main Board – Step 24

Lastly install the ATMega328 IC into IC6.



Finished!!!

Well .. almost! Please refer to the user guide for instructions on how to jumper the MIDIIN and MIDIOUT headers to set the polarity for different 3.5mm -> MIDI adapters.