CV Express build guide version 1.0

Thank you for your purchase of the 7Dials CV Express module. We hope you find this unit to be a creative addition to your modular synthesiser.

This build guide will show you how to build the CV Express module, focusing on our kit for the popular Eurorack format.

The assembly of this DIY module will only require a small amount of elementary electronics knowledge, but (like any DIY project) it does require a good level of soldering ability. If you are yet to acquire soldering skills or experience then we would recommend you first practice on some simpler kits. This project is not by any means a difficult build, but it wouldn't really be considered an ideal starting project for a total beginner.

There are some really good DIY learning resources and soldering tutorials available online, for example:

Adafruit-Soldering-Guide

If you're building the CV Express from one of our kits, please make sure you first check the quantities and component values of all parts against the BOM provided. All resistors of multiple quantities should have their values noted on the tape. Single quantity resistors will need to be identified by the builder, we've included a list of all the relevant resistor colour codes needed for this project. It's certainly worth double checking that the correct resistors are all going in the right spots.

100k - Brown-Black-Black-Orange--Brown
110k - Brown-Brown-Black-Orange--Brown
1k - Brown-Black-Black-Brown--Brown
390r - Orange-White-Black-Black--Brown
36k - Orange-Blue-Black-Red--Brown
4k7 - Yellow-Violet-Black-Brown--Brown
2k - Red-Black-Black-Brown--Brown
4m7 - Yellow-Violet-Black-Yellow--Brown
100r - Brown-Black-Black-Black--Brown
10k - Brown-Black-Black-Red--Brown
200k - Red-Black-Black-Orange--Brown
220k - Red-Red-Black-Orange--Brown
220r - Red-Red-Black-Black--Brown

If you're not building from a kit please refer to the BOM where we list part numbers and provide links to various suppliers. All of the links are provided only as an aid to help the diy builder find or compare the appropriate part required for this project.

Any links provided in this manual are not to be seen as an endorsement of that product.

If you are sourcing your own parts and have any questions, please don't hesitate to contact us, we'll be happy to help in any way we can. Builders can also check out the dedicated 7Dials CV Express Muffs thread:

https://www.muffwiggler.com/forum/viewtopic.php?t=145913&start=0

CV Express build guide

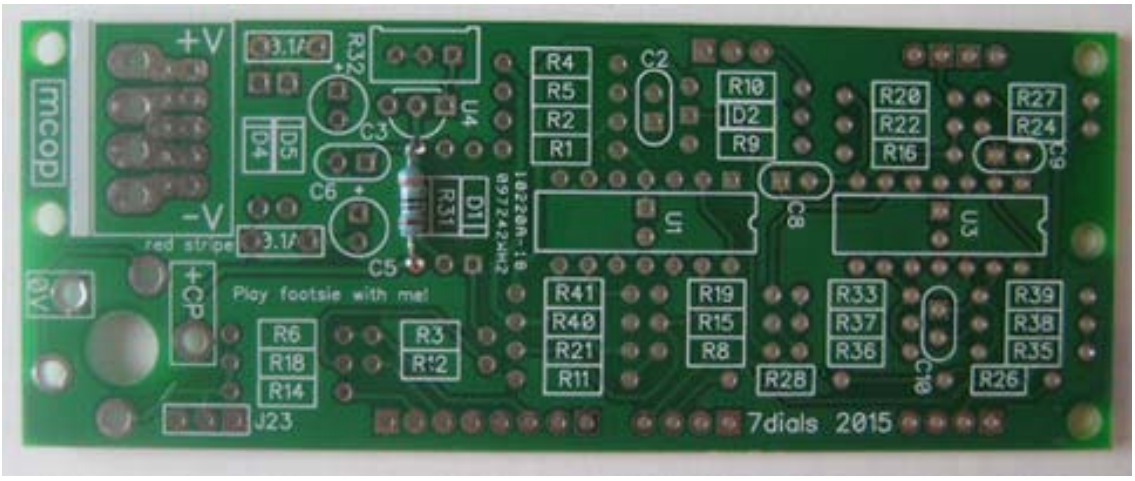
version 1.0

Build order

Prior to installing the resistors you first need to check and confirm the values, either visually, using the provided colour codes, or by measuring with a multimeter.

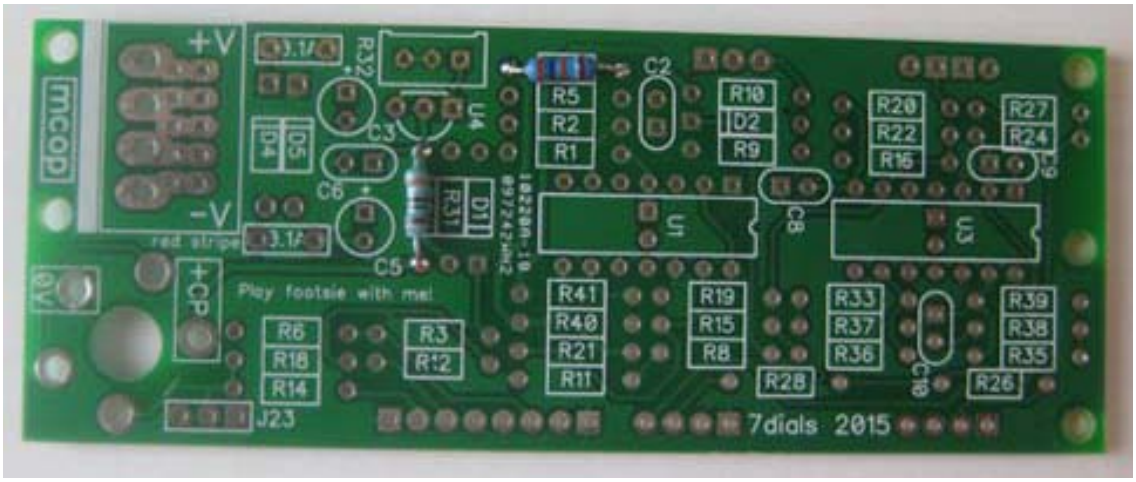
1.

Locate and install the single 390r resistor in the place marked R29.
390r resistors are marked - Orange-White-Black-Black--Brown



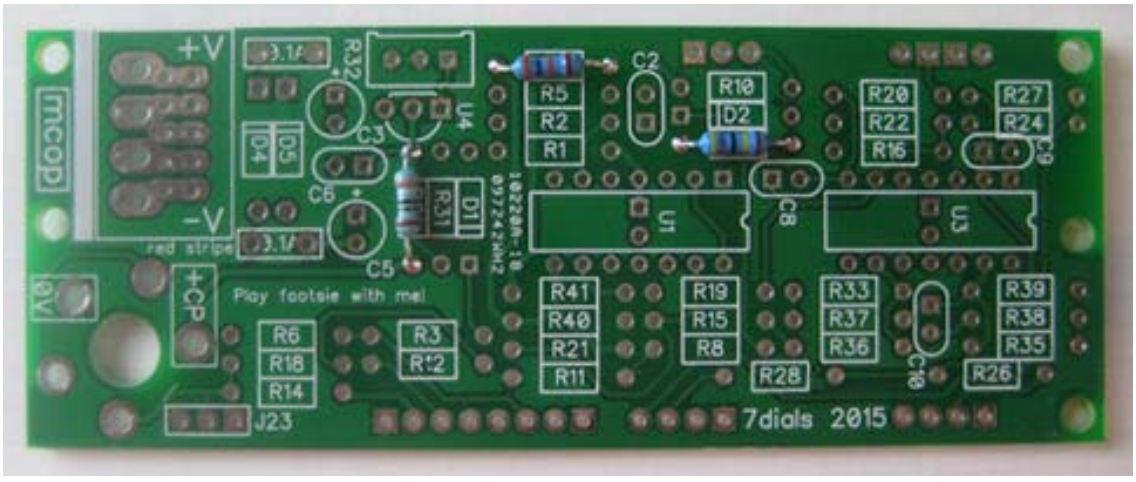
2.

Next, Install the single 36k resistor in the place marked R4.
36k resistors are marked - Orange-Blue-Black-Red--Brown



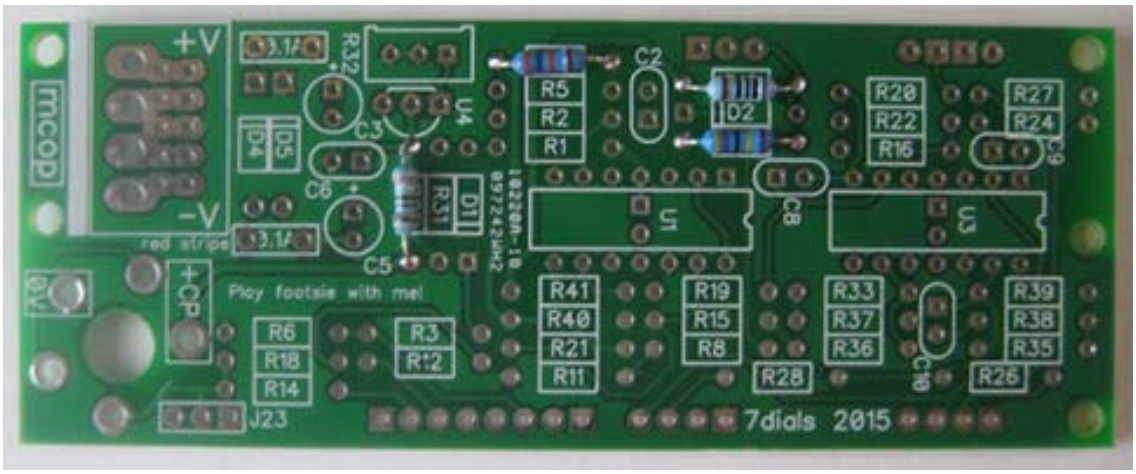
3.

Next, Install the single 4.7m resistor in the place marked R9.
4m7 resistors are marked - Yellow-Violet-Black-Yellow--Brown



4.

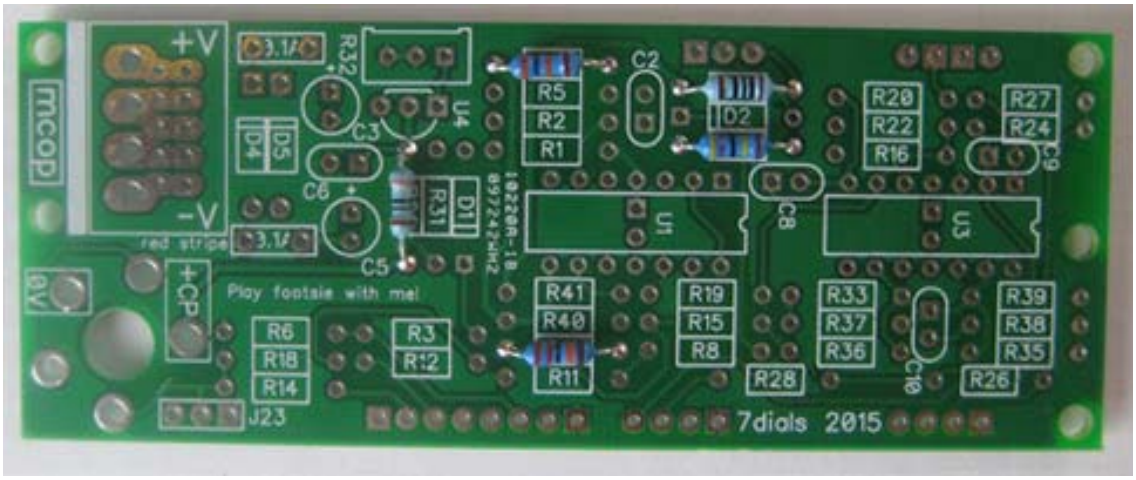
Next, Install the single 100r resistor in the place marked R10.
100r resistors are marked - Brown-Black-Black-Black--Brown



5.

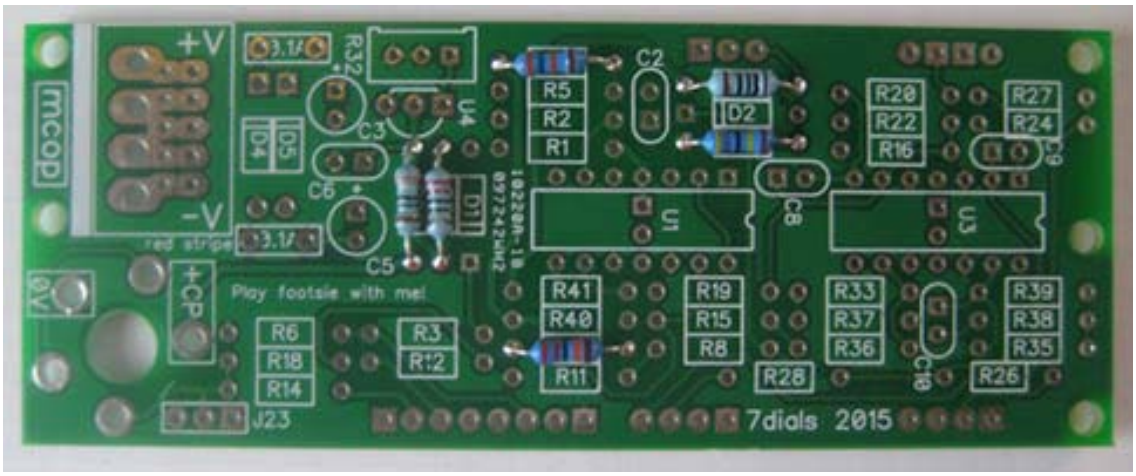
Next, Install the single 220k resistor in the place marked R21.
220k resistors are marked - Red-Red-Black-Orange--Brown

** Double check you don't mix up the 220k and 220r resistors **



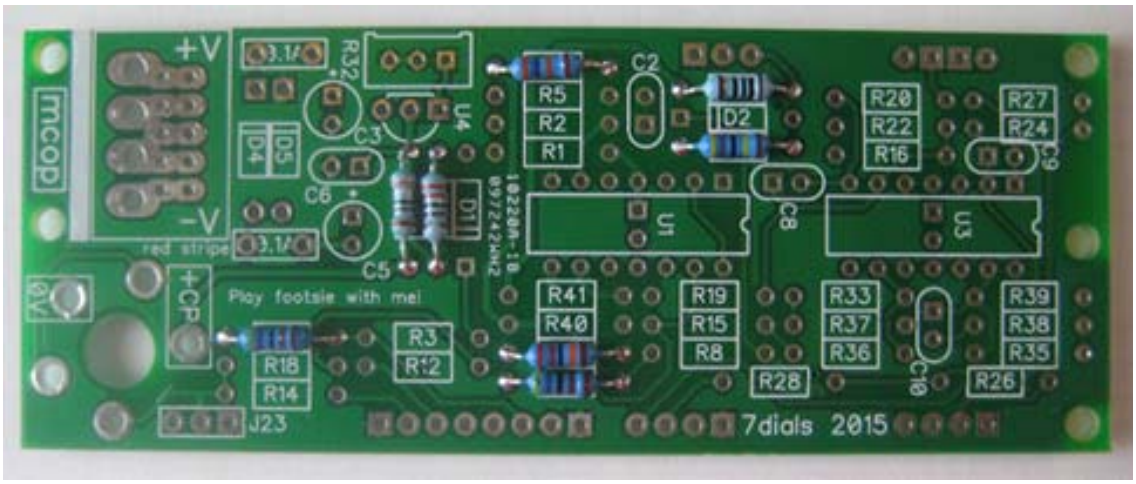
6.

Next, Install the single 220r resistor in the place marked R31.
220r resistors are marked - Red-Red-Black-Black--Brown



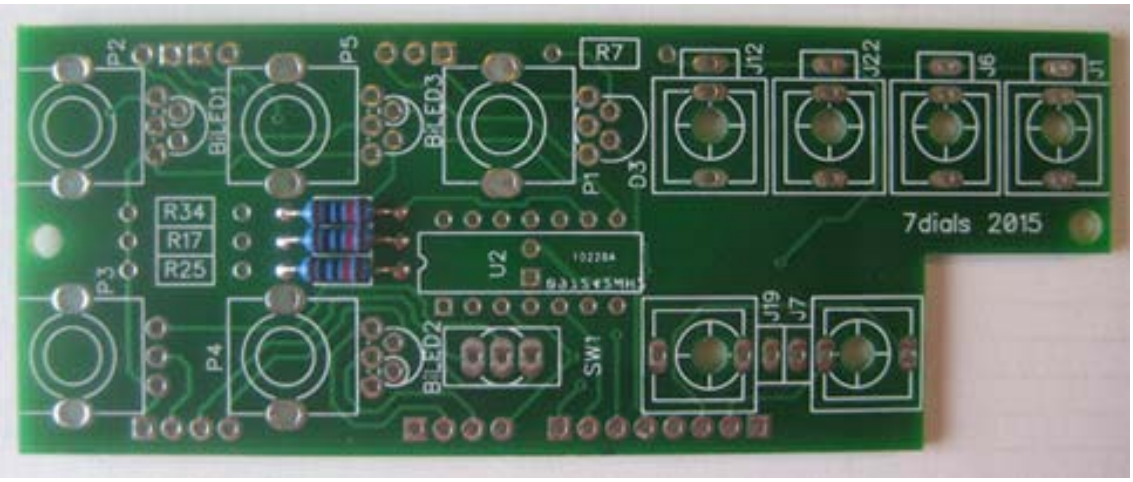
7.

Next, Install the pair of 4.7k resistors in the places marked R6 & R11.
4k7 resistors are marked - Yellow-Violet-Black-Brown--Brown



8.

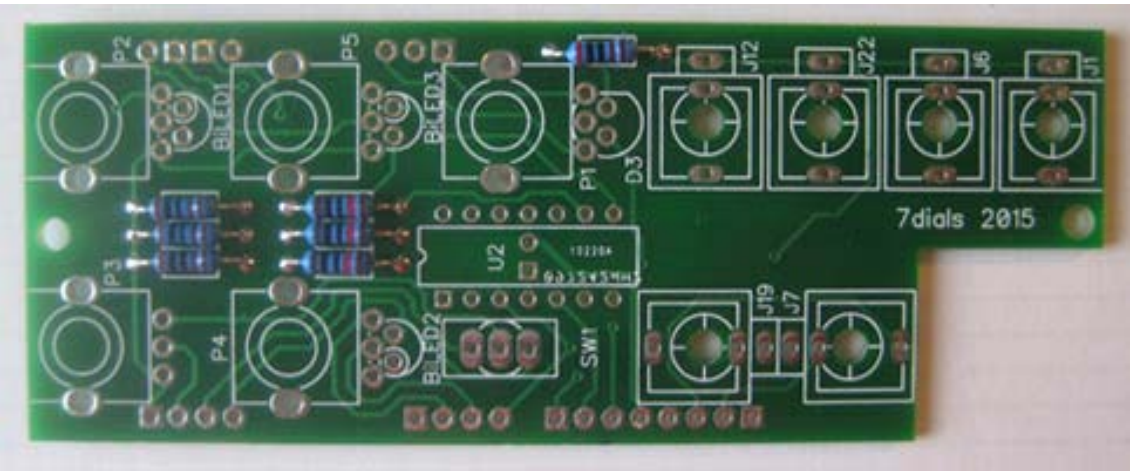
Next, Install three 10k resistors in the places marked on the Front Panel Component PCB as R13, R23 & R30.
10k resistors are marked - Brown-Black-Black-Red--Brown



9.

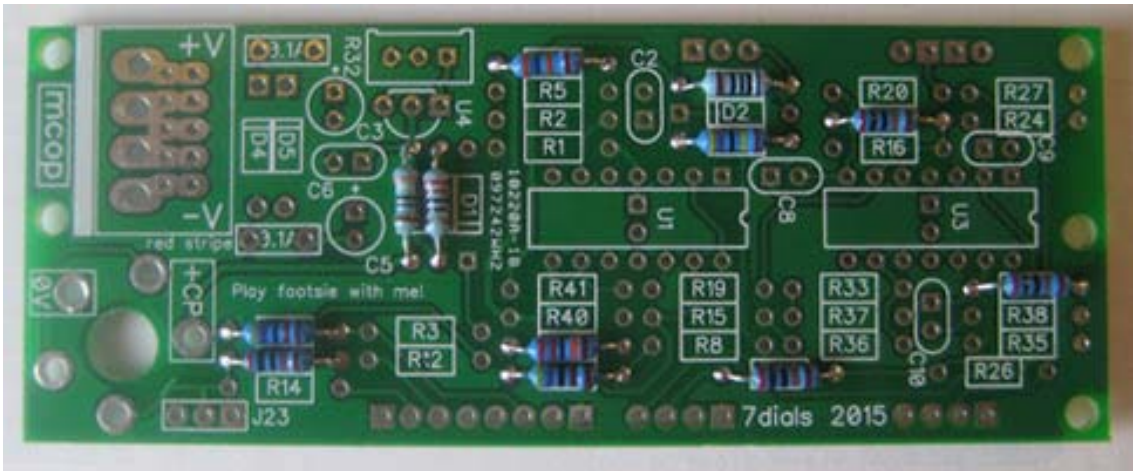
Next, Install four 2k resistors in the places marked on the Front Panel Component PCB as R7, R17, R25 & R34.
2k resistors are marked - Red-Black-Black-Brown--Brown

** Double check you don't mix up the 2k and 200k resistors **



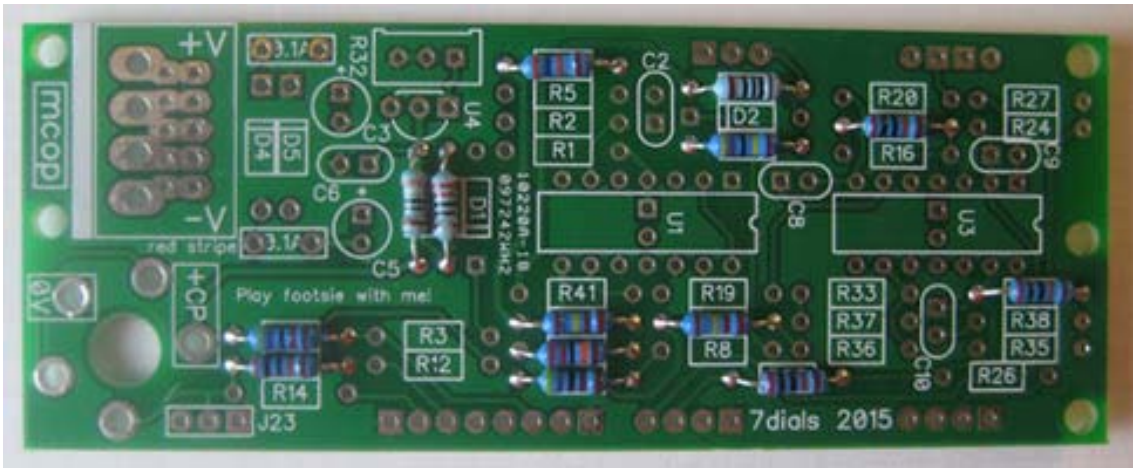
10.

Next, Install four 200k resistors in the places marked R18, R22, R28 & R39.
200k resistors are marked - Red-Black-Black-Orange--Brown



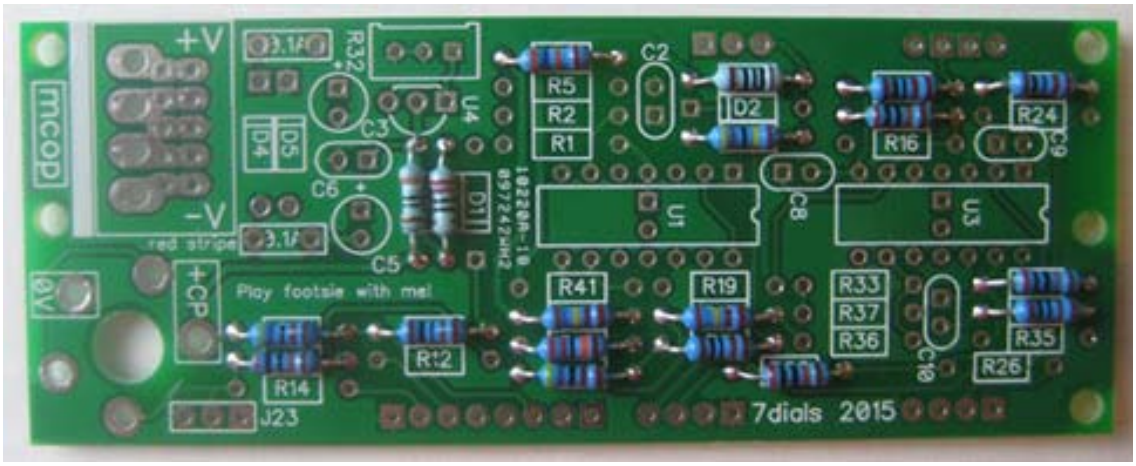
11.

Next, Install the pair of 110k resistors in the places marked R15 & R40.
110k resistors are marked - Brown-Brown-Black-Orange--Brown



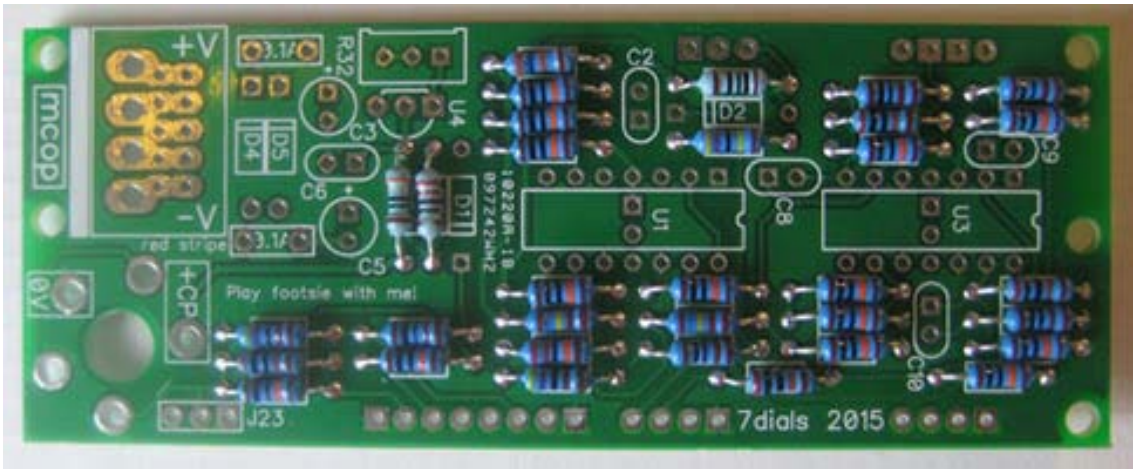
12.

Next, Install the five 1k resistors in the places marked R3, R8, R20, R27 & R38.
1k resistors are marked - Brown-Black-Black-Brown--Brown



13.

Next, Install the fourteen 100k resistors in the places marked R1, R2, R5, R12, R14, R16, R19, R24, R26, R33, R35, R36, R37 & R41.
100k resistors are marked - Brown-Black-Black-Orange--Brown

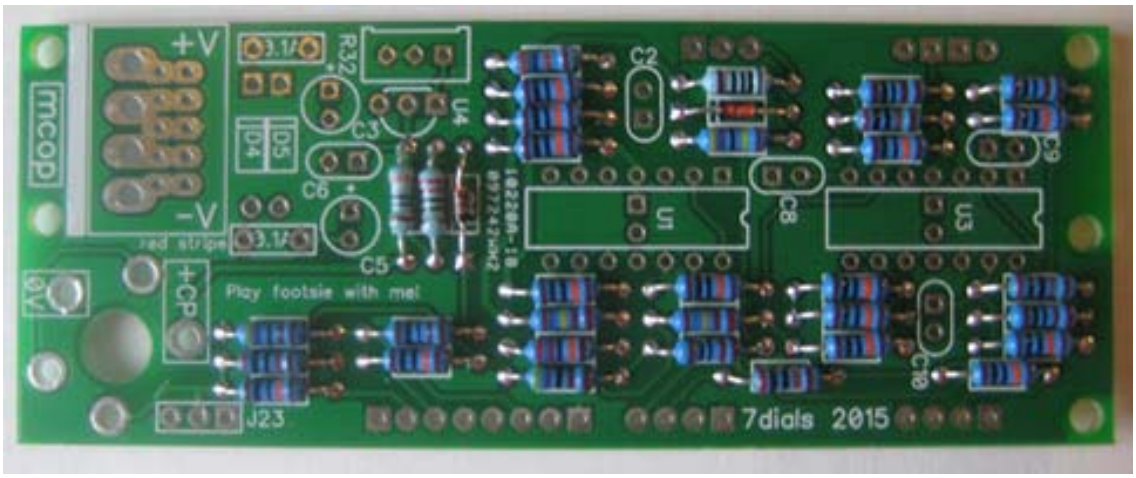


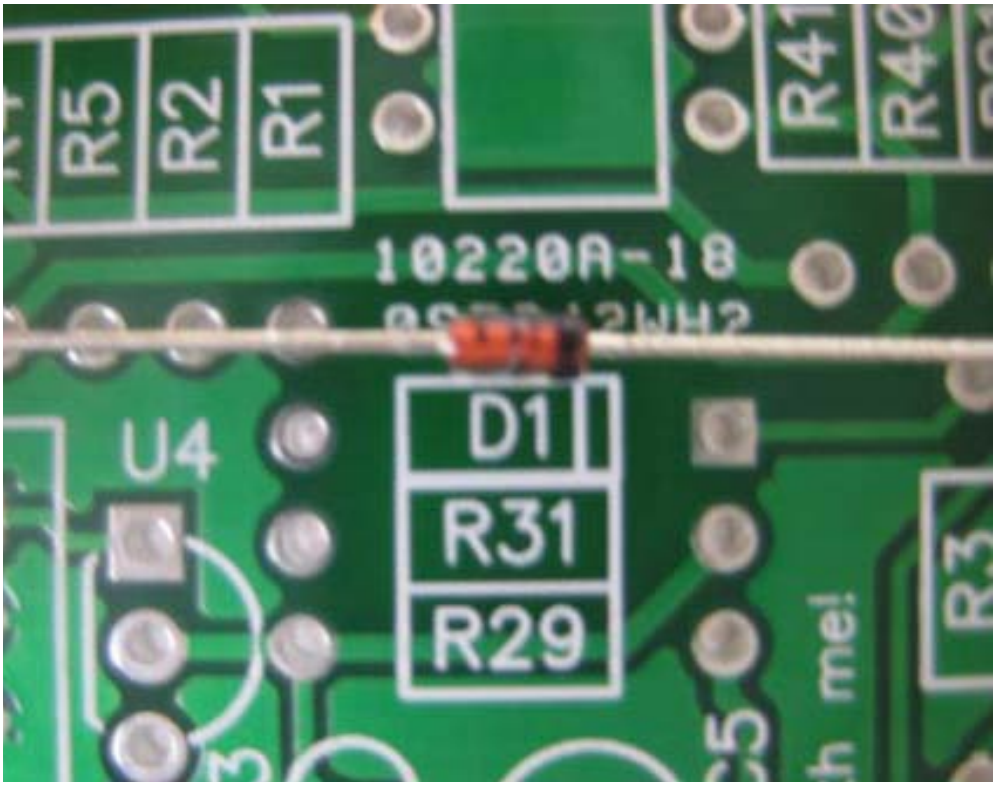
Now move onto soldering the diodes. There are a few different types included in the CV Express kit and it's very important that they are all put in the right places and also that they are all orientated correctly. It's also important not to linger too long with the soldering iron when installing diodes, they can easily be damaged by excessive exposure to heat.

14.

Install the pair of 1n4148 diodes in the places on the pcb marked D1 & D2. (2x loose in cap bag, small red body/black band on one end)

Please refer to the picture, it's very important that the black band is orientated correctly with the white stripe silkscreen marking on the pcb.

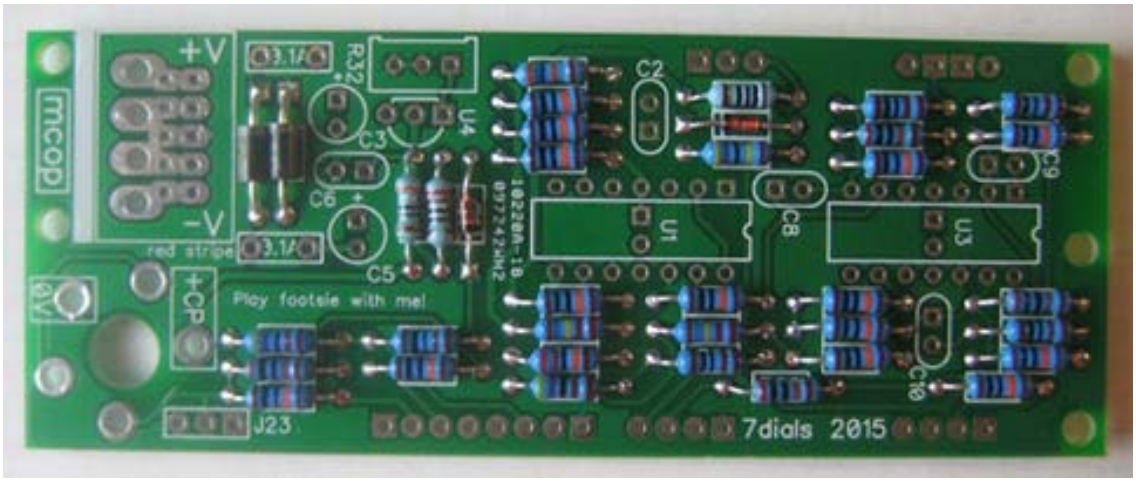


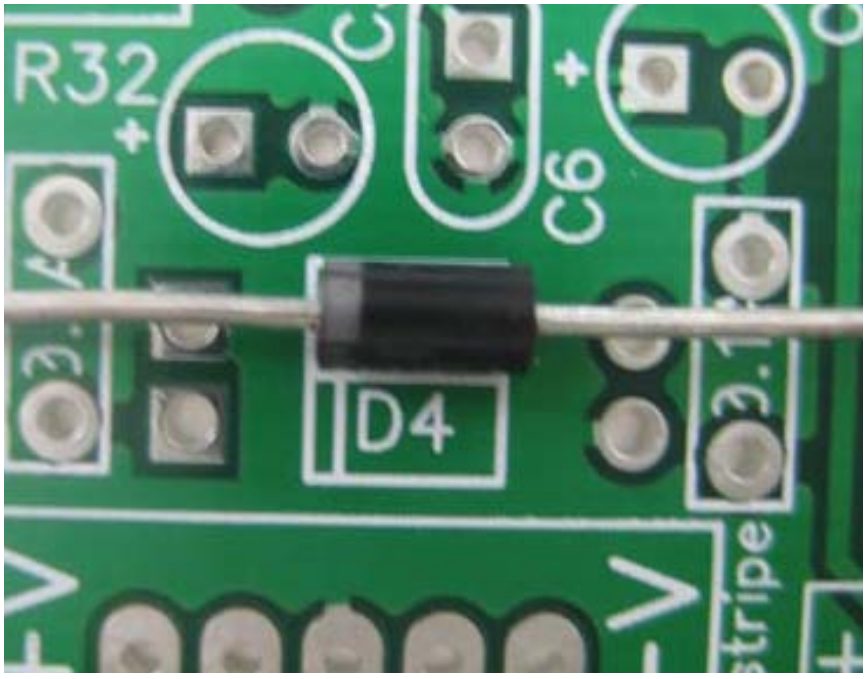


15.

Next, Install the pair of 1n4001 diodes in the places marked D4 & D5 (2x in cap bag, large black body/ silver band on one end)

Please refer to the picture, it's very important that the silver band is orientated correctly with the white stripe silkscreen marking on the pcb.



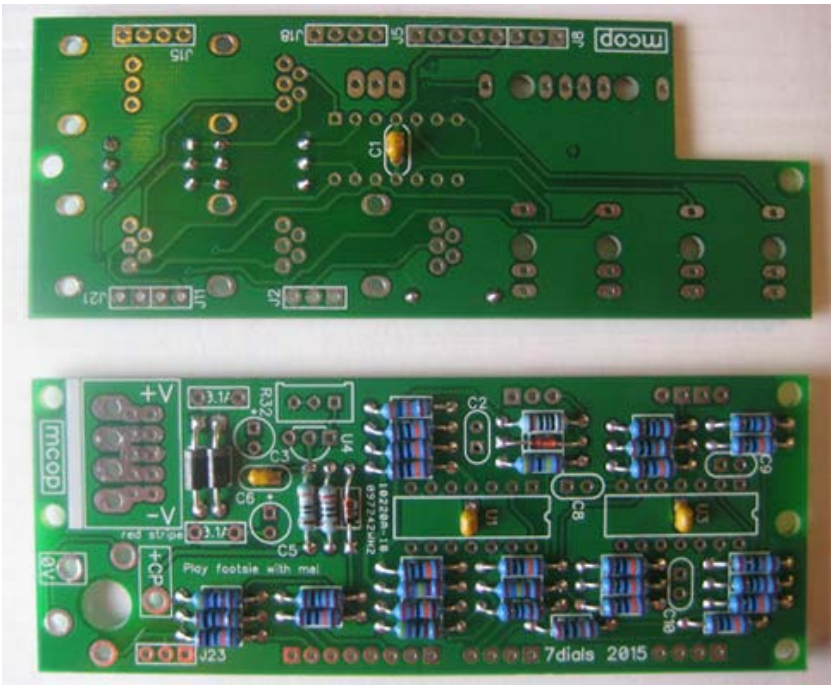


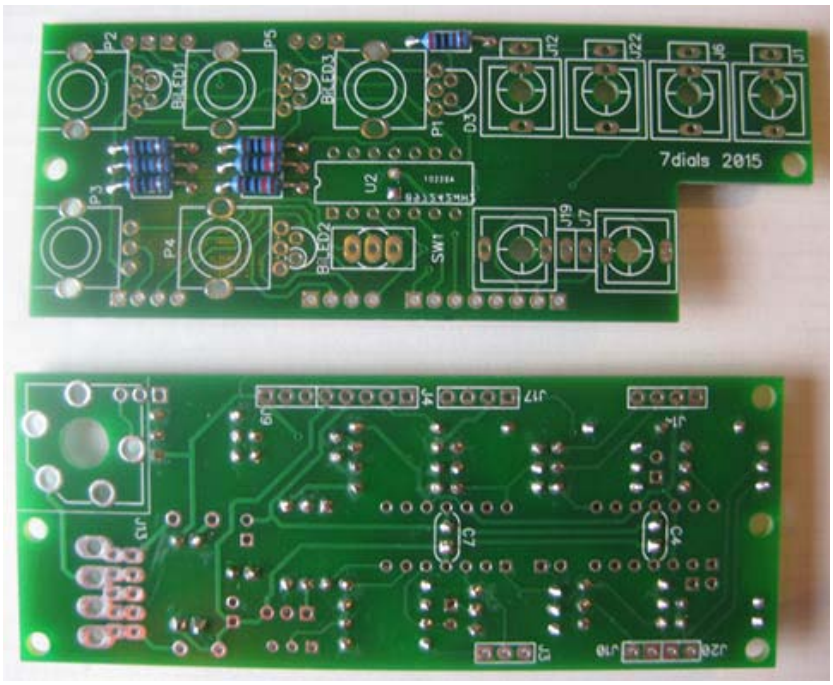
Next we proceed with installing the caps.

All of the ceramics caps are bipolar, so orientation is not important, but the two tall black 10uF electrolytic caps are polarised, so it's important to ensure that the instructions are closely observed when installing that pair.

16.

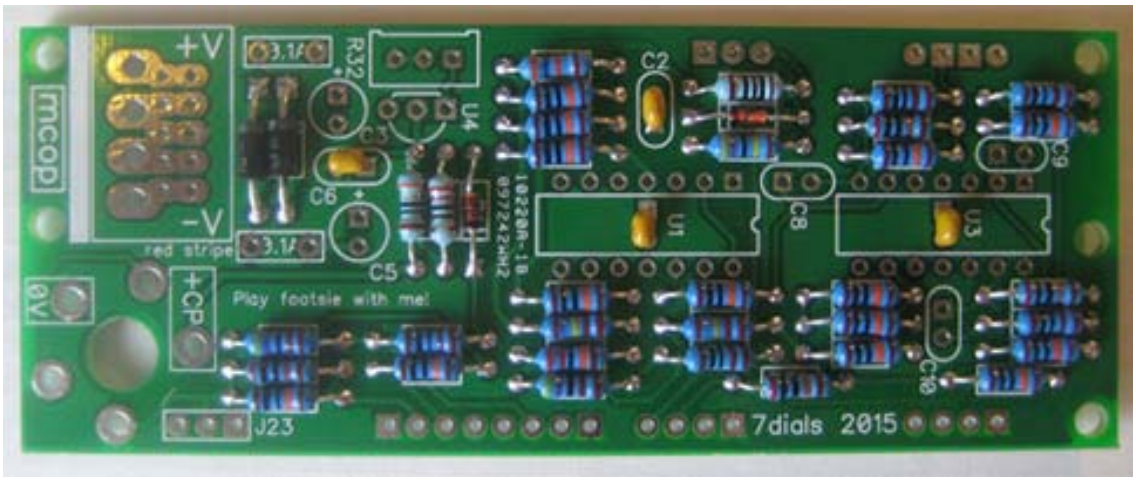
Install the four 100nF ceramic capacitors in the places marked C1, C4, C6 & C7.
(4x loose in cap bag, small orange body, long legs), be aware three of them are installed under, or on the opposite side of the TL074's. As long as you ensure the correct value is installed the side of the board the caps are installed on doesn't really matter. I personally prefer to install them on the same side as all of the other passive components. This does mean that the ic sockets cover them, but they are still able to be removed if required when installed this way.





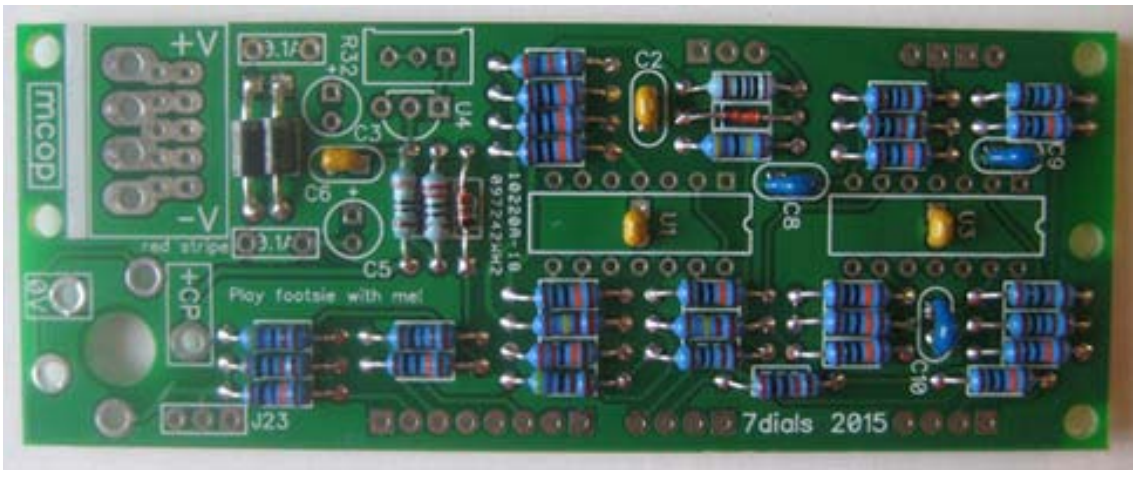
17.

Next, Install the single 10nF ceramic capacitor into the place on the pcb marked C2.
(1x loose in cap bag, small orange body, marked cardboard tape)



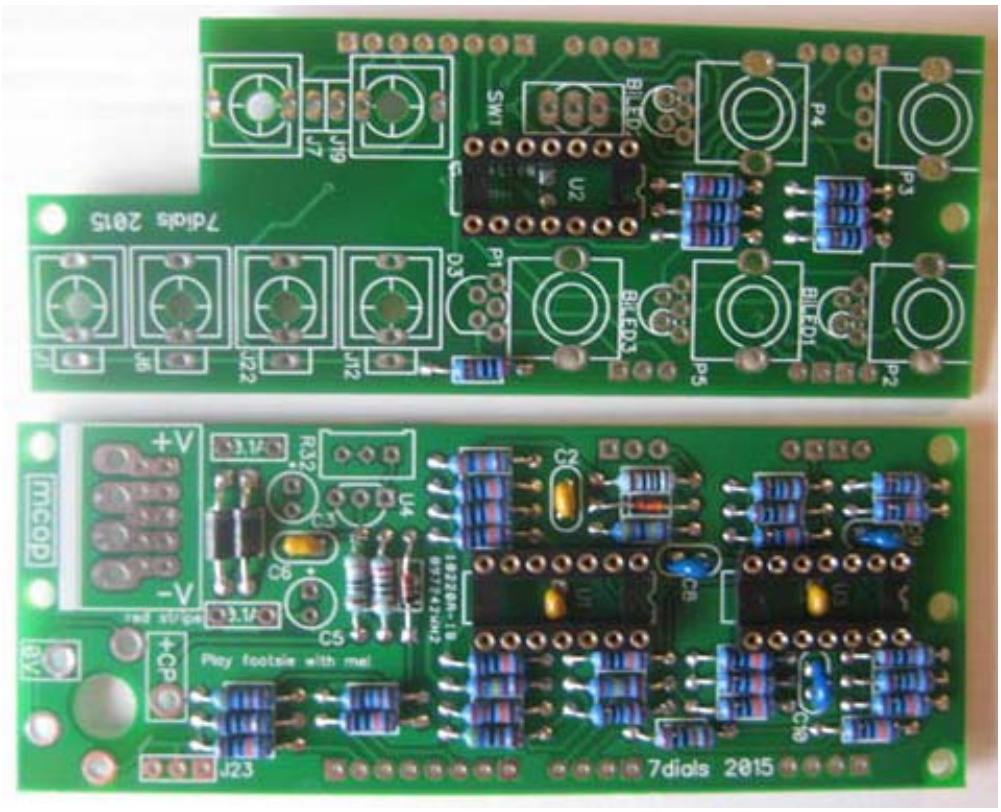
18.

Next, Install the three 3.3pF ceramic capacitors in the places marked C8, C9, C10.
(3x loose in cap bag, small blue body)



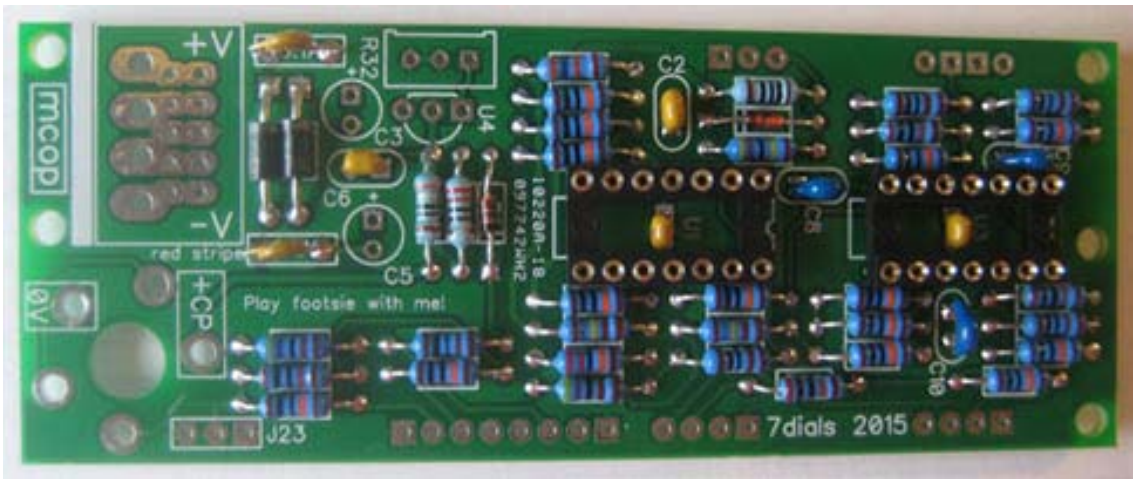
19.

Next, Install the three 14 pin ic sockets, ensuring the notch in the socket is aligned with the silkscreen image on the pcb, all of the sockets point upwards.



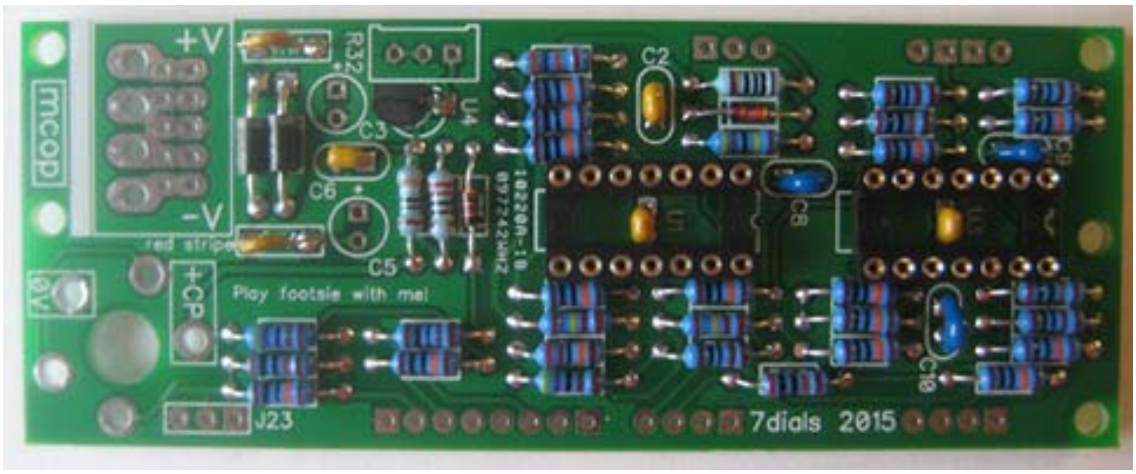
20.

Next, Install the two PTC fuses, these go in the two places marked 0.1a just above the power header, orientation does not matter.



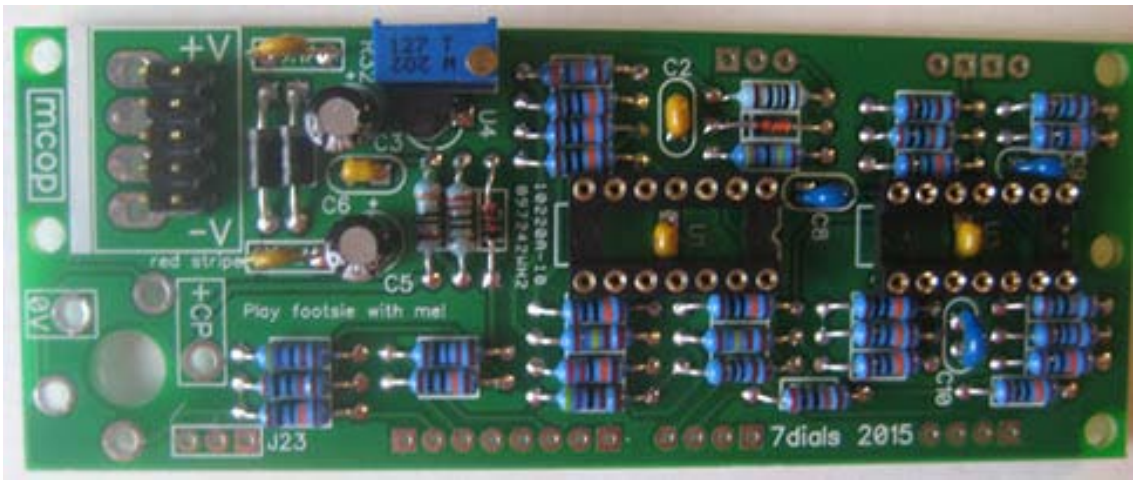
21.

Next, Install the LM317LZ in the space marked U4, make sure to orientate it so it matches the silkscreen image.



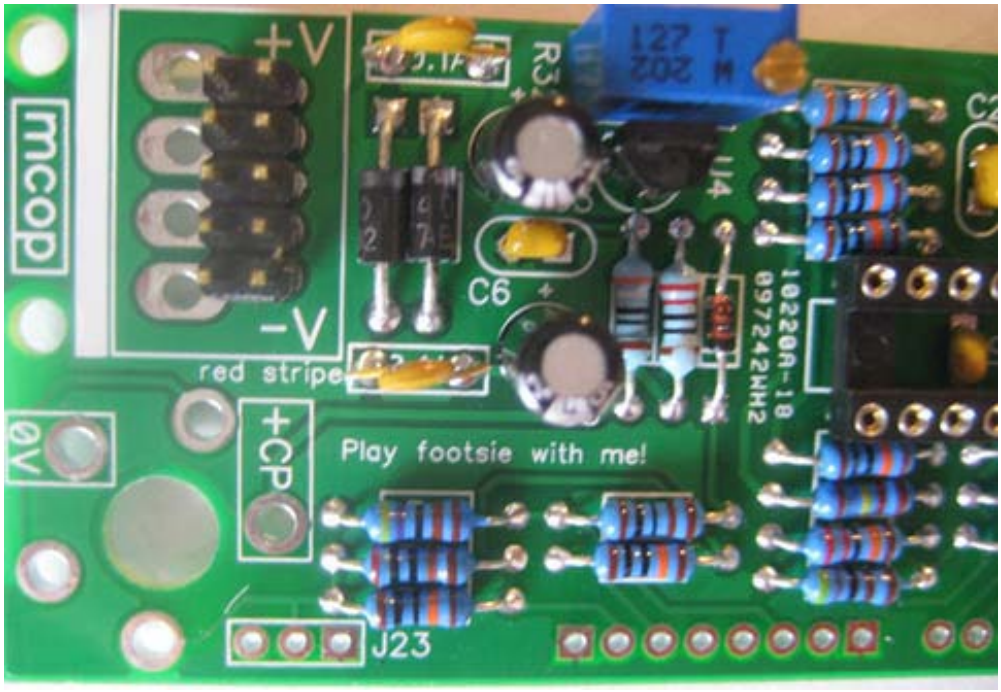
22.

Next, Install the 2x5 way power header.



23.

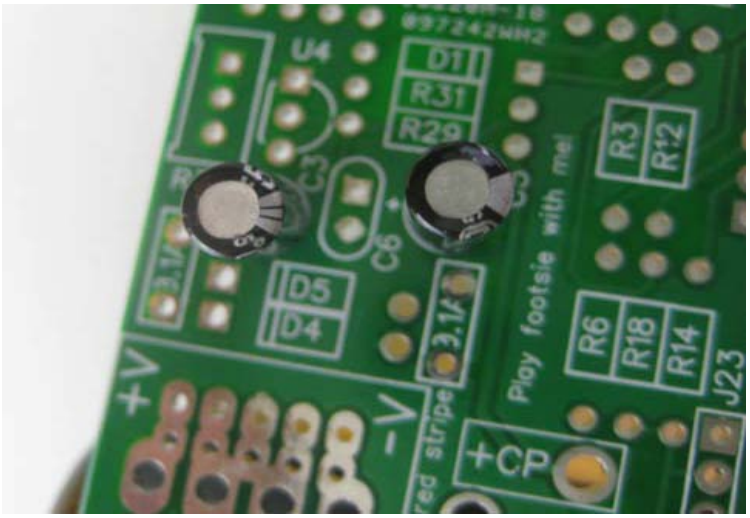
Next, Install the 2k trimmer.



24.

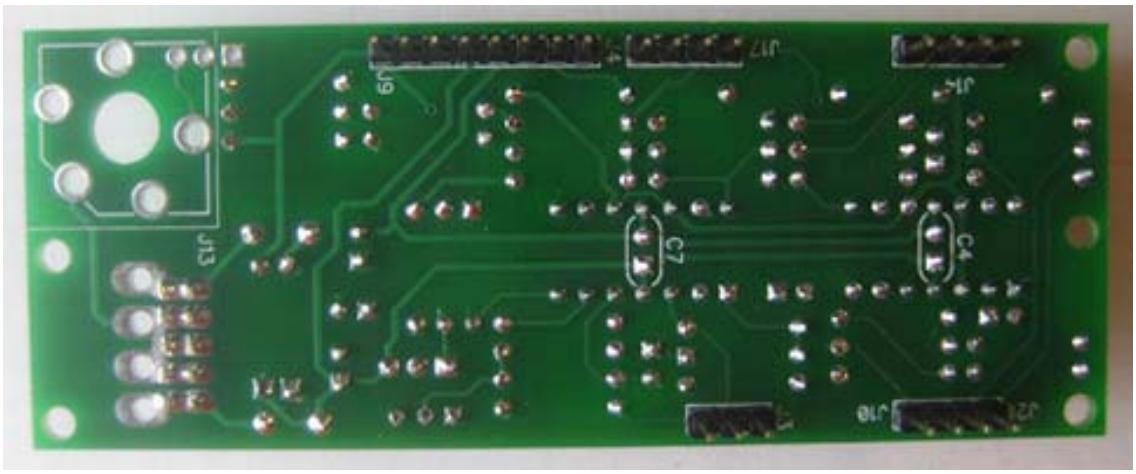
Next, Install the 2x 10uf electrolytic caps in the spaces marked C3 and C5. It's very important that these capacitors are installed correctly. The long leg goes into the square hole which has an associated + symbol next to it, the shorter leg goes into the round hole, so the gray stripe on the body of the cap is orientated away from the edge with the blue trimmer.

Please check the photo to confirm correct orientation.



25.

Next, install the male pin headers, these are installed on the opposite side of the PCB of all of the components that have been installed so far.

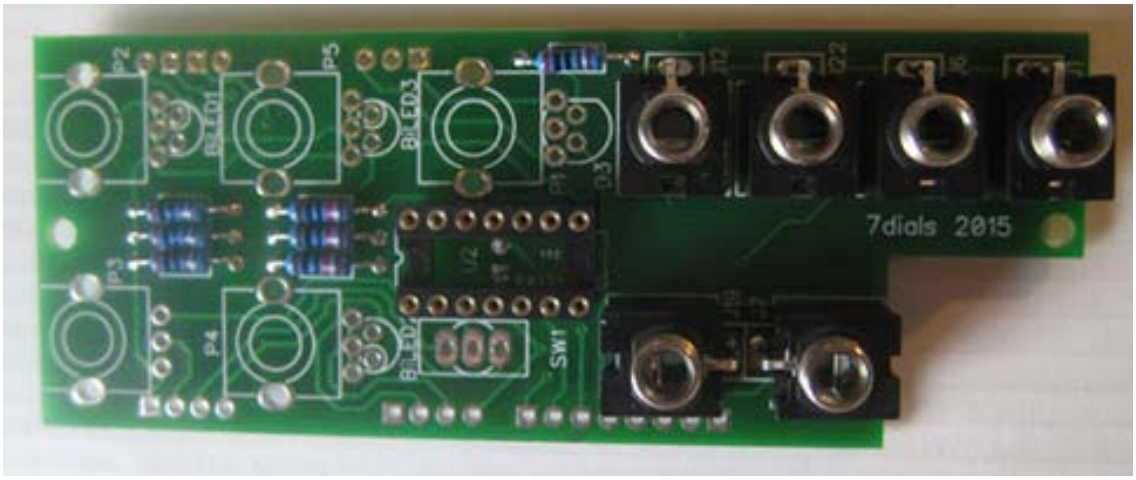


Please note: the 3pin header location marked J23 is left empty, do not install anything there.
No harm will come if you do, you'll just need another 3 pin male strip to continue with the build if building from the kit.

Look to get all the headers aligned neatly and flush with the pcb. Some people prefer to put the pcb sandwich together and then tack solder 1 pin of all the male headers first, and then (after confirming everything is aligned) go back and solder all of the remaining pins. The female pin headers on the front panel component pcb are not installed until later in the build, so don't solder any of them in just yet.

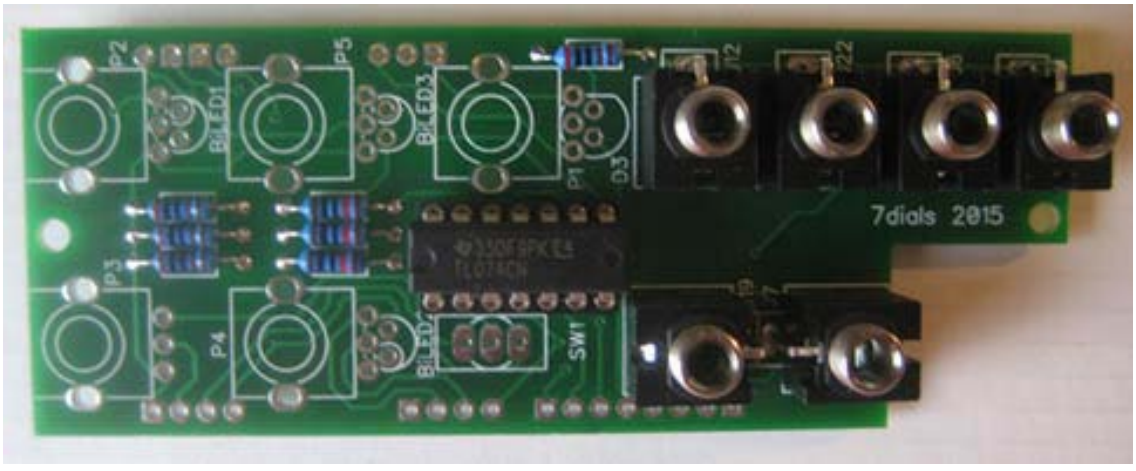
26.

Next, Install the six Thonkiconn jacks to the front panel component pcb.
Fit the jacks to the pcb, then place the panel, and finger tighten some of the jack nuts to couple the panel to the jacks and confirm the jacks are all installed cleanly, flip it over and then solder.



27.

Next, Install the TL074 into the 14 pin ic socket on the front panel component pcb.
It's not imperative to install it now, and some may prefer to do after all the soldering is complete. Just bear in mind that it's rather difficult to install an ic once all the pots and switches are installed.



28.

Next, Install (but don't solder yet) the remaining front panel components, consisting of five B100k 9mm pots, the SPDT switch, three red/green bipolar led's and a single orange led.

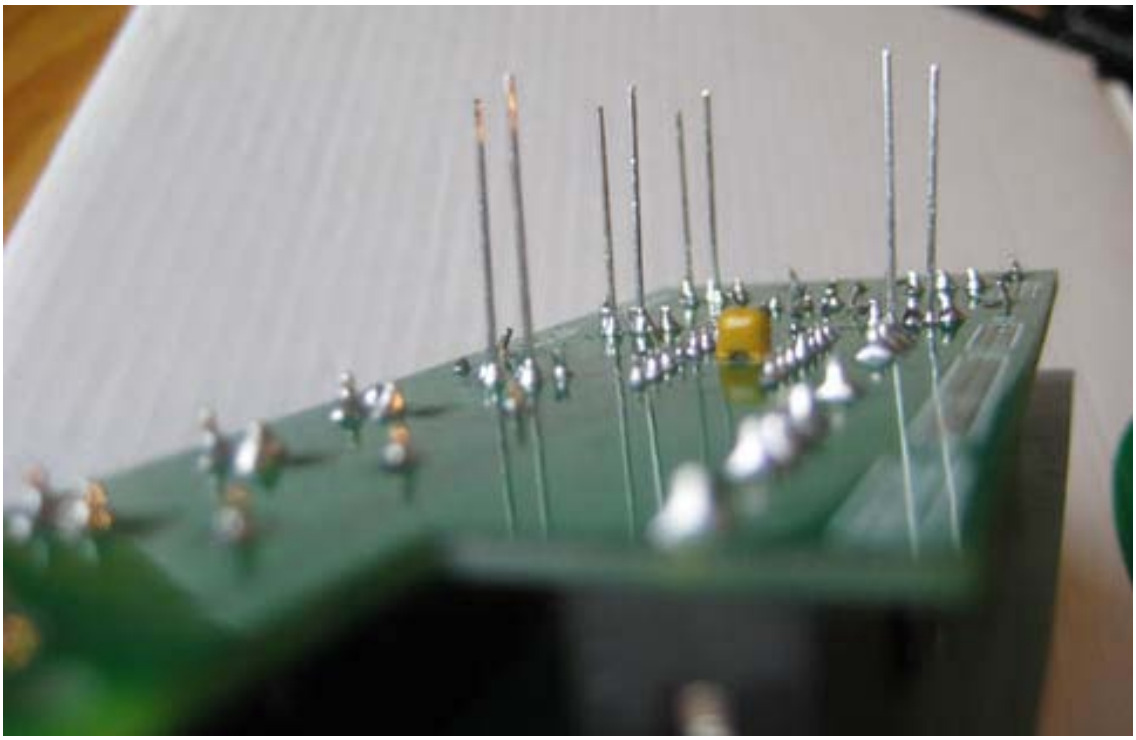
For the orange led, the short leg (cathode) is closest to the edge of the board - the flat edge of the silkscreen outline.

The orange led is installed into the placed marked D3.

For the BiLED's, the inner circle indicates the cathode of the primary led, so the short lead goes through the inner circled hole on the silkscreen (this presumes the builder wants red to indicate positive voltages and green to indicate negative voltages).

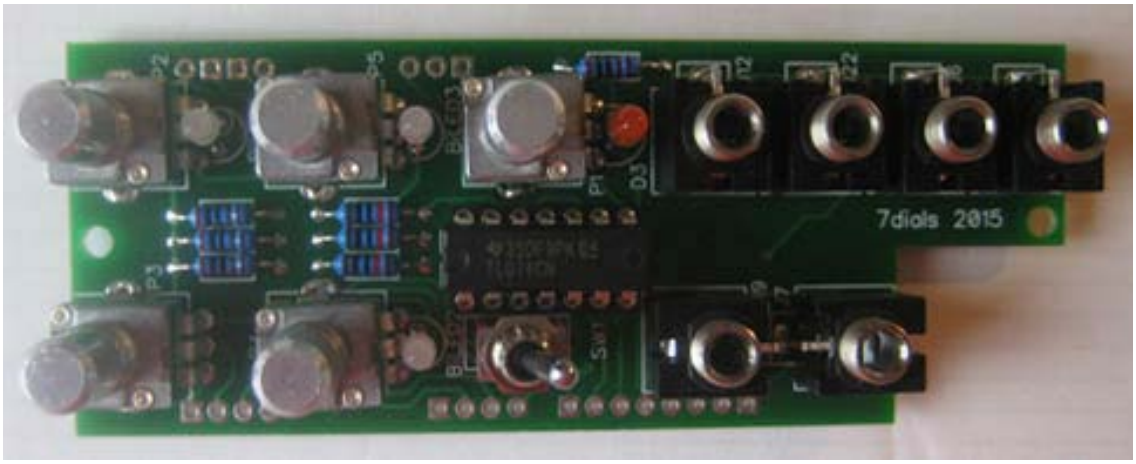
All BiLED cathode points are located nearer the outside edge of the pcb as per the pcb silkscreen, so please note:

** BiLED2 faces the other way from BiLED1 and BiLED3 **



Finger tighten onto the front panel some of the nuts for the pots, jacks, and the switch. This helps align the parts to the panel.

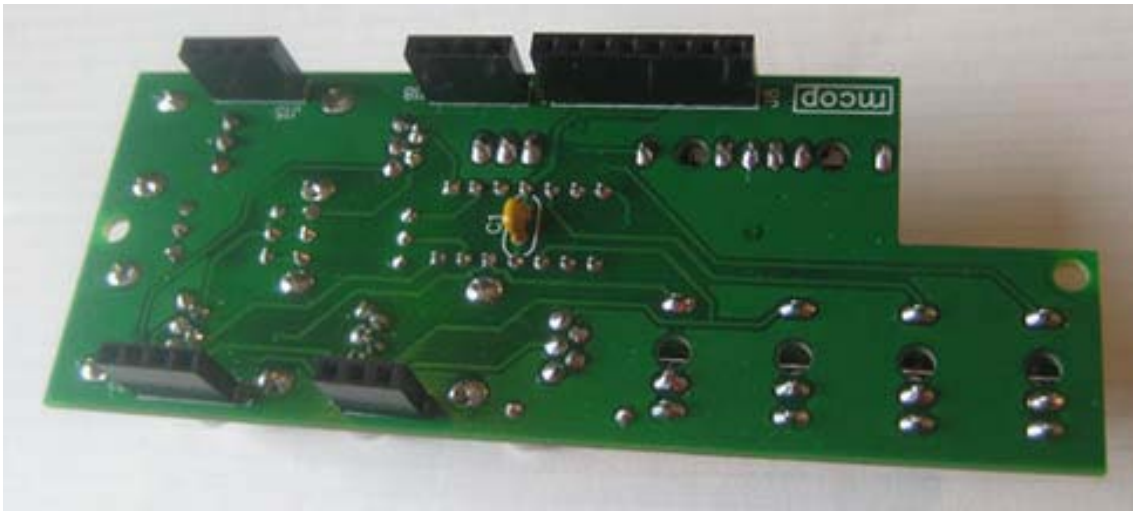
Flip the panel and ensure that all four led's are protruding correctly through their panel holes, then you can finally start to solder the pots, switch and led's.

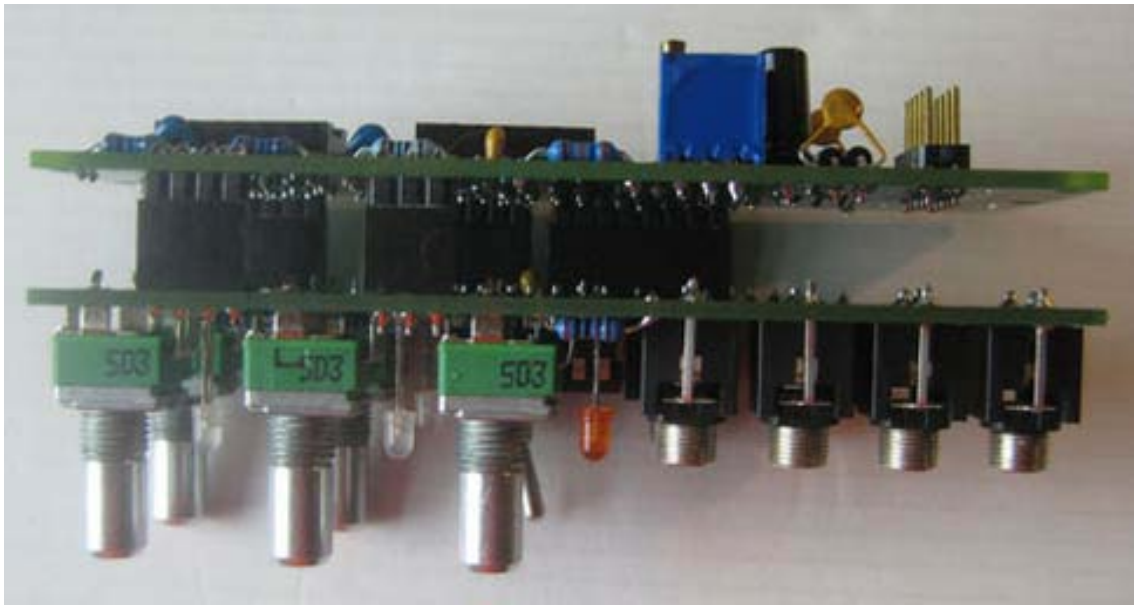


29.

Next, Install the female headers on the front panel component pcb.
These headers are installed on the opposite side of the front panel component pcb of any components installed prior to this step.

It's worth considering attaching the other pcb and aligning all the headers before tack soldering a single pin on all headers, and then proceeding to solder the rest of the pins once it's confirmed everything is lined up correctly.



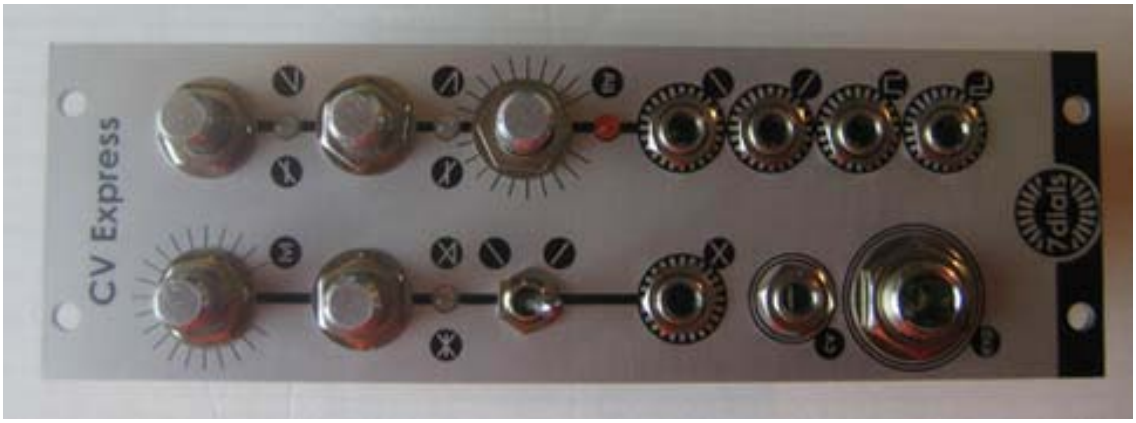


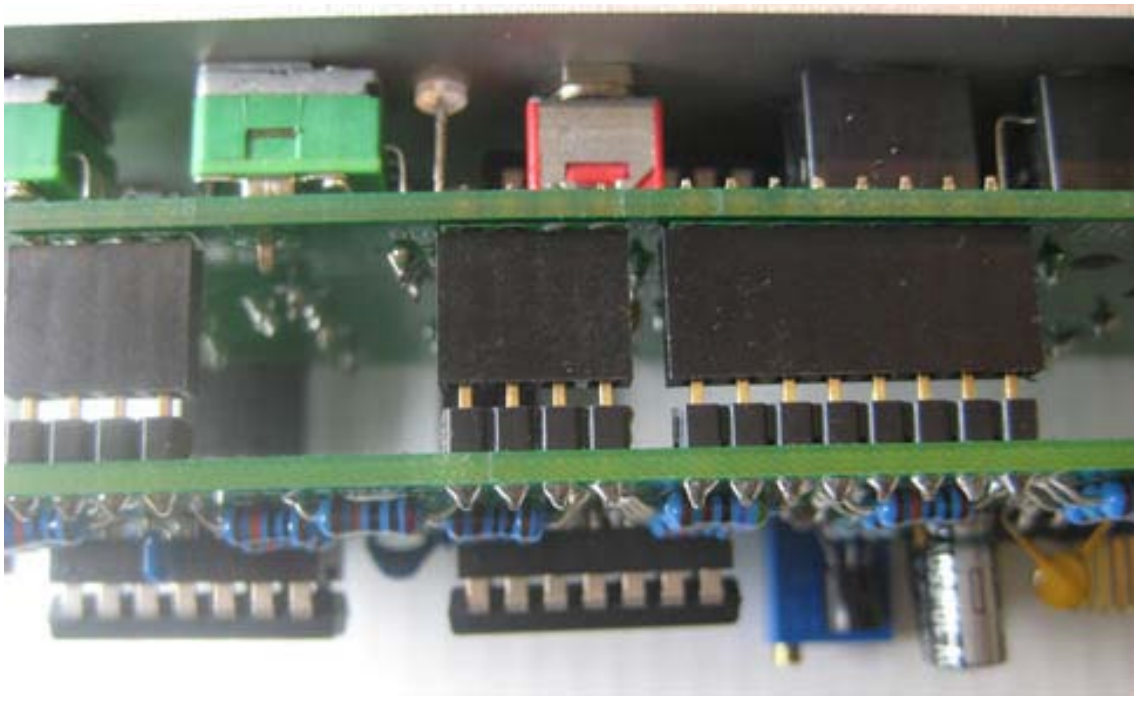
30.

Next, Install the ¼' jack. ensure to fit and solder it on the same side of the pcb as the pin headers, so the opposite side to all of the resistors etc.

** This component dictates the depth of the whole module, and hence the space between the pcb's.
You should expect to see a few millimeters of the pins showing between the male and female pin headers.

In the kits we've provided a pair of 12mm pcb spacers, plus additional washers.
Please ensure to use these, and don't try to force the male and female headers to close fully once the ¼' jack is installed. Doing so can cause excessive stress to the inside of the jack. **



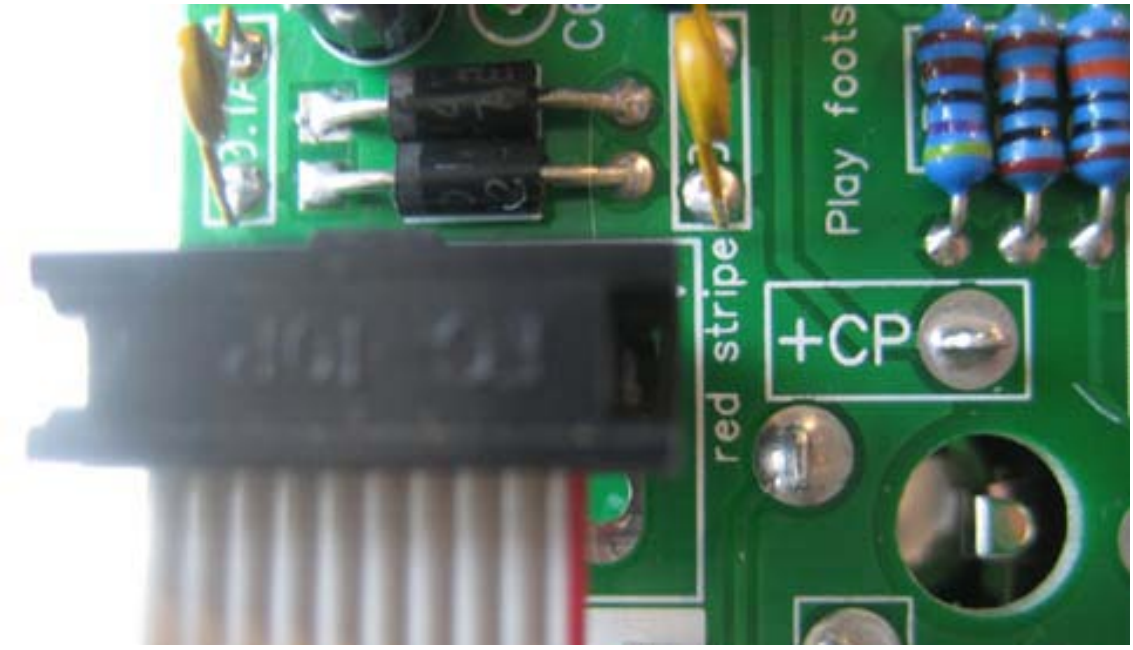


31.

Next, Install the five knobs. Three are black for the offset controls, grey is for the vari output level and red is for the comparator threshold.

32.

Finally, Install the power cable, taking extra care to ensure the red stripe is oriented to match the silkscreen legend, red stripe to -V. The module is reverse polarity protected.



CV Express
7dials

RefDes	Value	Quantity
C1, 4, 6, 7	100n Ceramic 2.54mm (or 0805 SMT)	4
C2	10n Ceramic 2.54mm	1
C3, 5	10-22uF Electrolytic 63V	2
C8, C9, C10	3.3pF Ceramic 2.54mm	3
D1, 2	1N4148 Diode	2
D4, 5	1N4001 Diode	2
BiLED 1, 2, 3	3mm 2V 2pin Bipolar LED Red/Green	3
D3	3mm LED Orange	1
P1-5	B100K Linear Alpha Pot 9mm	5
F1, 2	0.1A PTC Resettable Fuse	2
R1, 2, 5, 12, 14, 16, 19, 24, 26, 33, 35, 36, 37, 41	100K Resistor	14
R15, 40	110K Resistor	2
R3, 8, 20, 27, 38	1K Resistor	5
R29	390R Resistor	1
R4	36K Resistor	1
R6, 11	4K7 Resistor	2
R7, 17, 25, 34	2k Resistor	4
R9	4M7 Resistor	1
R10	100R Resistor	1
R13, 23, 30	10K Resistor	3
R18, 22, 28, 39	200K Resistor	4
R21	220K Resistor	1
R31	220R Resistor	1
R32	2K 3296W 25 Turn Trimmer	1
SW1	SPDT On/On 2.54mm PCB Mount Switch	1
U1, 2, 3	TL074CN Op Amp	3
U4	LM317LZ Voltage Regulator	1
	Thonkiconn 3.5mm Jack PJ301M-12	6
Dual Footprint Euro/4 Pin Header	2x5 Male Pin Header	1
J13	Switchcraft 114 Stereo Jack	1
	...or a cheaper clone of the Jack	
	12mm Nylon Spacer	2

	Set of M3 25mm Bolt & Nut	2
	M3 6mm Screws & Washers	4
	14 Pin IC Socket	3
	3 Pin Male Header	1
	3 Pin Female Header	1
	4 Pin Male Header	3
	4 Pin Female Header	3
	8 Pin Male Header	1
	8 Pin Female Header	1
	Davies Knobs - Black	3
	Davies Knobs - Grey	1
	Davies Knobs - Dark Red	1