MA VCA OVERVIEW

For the most recent version of this document please visit http://thonk.co.uk/documents/MA/

For all technical support please visit http://bit.ly/1tl78E0 on Muffwiggler.

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DIY INSTRUCTIONS

This document gives detailed instructions that assume you have purchased a complete kit from www.thonk.co.uk. It also assumes no previous knowledge of electronics. To learn to solder try http://youtu.be/I_NU2ruzyc4 and the **Adafruit guide to excellent soldering** – http://bit.ly/1l77tF4

Watch and understand that whole YouTube video! If you're not achieving the results shown in the video then you need to buy new tools or seek advice.

You will not end up with a working module otherwise.

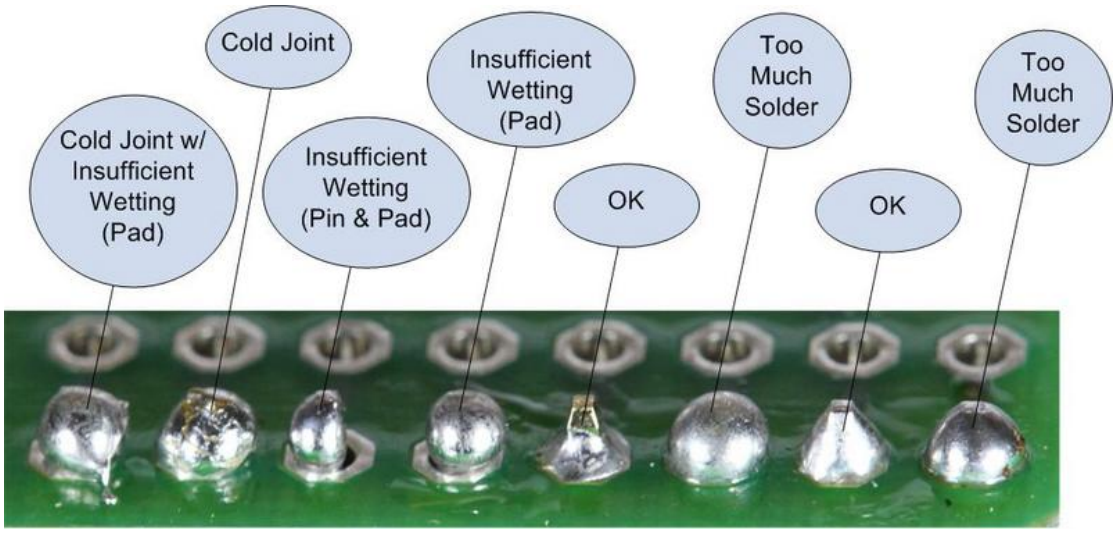
TOOLS REQUIRED

Soldering iron, tweezers for SMD parts, snipe nose pliers, wire strippers, small flat head screwdriver and diagonal cutters AKA snips AKA side-cutters. A Digital Multimeter is always helpful for checking for bad solder joints and continuity. Thonk sell a range of inexpensive tools here - http://bit.ly/1jxqF3n

SOLDER JOINTS

Your solder joints should look like those shown as 'OK' below, they should have that neat conical shape on BOTH sides of the PCB. If they don't look the same on both sides then stop! Work out why from the soldering guides linked and don't continue until you are getting those results.

This isn't about perfectionism, you are very likely to end up with a destroyed, damaged or defective unit if you're not hitting that standard.



This photo is from the **Adafruit guide to excellent soldering** - bit.ly/1l77tF4 and is reproduced under an Attribution-Sharealike creative commons license - http://creativecommons.org/licenses/by-sa/3.0/

VCA BUILD INSTRUCTIONS

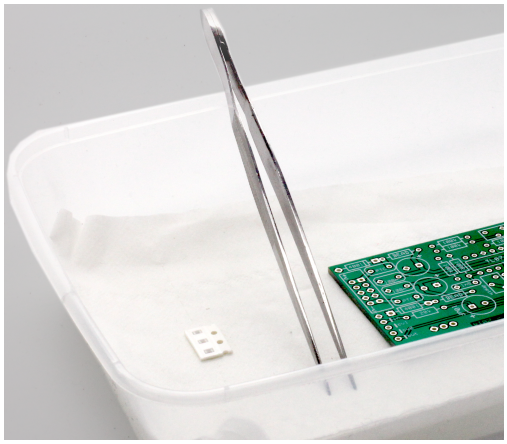
1.

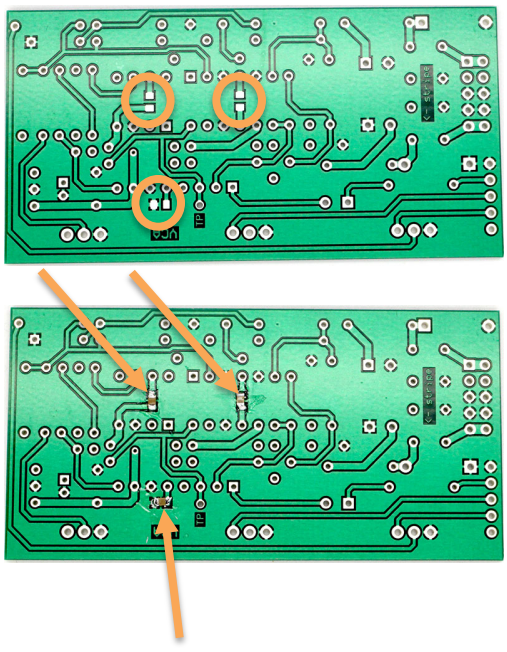
Start by emptying the **whole of the VCA bag** into a bowl or container. This makes it much easier to pick parts as you need them and you're a lot less likely to lose anything.

2.

First you will solder the three 0.1uF SMT capacitors.

When you remove the SMT parts from the white plastic packaging I highly advise doing so inside a bowl or smooth box with some soft white tissue paper inside. Carefully peel back the transparent plastic with the parts angled down so they fall into the receptacle. The tissue paper will stop them bouncing and sliding. If the receptacle is big enough to fit the PCB in while you solder even better, then when you move the part to the PCB for soldering you remove the chance of losing them.





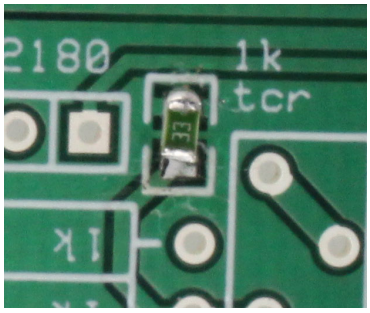
Soldering the type of SMT parts included with this kit is not hard if you have **tweezers**. You have no tricky multi pin SMT IC's or anything of that nature to deal with in this kit.

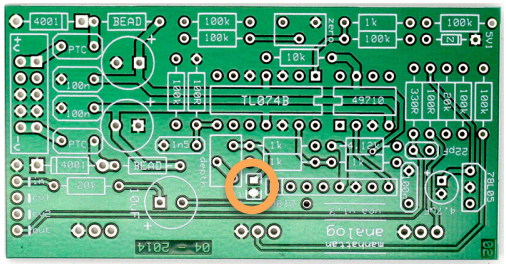
Good technique is important though. This video is a great introduction to the standard way of soldering SMT resistors and caps by hand:

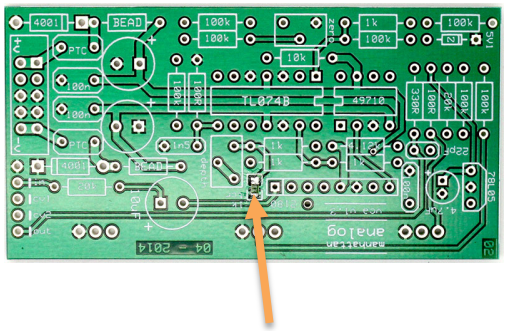
http://youtu.be/PU7wLcuqc-I

3.

Using the same technique as previously, solder the '1K tcr' SMT tempco resistor into place. The green face marked '33' should face upwards if possible but it isn't vital. Like any resistor it can be soldered in either orientation.





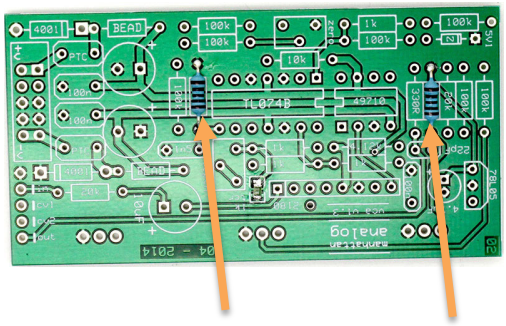


4.

Next solder the two 100R resistors into place as shown.

NOTE! *In some of the kits the 100R resistors are provided as two separate bags with 1 piece in each.*

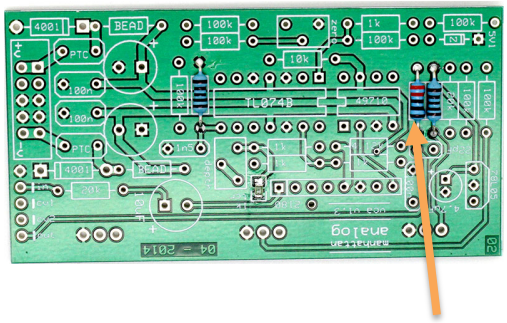
NOTE! *You should have nice shiny solder cones on BOTH sides of the board. If you have not then re-evaluate your soldering technique and equipment and revisit the YouTube video linked on page 1 and the 'good joints' image on page 2.*



5.

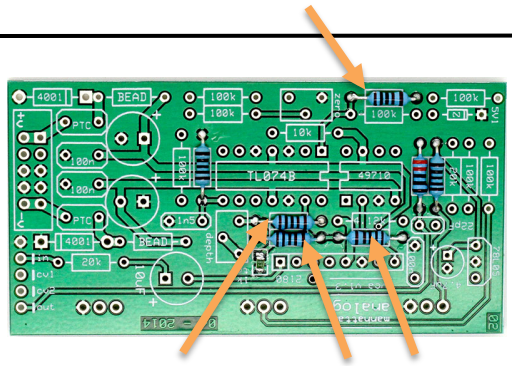
Next solder the single 330R resistor into place as shown.

NOTE! Keep a couple of resistor legs spare as you will need one later!



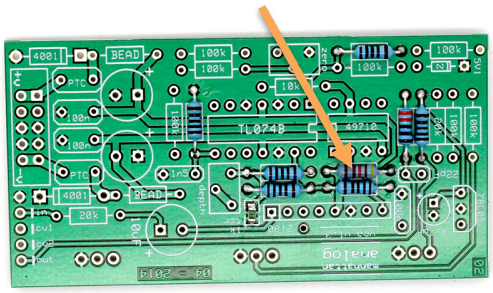
6.

Next solder the four 1K resistors into place as shown.



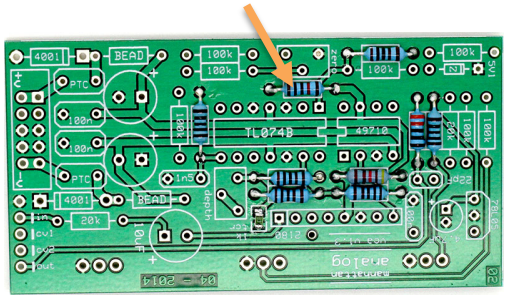
7.

Next solder the single 4.12K resistor into place as shown.



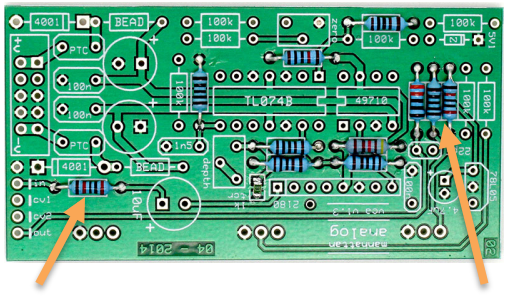
8.

Next solder the single 10K resistor into place as shown.



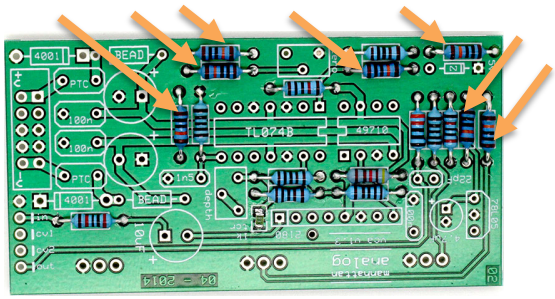
9.

Next solder the two 20K resistors into place as shown.



10.

Next solder the seven 100K resistors into place as shown.



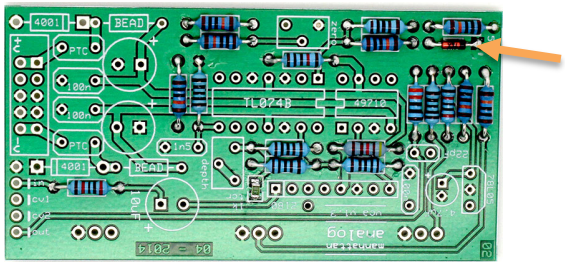
11.

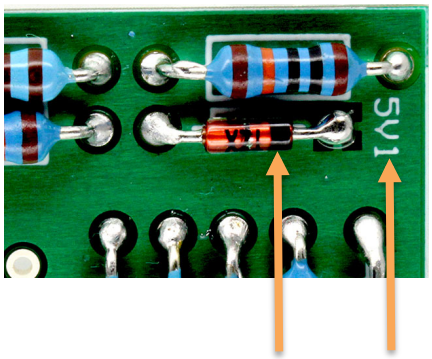
Next open the bag containing the 5 diodes, select the orange 5.1V Zener Diode and solder it into place as shown.

NOTE! *Orientation is* ***vital****. The* ***Black*** *ring on the diode should be closest to the 5V1 text.*

NOTE! *Diodes can be damaged with a long exposure to the heat of the iron.*

Solder neatly and quickly, you should achieve the nice shiny solder cones mentioned previously on both sides of the board without needing to apply heat for longer than 3 seconds per joint.





BLACK RING TEXT

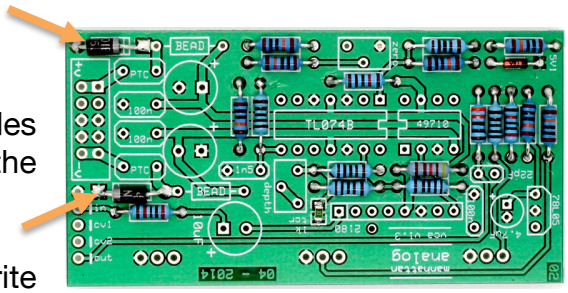
12.

Next take the two black and silver diodes marked 1N4001 and solder into the positions shown.

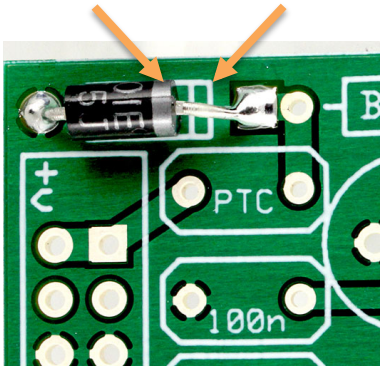
Do not mistake the two dark grey ferrite beads for the 1N4001. You are soldering the parts with writing on in this step.

NOTE! *Orientation is* ***vital****. The* ***silver*** *ring on the diode should match the* ***boxed end*** *on the silkscreen.*

NOTE! *Diodes can be damaged with a long exposure to the heat of the iron.*

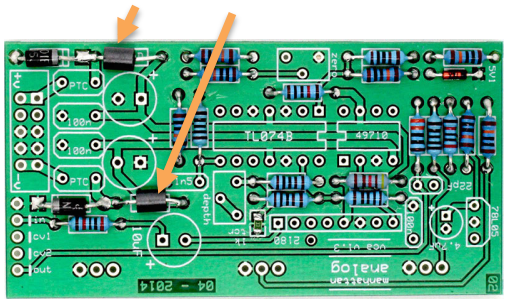


SILVER RING BOXED END



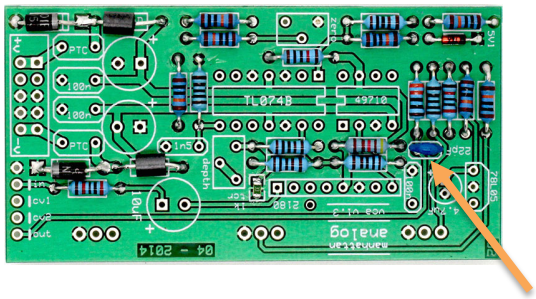
13.

Next solder the two Ferrite Beads into position as shown.



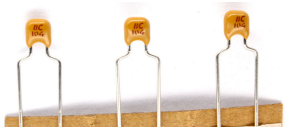
14.

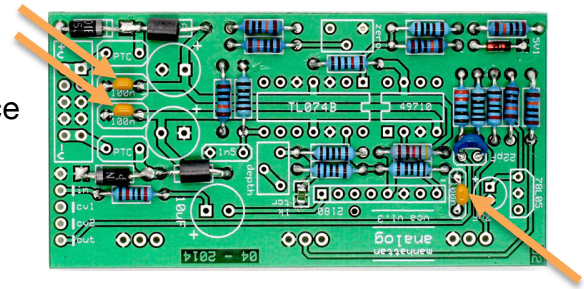
Next solder the single blue 22pF capacitor into place as shown.



15.

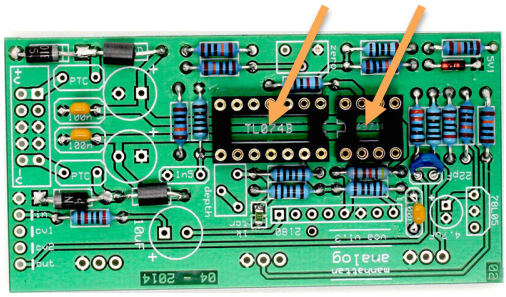
Next solder the three 100n caps into place as shown.





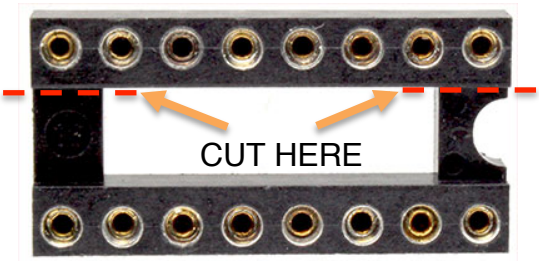
16.

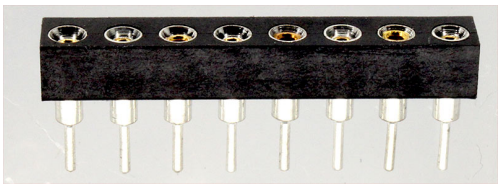
Next solder the 14 pin and 8 pin IC DIL sockets into place as shown. Make sure the notches in the sockets match the silkscreen, on this board they face each other.



17.

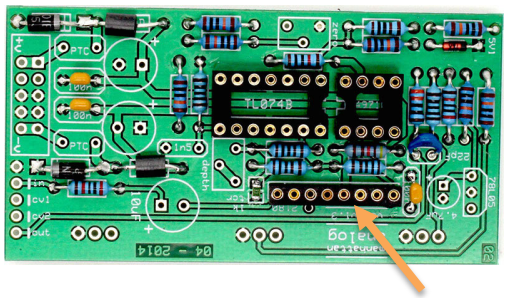
Next you're going to cut the 16 pin DIL socket in the positions shown to create a single line 8 pin socket as shown.





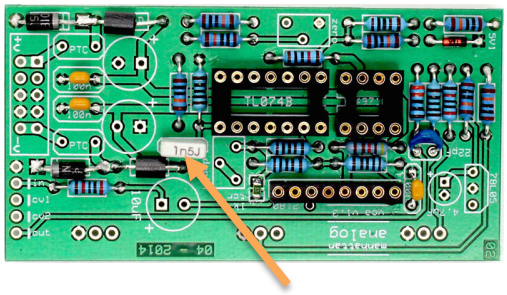
18.

Next solder your newly created 8 pin single line socket into place. The other half of the socket can be kept for future projects.



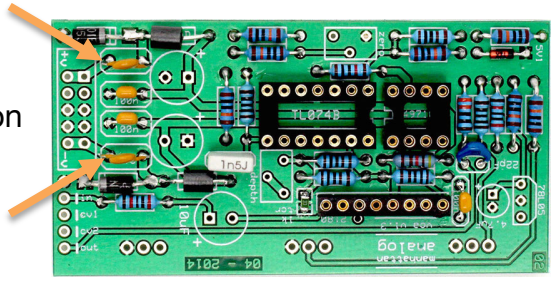
19.

Solder the single 1n5 capacitor into place as shown.



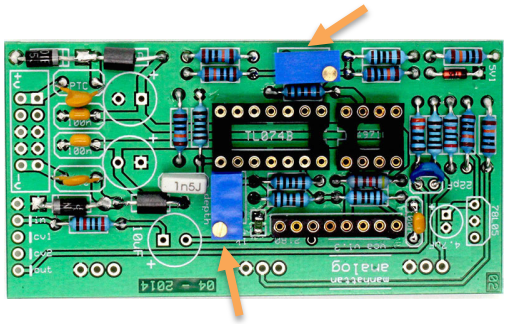
20.

Solder the two orange fuses into position as shown.



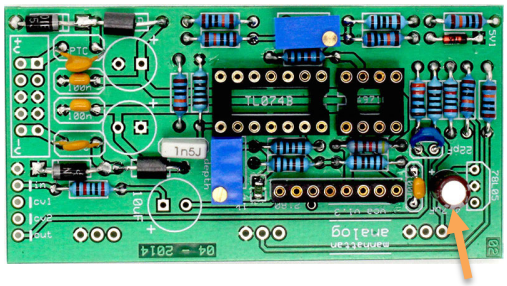
21.

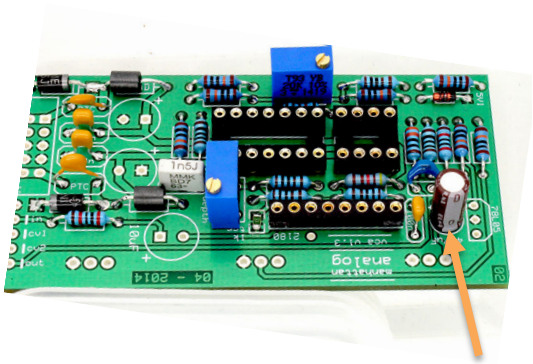
Solder the two blue trimmers into position as shown.



22.

Solder the single 4.7uF 'SILMIC II' electrolytic capacitor into position as shown.





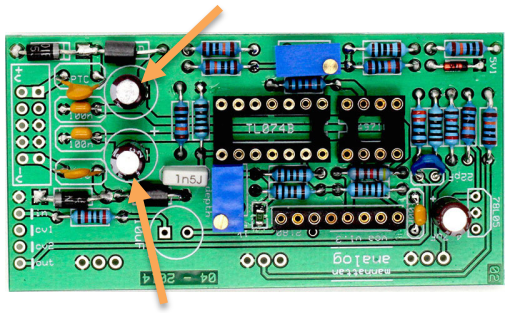
NOTE! *DO NOT MISTAKENLY SOLDER ONE OF THE TWO* ***47uF NICHICON*** *ELECTRO CAPS HERE!*

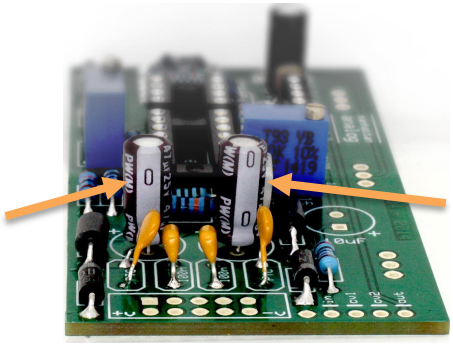
NOTE! *Orientation is vital. The longer lead on the part should be positioned in the square pad marked with the plus/positive symbol.*

23.

Solder the two 47uF Nichicon electrolytic capacitors into position as shown.

NOTE! *Orientation is vital. The longer lead on the part should be positioned in the square pad marked with the plus/positive symbol.*

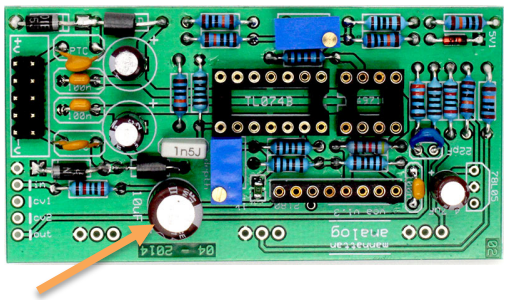


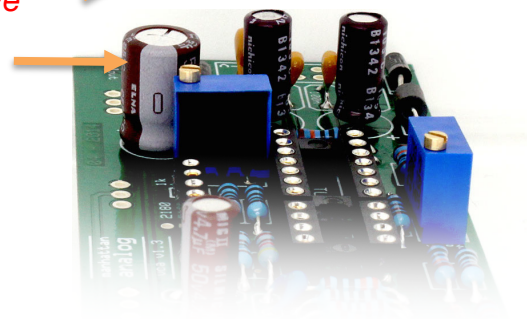


24.

Solder the larger remaining electrolytic capacitor into position as shown.

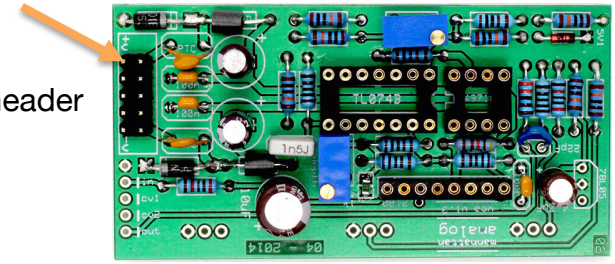
NOTE! *Orientation is vital. The longer lead on the part should be positioned in the square pad marked with the plus/positive symbol.*





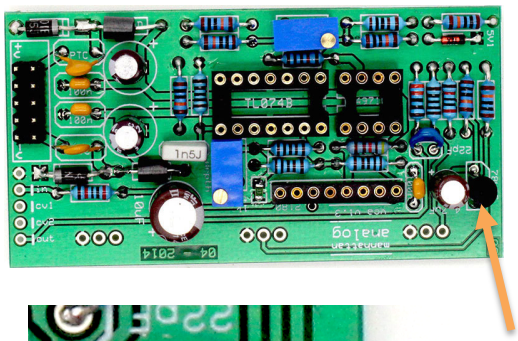
25.

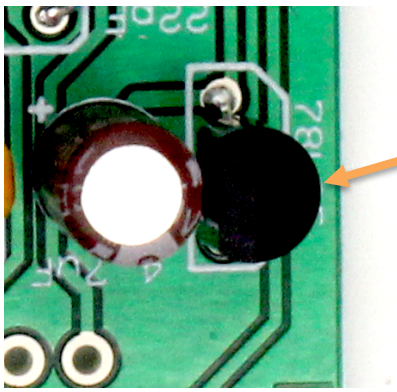
Solder the ten pin Eurorack power header into position as shown.



26.

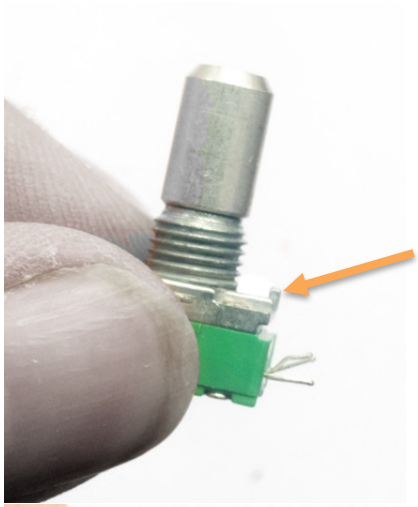
Open the yellow ESD packet and solder the 78L05 into position. The rounded side of the component faces out towards the edge of the board.

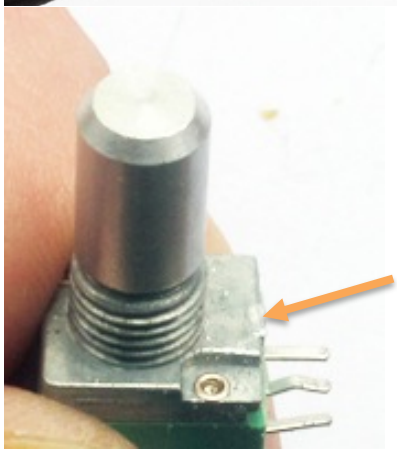




27.

Remove the nut and washer from each pot and cut or break off the small anti-rotation lug on each one.

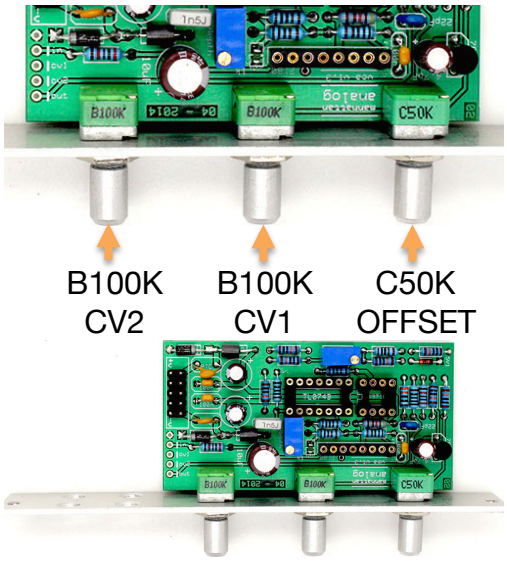




28.

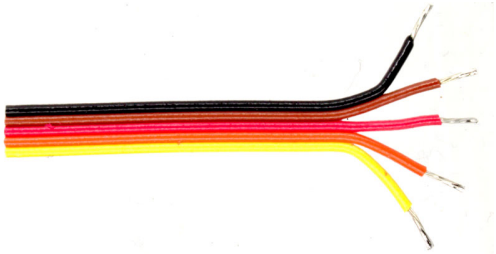
Next position the pots as shown but DO NOT SOLDER yet. Hand-tighten the nuts and washers onto the pots to secure the panel into place.

Make sure all three pots are flat and touching the PCB then solder all 9 joints. You may just want to tag one terminal on each pot with solder first so that the pots are all definitely flush with the PCB. Then finish the other 2 joints on each pot. Remove the panel again and put the washers and nuts somewhere safe.



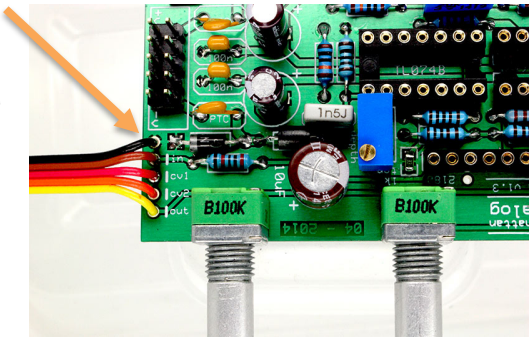
29.

Next take the coloured ribbon wire provided, break it down to a 5 stranded piece, fan out one end, strip the insulation and tin the conductors.



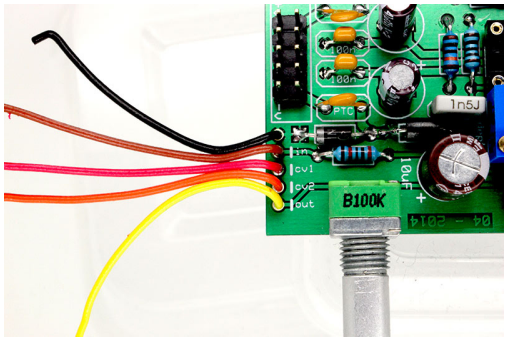
30.

Solder into place as shown so there is one wire going into each of the 5 pads as shown.



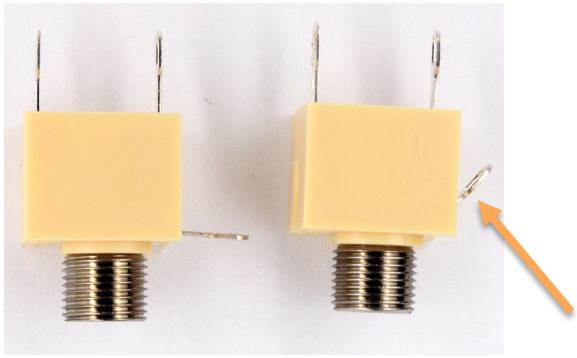
31.

You can now split the wires apart.



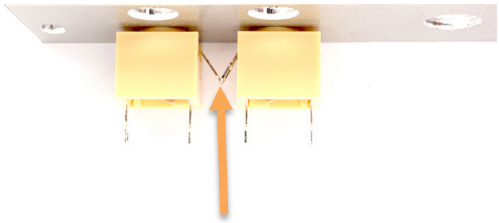
30.

Take the four cream coloured jacks and bend the ground pins up as shown.



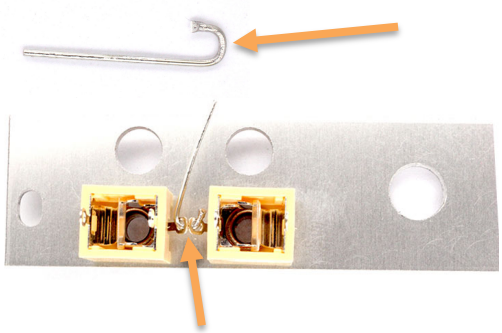
31.

Tighten the jacks into place on the CV1 and IN positions so the ground pins are touching as shown.



32.

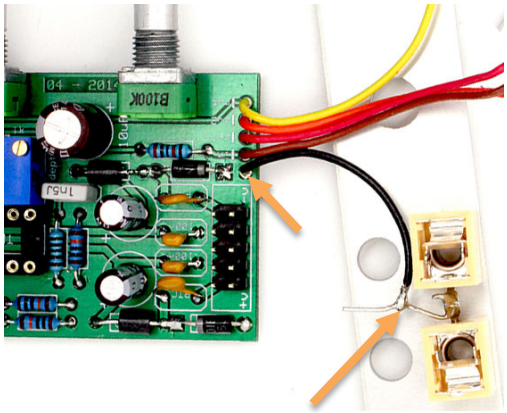
Take one of the resistor leads you saved earlier, use pliers to bend into a 'crook' shape and thread through the two touching jack ground pins. Solder so there is a solid conection between the jacks and the lead.



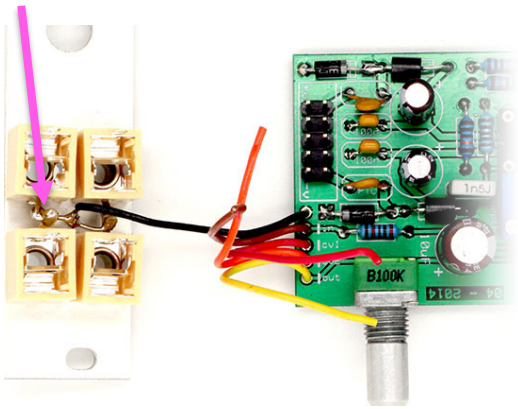
33.

Now solder the wire going from the ground pad on the PCB (my wire here is **black** yours may be a different colour!) to the centre of the jack lead.

The Ground pad is the one closest to the power socket.



34.

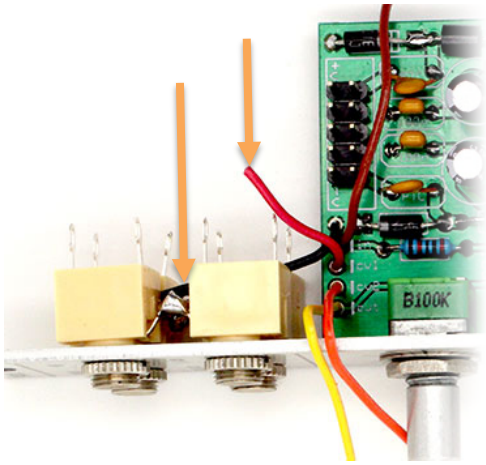


Next you need to fix the other two jacks to the panel and solder both ground pins together to the lead. It's easiest to thread the ground pins onto the hanging lead BEFORE pushing the jack barrel through the hole in the panel.

Now there is a connection between:

1. The ground pins on all 4 jacks
2. The bridging resistor lead
3. The wire to the ground pad on the PCB

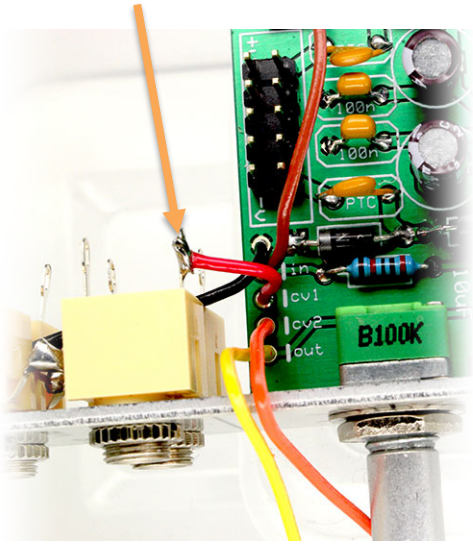
35.



Push the ground wire down between the four jacks so it is out of the way and secure.

Cut the **CV1** wire down (in my diagram it's red, yours may be a different colour) so that it's extending about 1cm further than the closet vertical pin on the **CV1** jack. Check the panel legend for reference!

36.

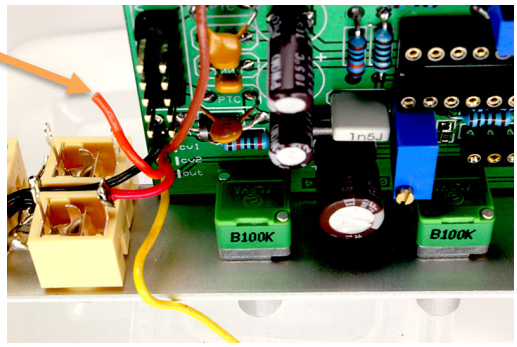


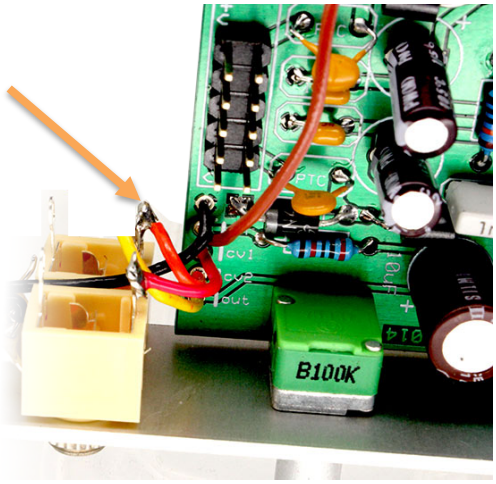
Strip then solder the **CV1** wire (red in my photo) to the nearest pin on the **CV1** jack

37.

Now repeat the process with the wire leading to the **CV2** pad on the PCB (in my photo it is orange).

Trim the **CV2** wire so it protrudes 1cm from the nearest vertical pin on the **CV2** jack and solder.

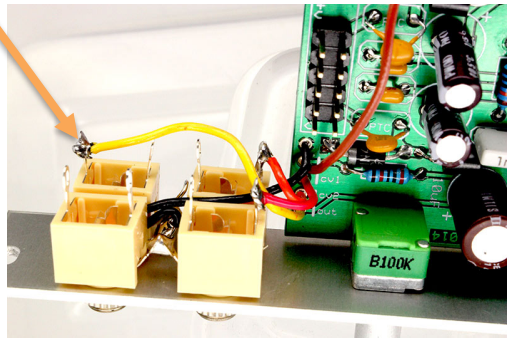




38.

Now solder the wire from the **OUT** pad on the PCB to the vertical pin furthest from the PCB on the **OUT** jack.

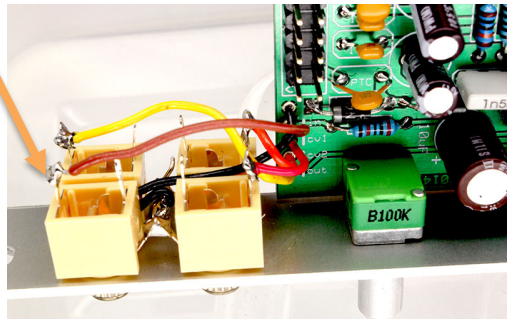
In my photo this wire is yellow.



39.

Finally solder the wire from the **IN** pad on the PCB to the vertical pin furthest from the PCB on the **IN** jack.

In my photo this wire is brown.

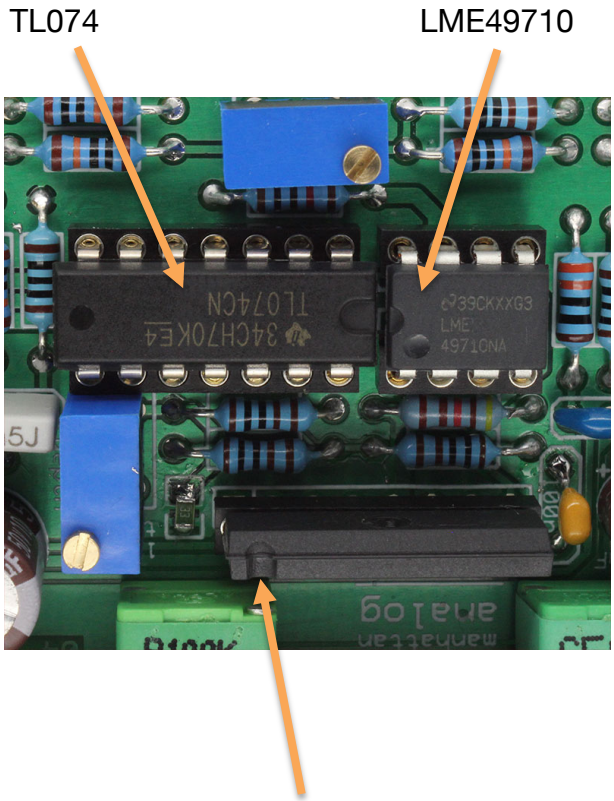


40.

Take the remaining three ICs from the black foam in the ESD packet and position as shown. Make sure the notches in the **TL074** and **LME49710** are facing inwards as shown and matching with the notches on the IC sockets.

Note that on the single row header you cut down to size, there is a box marked on the PCB, at the point closest to the blue trimmer. Align the notch on the **THAT2180B** chip.

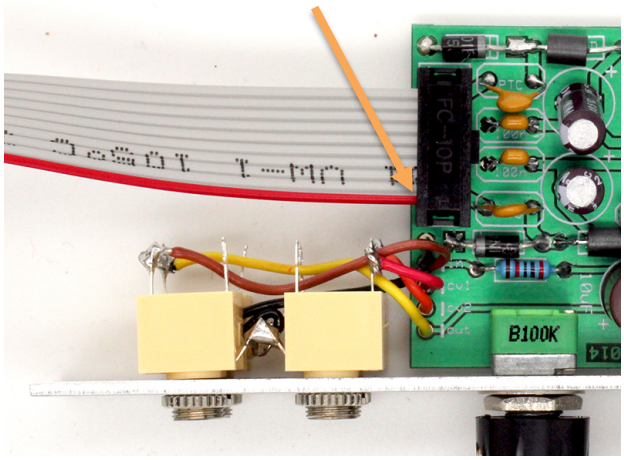
The pins on the **THAT2180B** are quite long so take care to not bend them when pushing into the socket. A little effort is required at first but once it starts moving it will slip in easily.



41.

Finally connect the power cable as shown, so the red stripe is at the point on the board marked –V, closest to the frontpanel.

Next we'll connect the power, switch on and user a Multimeter to trim the module.



42.

Here are the Manhattan Analog instructions for trimming the module.

1. Probe the pad on the PCB marked 'TP' ("Test Point")
2. Set offset to max CW (full volume) *or* insert a +5.00V CV source into one of the inputs
3. Use the trimpot labelled 'zero' to set the voltage @ 'TP' to 0V
4. Set offset to max CCW (off)
5. Use the other trimpot to set voltage @ 'TP' to 305.00mV, give or take ~3mV (~1%).

It should then open fully to unity gain with a +5V CV signal. The zener diode limits the offset + incoming CV sum to ~5.14V, so if you mash it up to the diode's break point you'll get a little bit of positive gain with it trimmed to unity at +5.00V.

If you like distortion I encourage you to tweak the trimpots to taste as you can really overdrive it by setting the zero-point (step 3) to a positive value. (*this is from memory so forgive me if I got something backwards...) The THAT chip sounds really meaty when you overdrive the shit out of it. It's not a bad distortion module if patched/set up that way. cool

Alternative CV response is possible - you can set it up to accept 8V or 10V signals by changing the zener diode to an appropriate value and trimming as above. I did a few @ 8V as prototypes when I ran out of 5.1V zeners.