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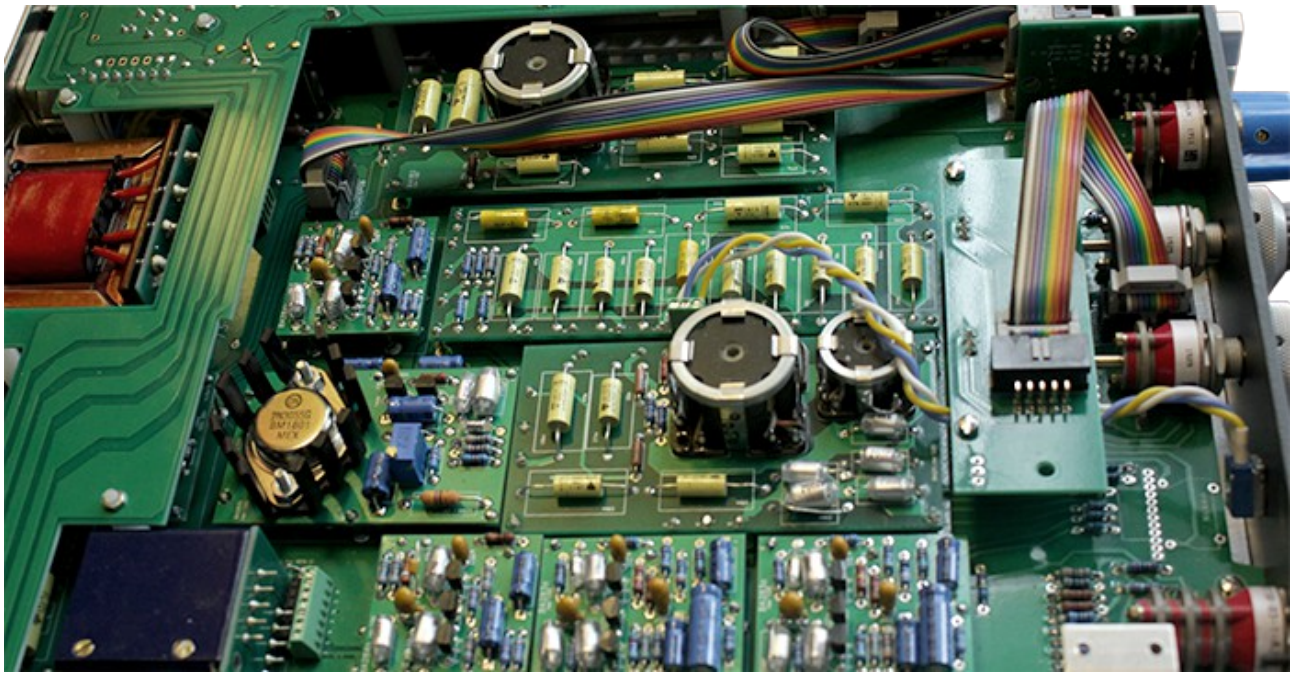
2NV73

ASSEMBLY GUIDE

REV: 1:00



QUICK ASSEMBLY GUIDE

6 STEPS TO MIC PRE & EQ HEAVEN!

1. Solder parts on PCBs
2. Place PCBs in metal work
3. Make ribbon cables
4. Initial test
5. Set bias
6. Attach face plate & knobs

Record!

Frequently Asked Questions (FAQ)

Q. Is there a schematic that would be useful?

A. Schematics for the build can be found here: Schematics
PCB designations reference this.

Q. How can I power the unit?

A. As standard, there is an internal power-supply in the 2NV-Rack. Simply connect a 24VAC power brick, and that's it. Alternatively you can power it via the +24V or -24V rail of your 51X lunchbox.

Q. How do I set up the unit to use +24V of my 51X lunchbox?

A. Refer to page 8

Q. How do I set up the unit to use -24V of my 51X lunchbox?

A. Refer to page 8

Q. I have never made ribbon cables before, is it difficult or time consuming?

A. The opposite! All you need is a small vice.. you insert the ribbon cable into it's housing, making sure it's aligned straight, and then squeeze in the vice, and that's all there is to it!

Q. Who can build this?

A. You!
As long as you have patience and are thorough in your work, anyone can build these units. There's lots of support and information and it is tried and tested. There is very little off board wiring too.

1. Solder parts on PCBs

Insert all parts on to the PCB as marked on the silkscreen.
Silkscreens can be downloaded here: silkscreens

GENERAL TIPS:

• Start with smaller parts (resistors etc.) and work up to the larger parts (caps etc.)

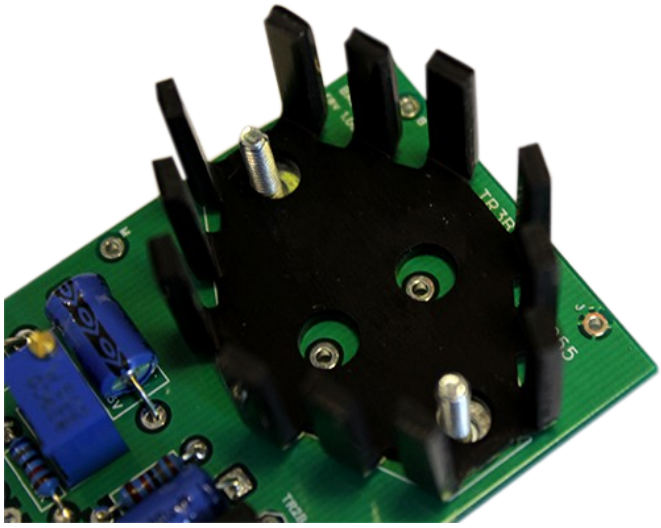
• Take care when soldering polystyrene caps as they are particularly sensitive to heat. So try not to take too long when soldering them.

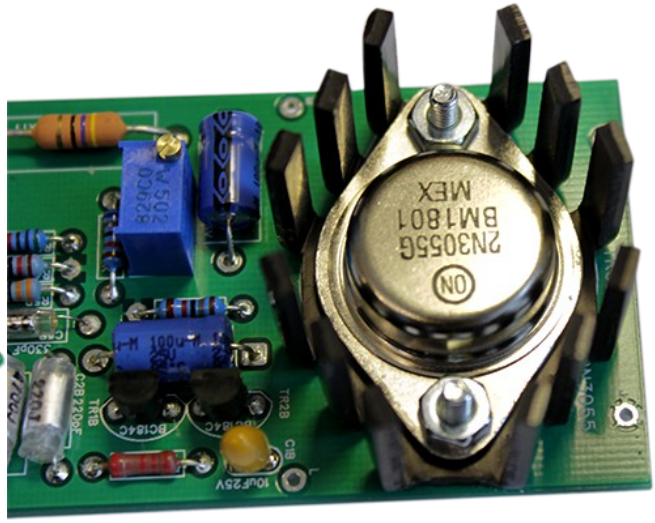
• Before soldering the DI PCB, decide whether you will use +24V or -24V when powering the unit via a 51X lunchbox. See page 8.

For the 'BA' PCBs:

It'll be easier to solder the PCB pins last, once everything is soldered. So just solder the other parts for now.

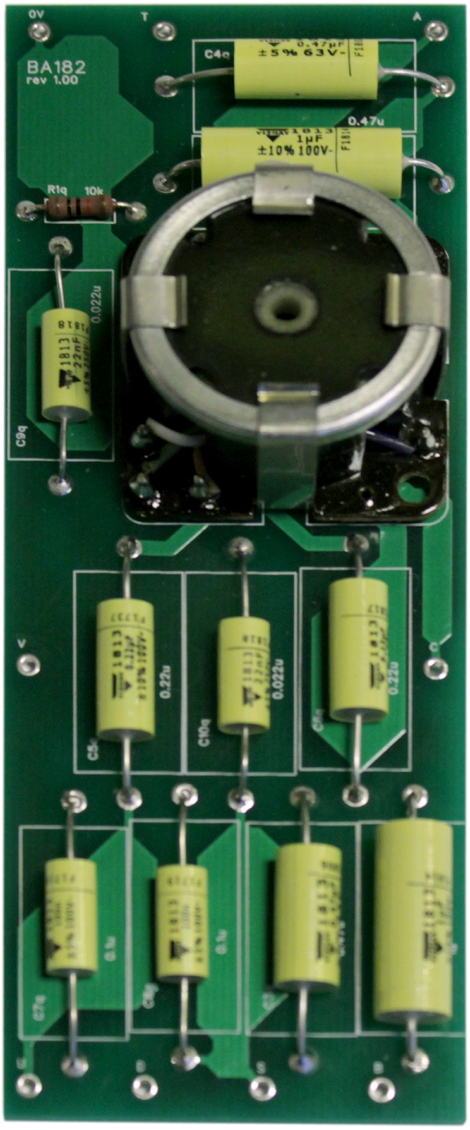
For the BA283b:

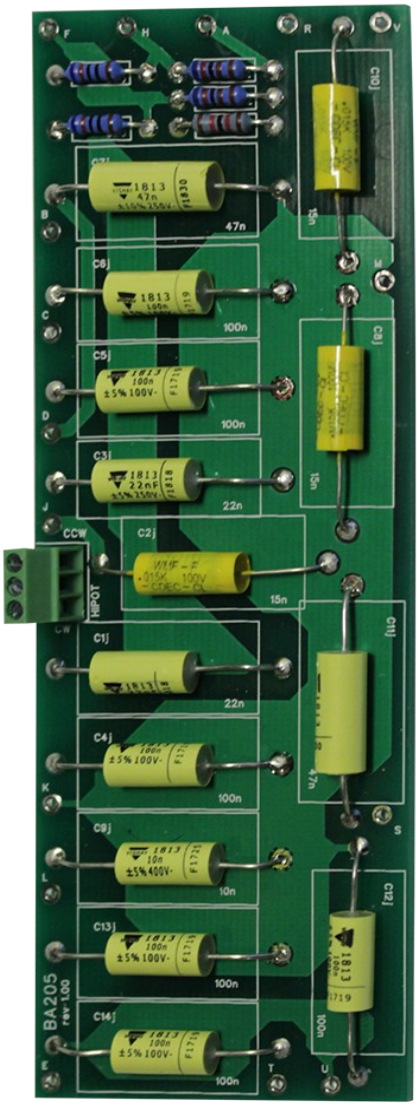


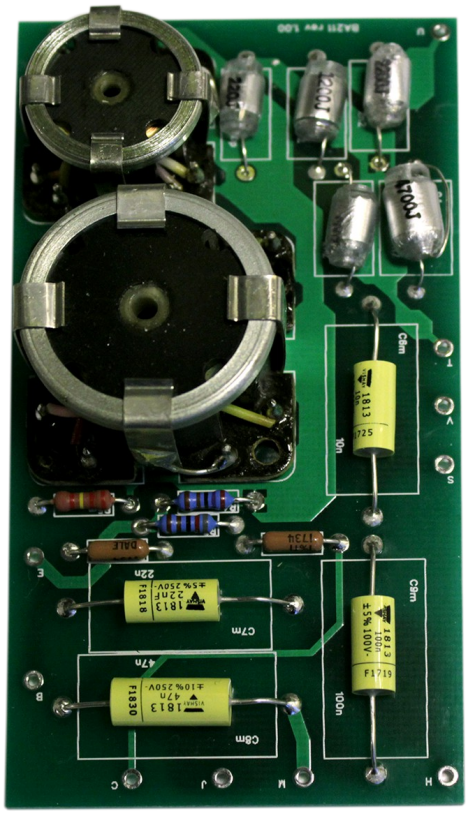


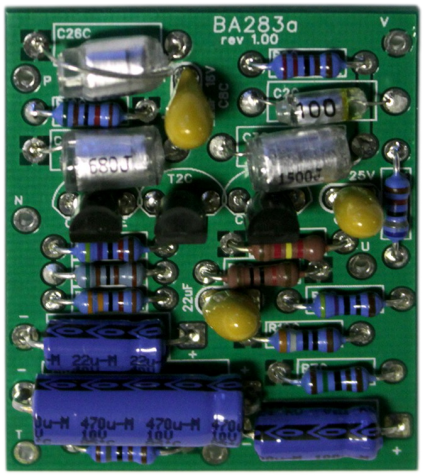
The 2N3055 will be placed on to the heatsink using the 2N3055 screws and nuts, and then soldered.

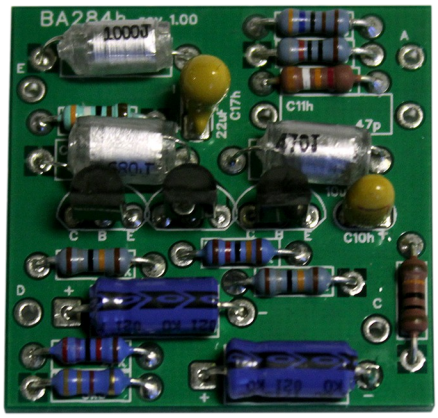
The 'BA' PCBs will look like the following:







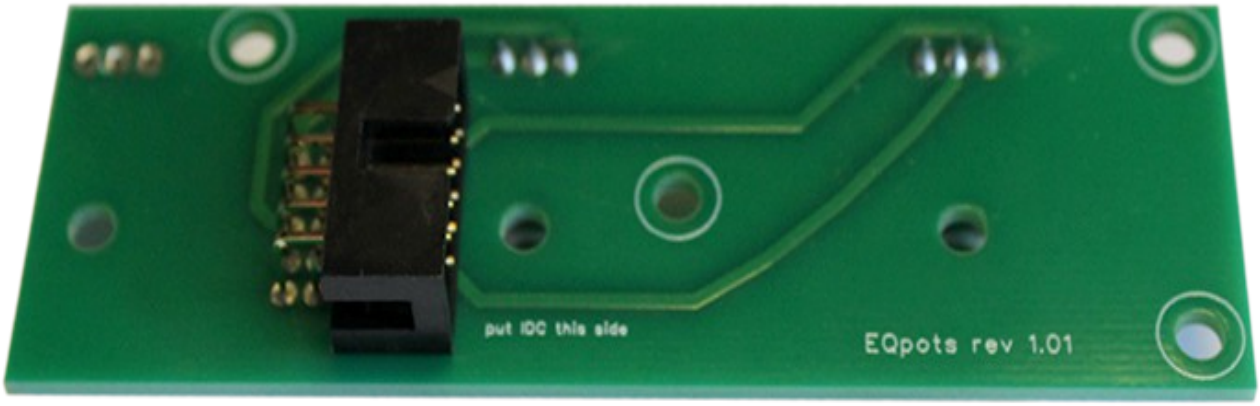




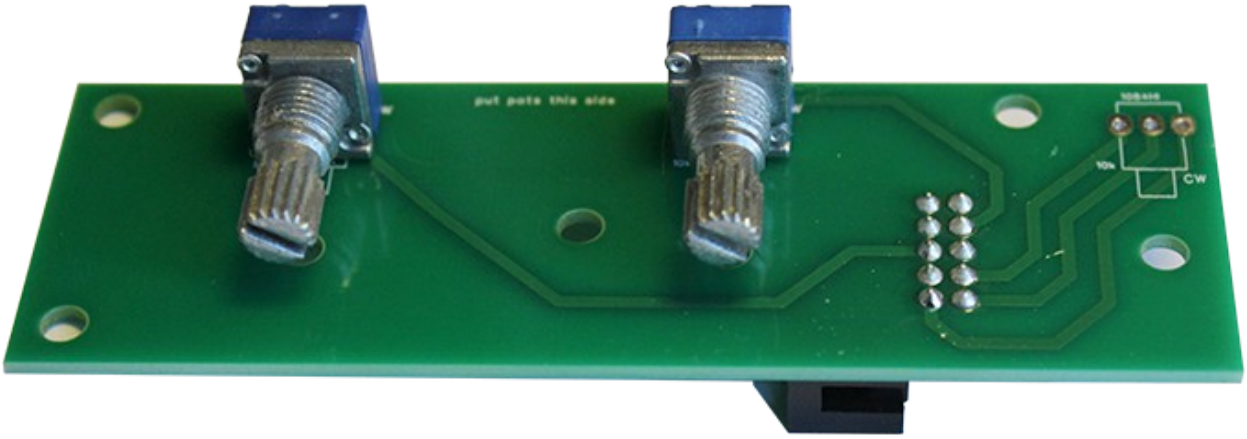
For the EQpots PCB:

TIP: *Use blu tack to align the pots straight, then just solder the middle pins. Check alignment, and if not ok, you can heat the middle pin again and adjust. When happy, finish soldering the other pins.*

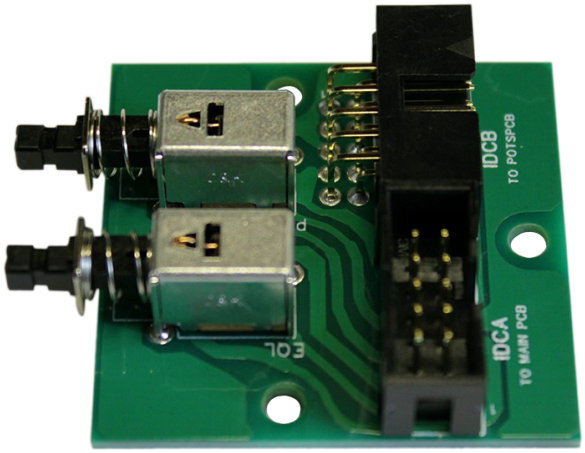
EQpots PCB top:



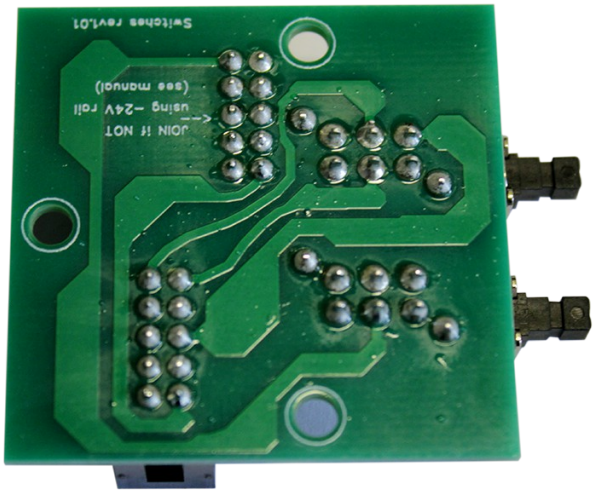
EQpots PCB bottom:



Switches PCB top:



Switches PCB bottom:



Powering options:

There are 3 powering options possible with the 2NV units.

- Internal +24V PSU of 2NV-Rack
- +24V rail of your 51X lunchbox
- -24V rail of your 51X lunchbox

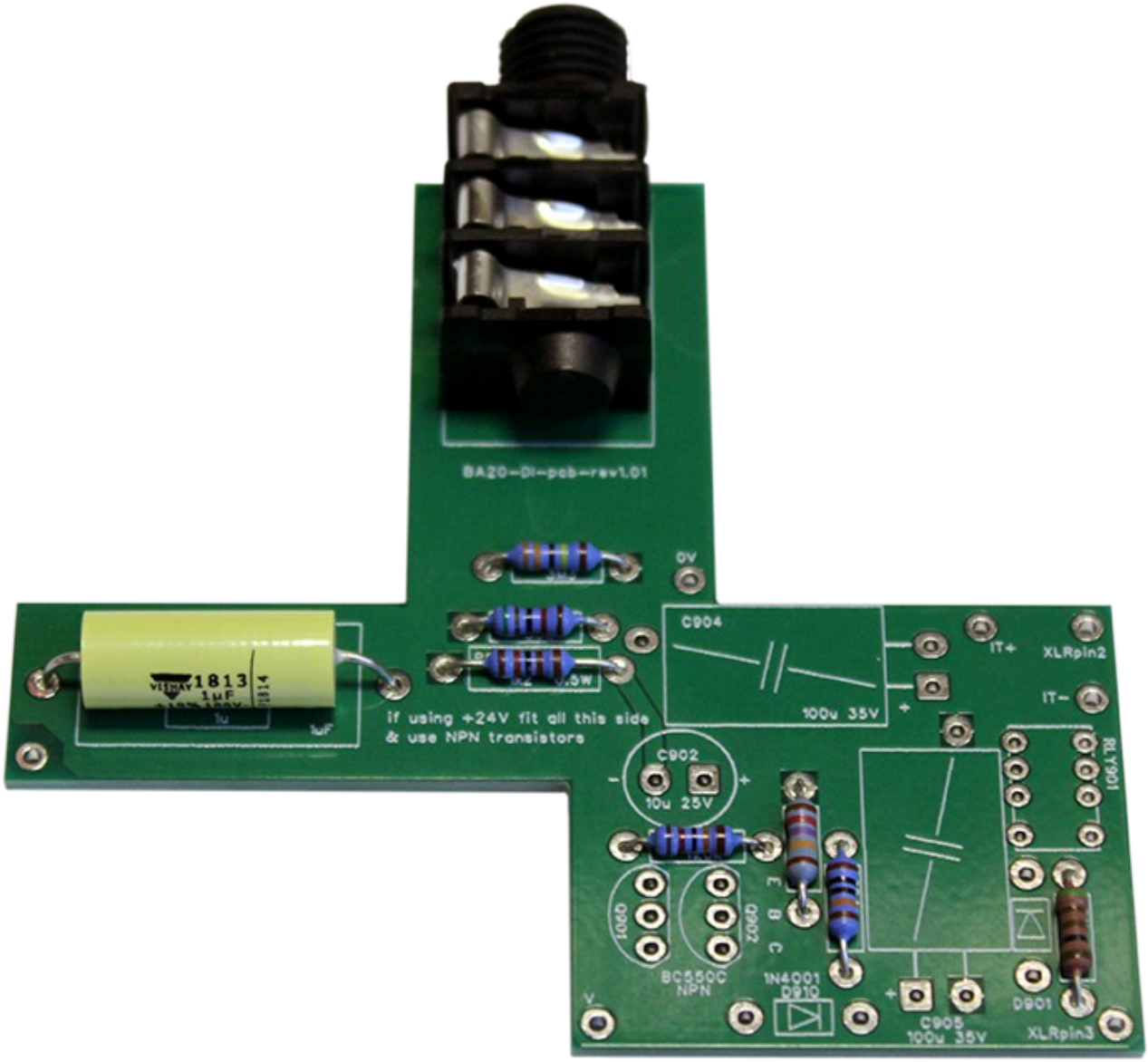
There is a switch on the 2NV-rack which will switch between internal PSU and the 51X rail.

For the DI circuit, if you will NOT be using the negative 24V rail of your 51X lunchbox, you will solder it as per +24V. The DI will work on both 51X and internal PSU switch options.

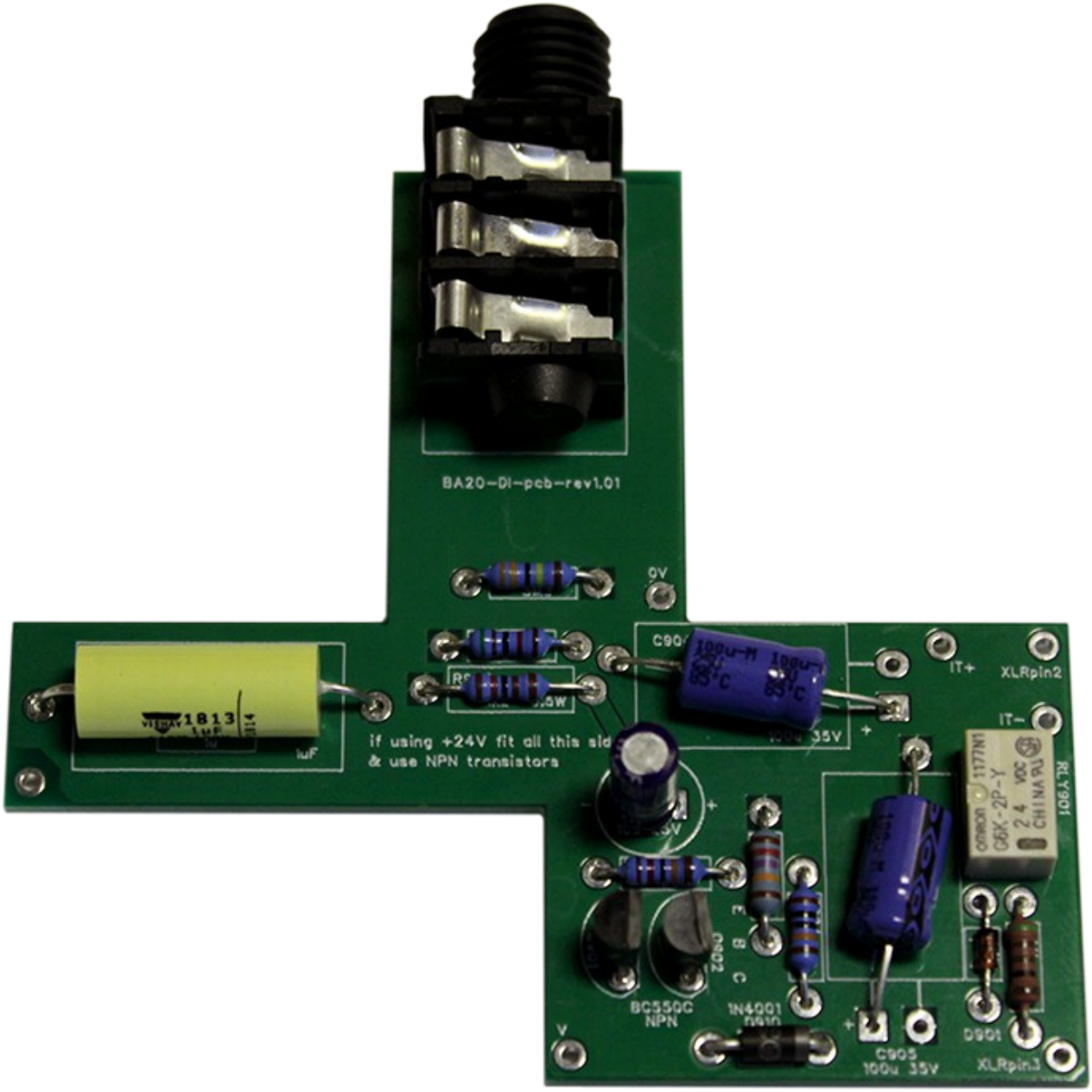
If you WILL be using the negative 24V rail of your 51X lunchbox, you will have to decide whether you want to configure the DI to work with the internal PSU of +24V, or the -24V of the 51X. (note: no damage will be done, it will just only work with one option. Micpre/EQ etc will still work as normal of course.)

To solder the DI PCB:

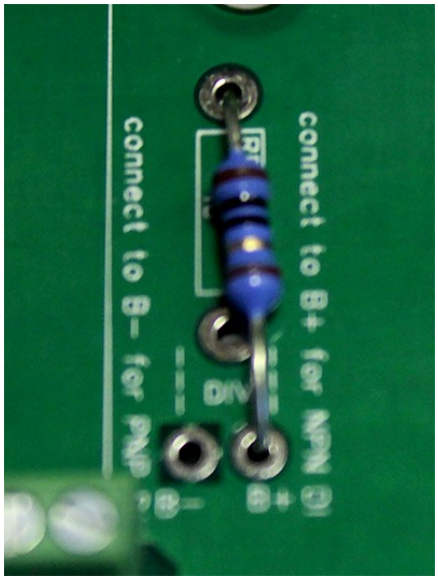
Common parts to both +24V and -24V powering options:



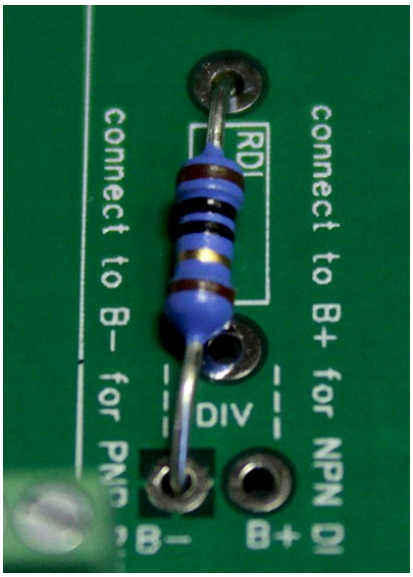
For +24V option (standard):
(Parts soldered as per top silkscreen)



The two other things to set regarding the powering option, will be the DI resistor on the MAIN PCB. This feeds the voltage rail to the DI PCB. Either **+24V** or **-24V.**

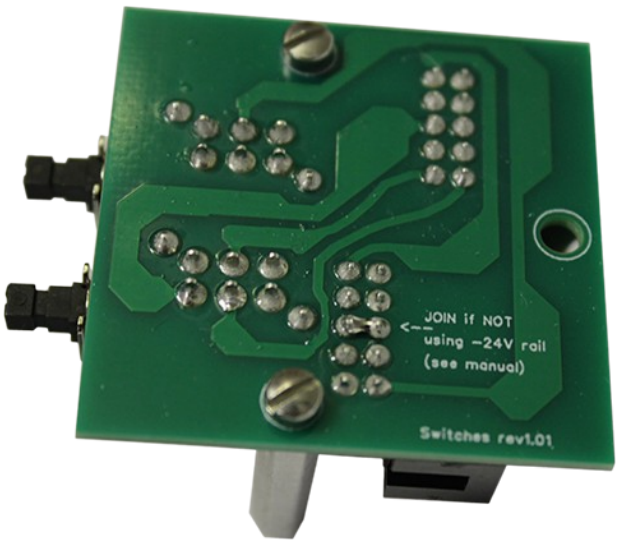


+24V

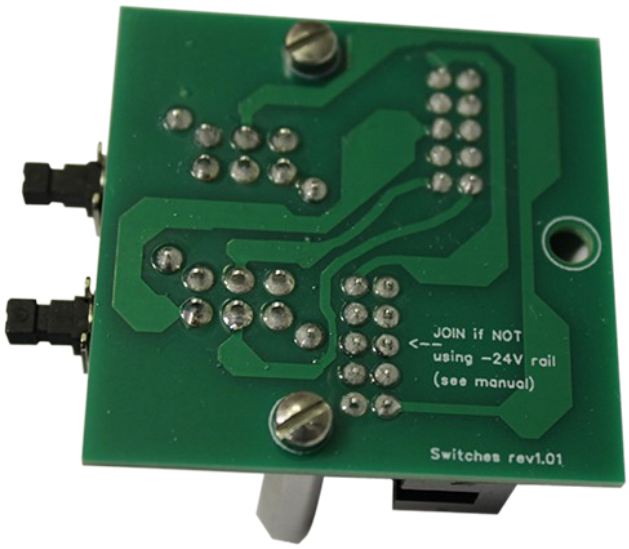


-24V

The switches PCB, will need to be jumpered for +24V or left unjumped for -24V.



+24V



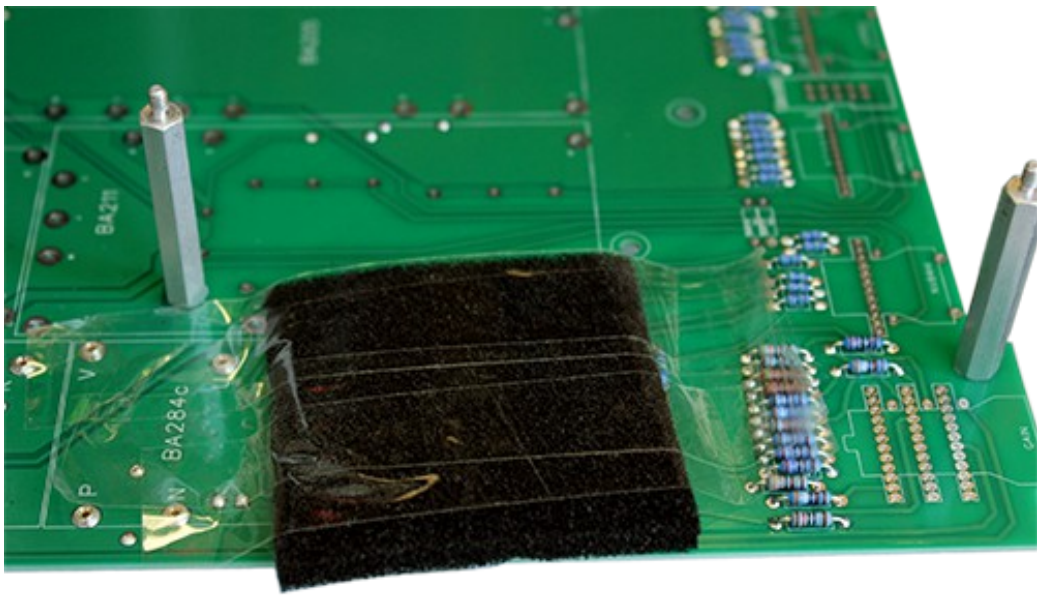
-24V

And that's all you need to do for powering options.
You can now continue soldering everything as per normal.

For the MAIN PCB:

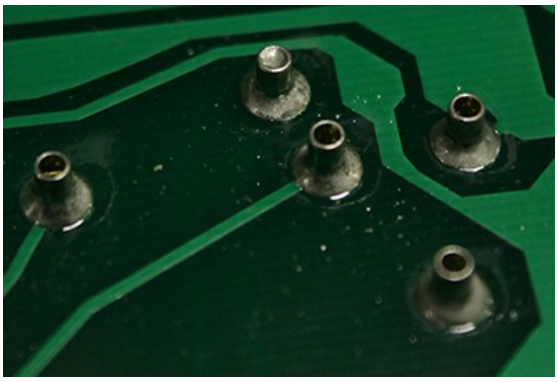
Again, I recommend starting with the parts on the underside. Then resistors, smaller parts, and then finally larger parts.

PCB Sockets:
The easiest way to do them is to use a piece of foam (like what some of the transistors will be delivered in by Mouser) and tape it down. This allows you to solder multiple pins at once. (tip: don't hold too much pressure on the soldering iron so that the pins don't move and misalign)
Or you can use blu tack again to hold the pins in place while you solder.



Using foam taped down to hold in PCB pins whilst soldering.

TIP: You may like to solder a couple of the PCB pins to close them, so as the BA PCBs do not drop too low into the MAIN PCB.

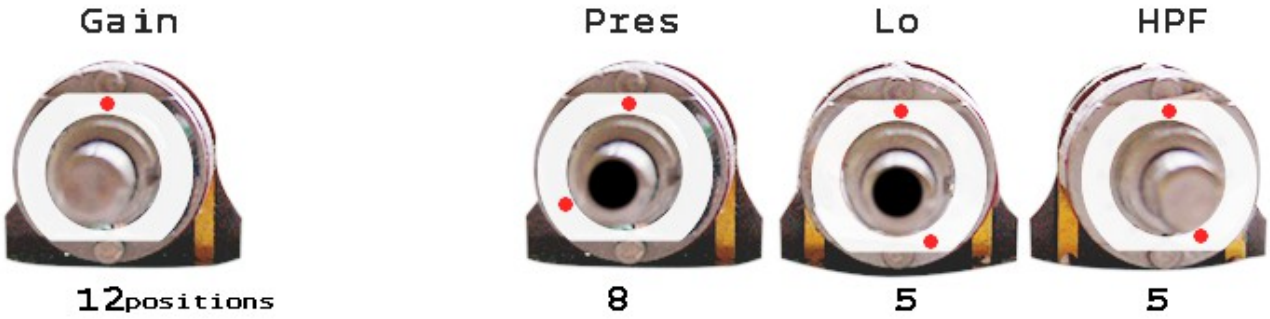


Be careful not to add too much solder of course or you will block the closing mechanism inside.

DO NOT do this to the DI sockets, as that will be held up by the DI jack itself, and it will be more difficult to align correctly with the sockets closed.

For the Grayhill switches:

You will set the pins before soldering.
They will be set as follows:

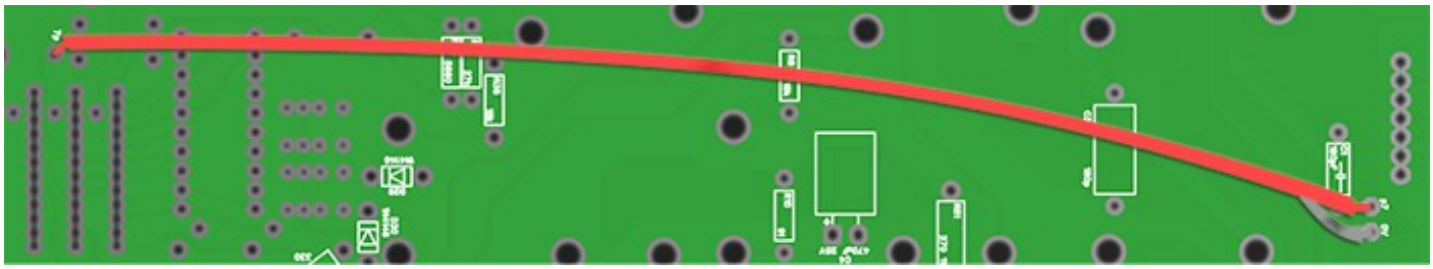


Once the pins are set, you will stick on the sliver stickers.

*Note the extra position on the “Presence”. There was room on the PCB, for an extra cap to make an extra frequency without affecting the rest of the circuit, so it was added as a 'secret' extra frequency. You can of course have 7 here as per the original, but really no reason to not have the extra frequency.

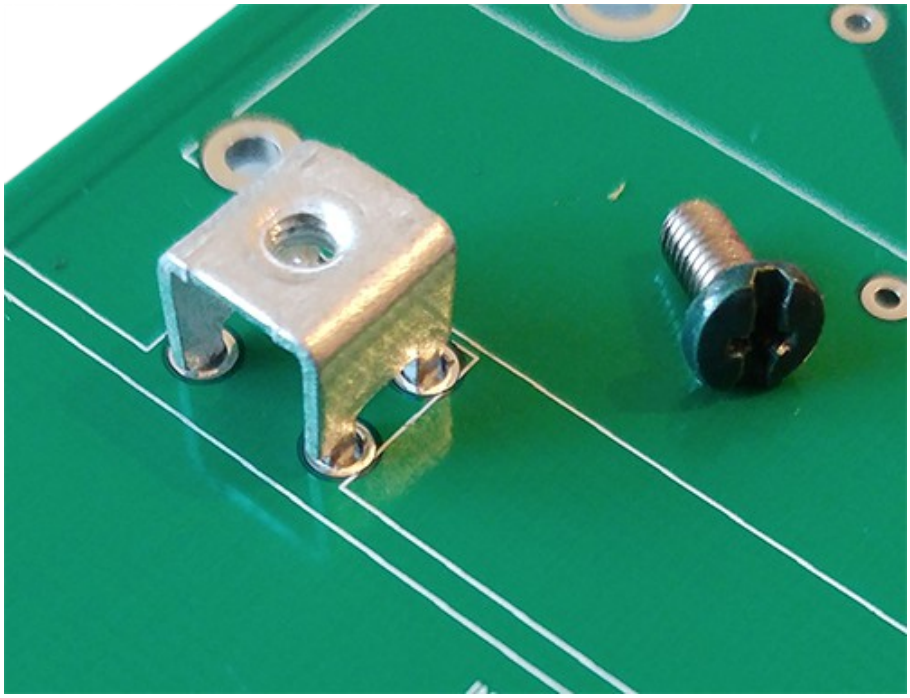
On the concentric Grayhills, you will use the PCB support in the Mouser cart to secure to the PCB. Add it with its nut before fitting into the PCB.

Pin 7 cable:
You will need to join “7p” to “p7” using a length of shielded cable. You will connect the shield only at one end. (pin marked “0V”)

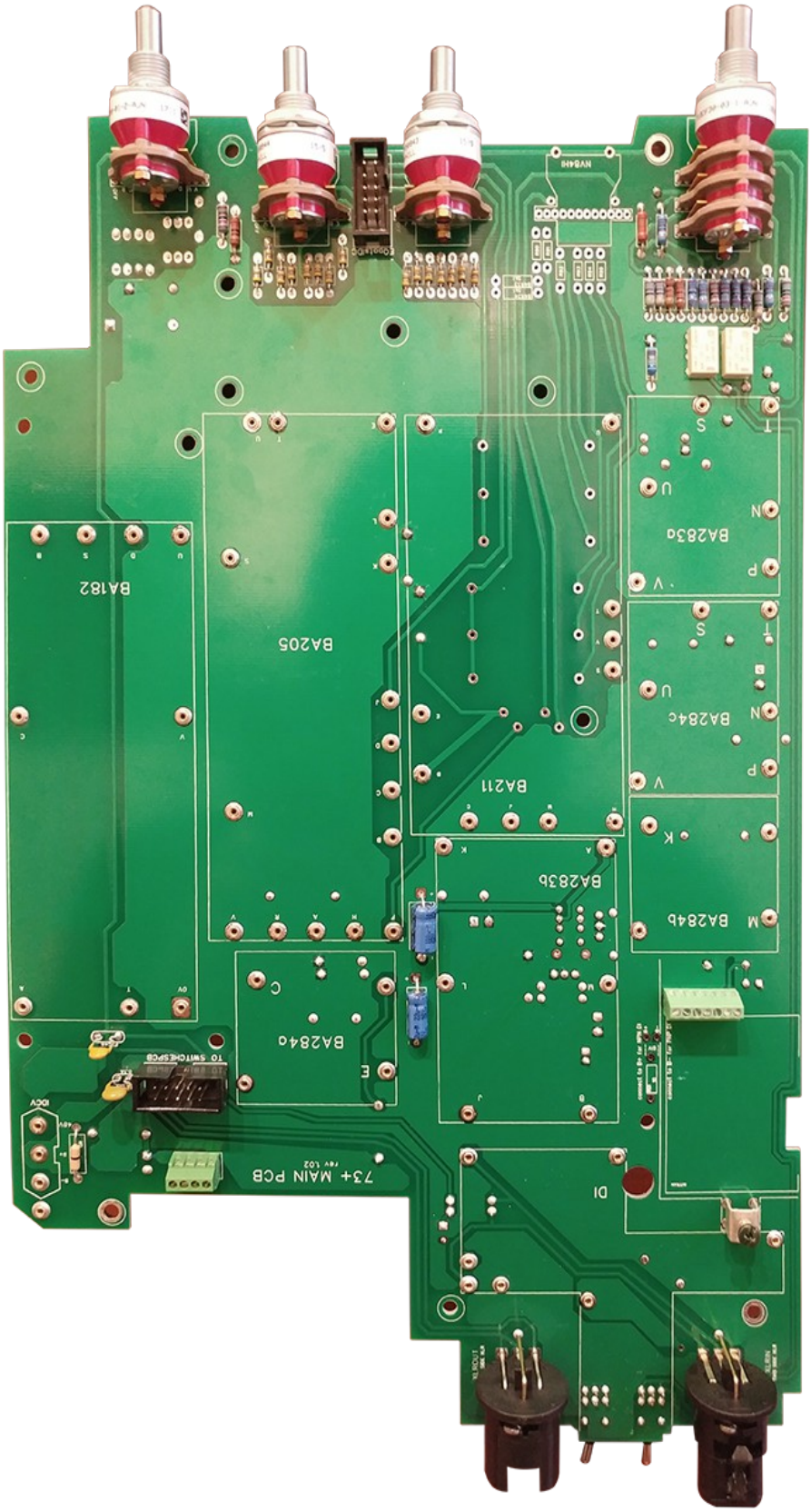


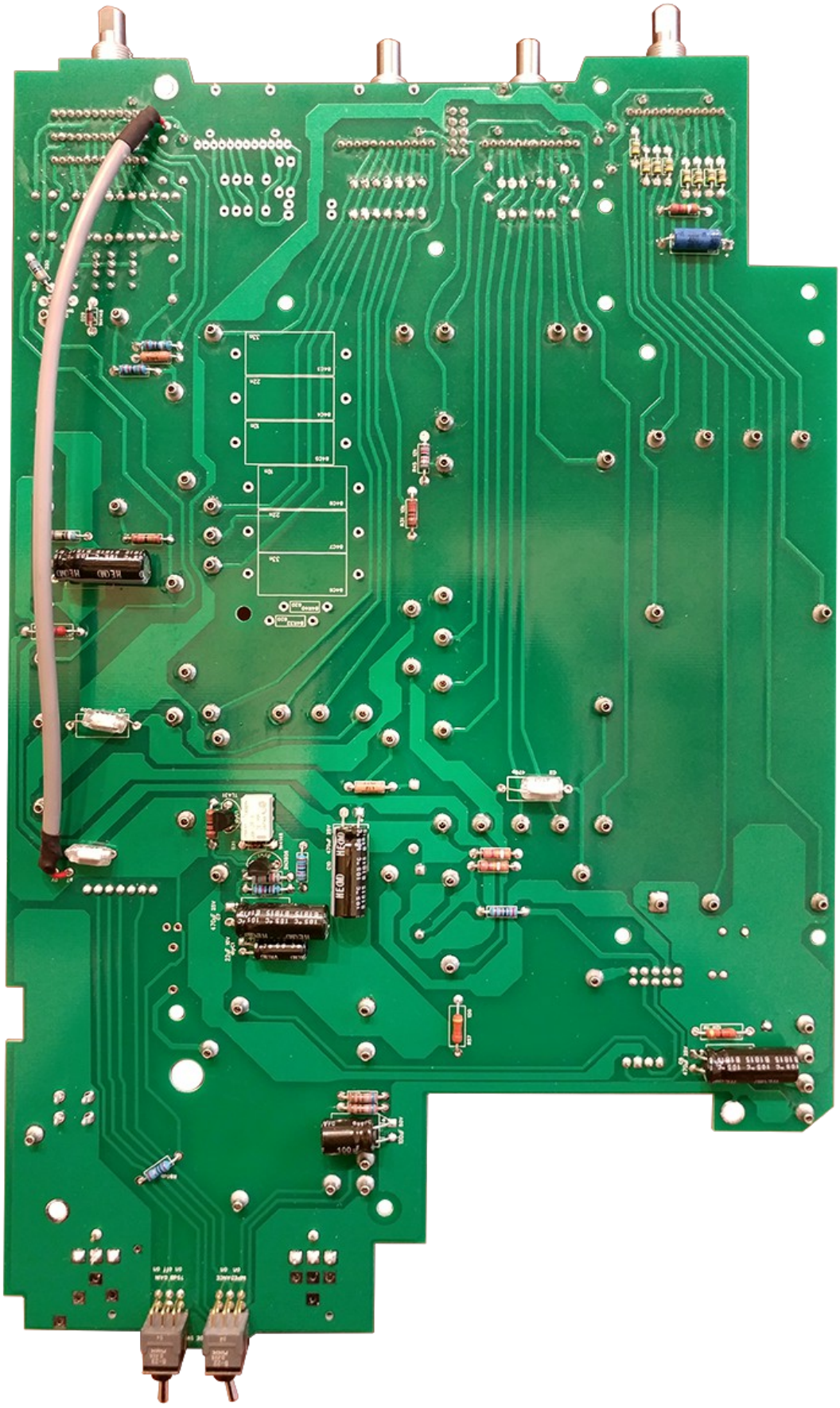
Input transformer PCB screw mount:

Be sure to push the screw mount for the input transformer hard enough into the PCB so its legs go in correctly. See picture below:



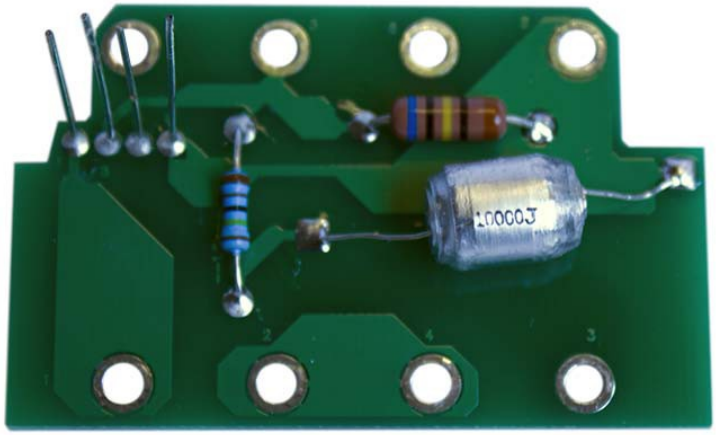
The main PCB will look like this:



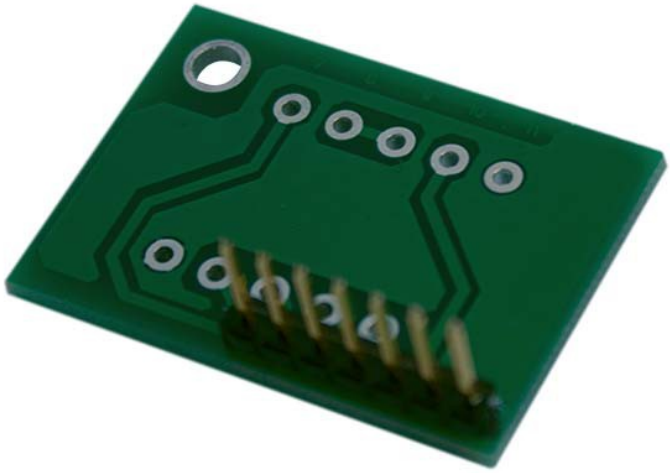


Output transformer PCB:

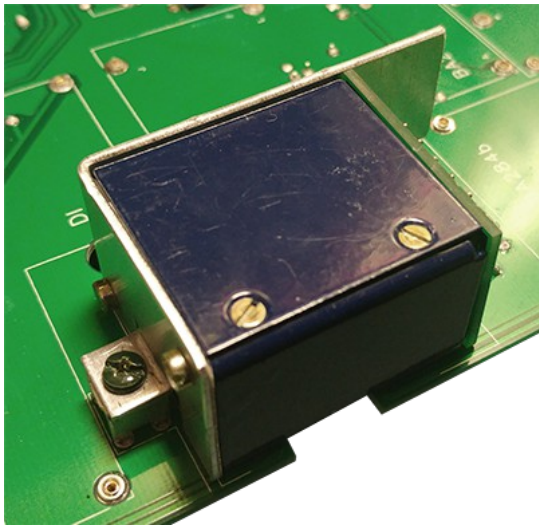
Use left over cuts of resistor legs for the pins. Leave them long and cut them to length later when aligning in the metalwork, to ensure they are the correct length.

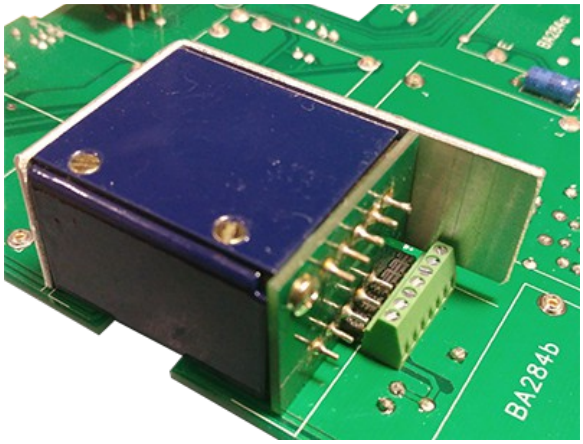


Input transformer PCB:



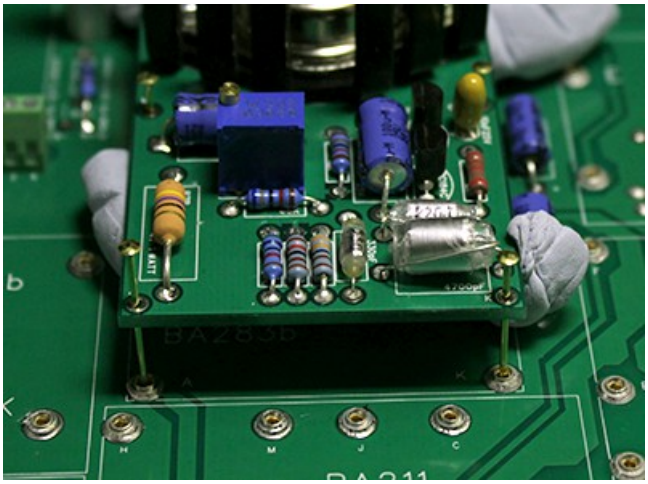
The Input transformer will be attached to the main PCB as follows:



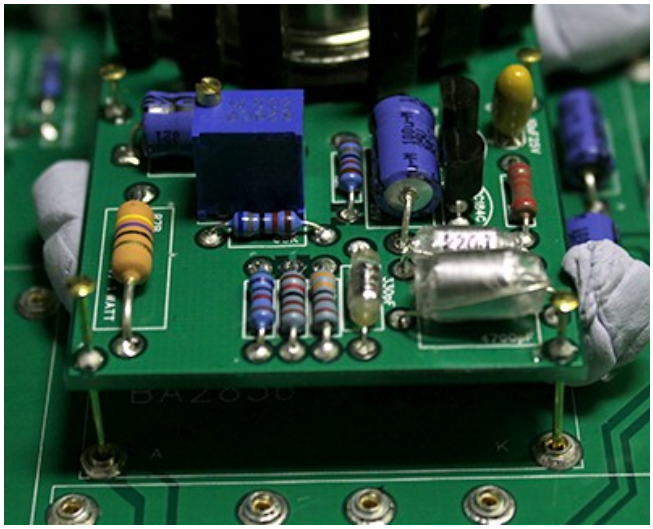


For the PCB pins:

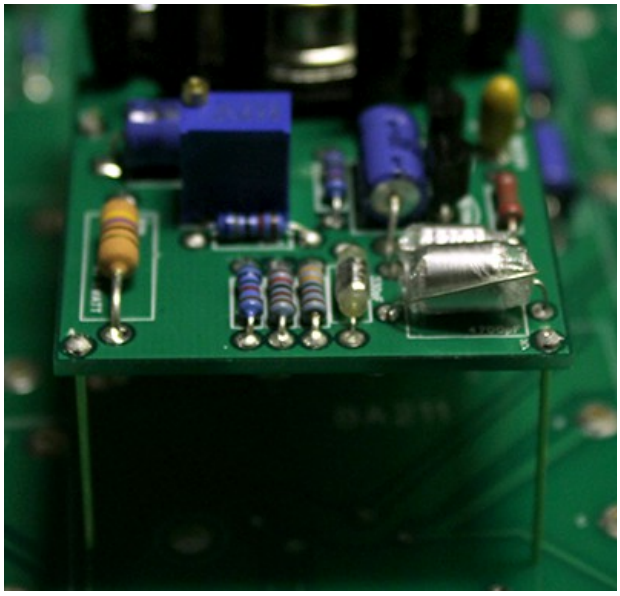
Now everything is soldered we can fit the PCB pins.



We will place the pins through the 'BA' PCBs and into the MAIN PCB. Using blu tack you can set the appropriate height and hold it in place.

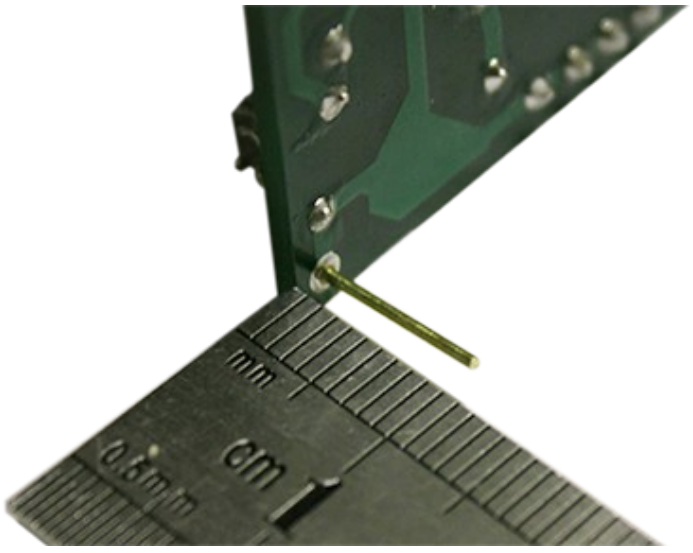


Then we can solder the PCB pins, from above.

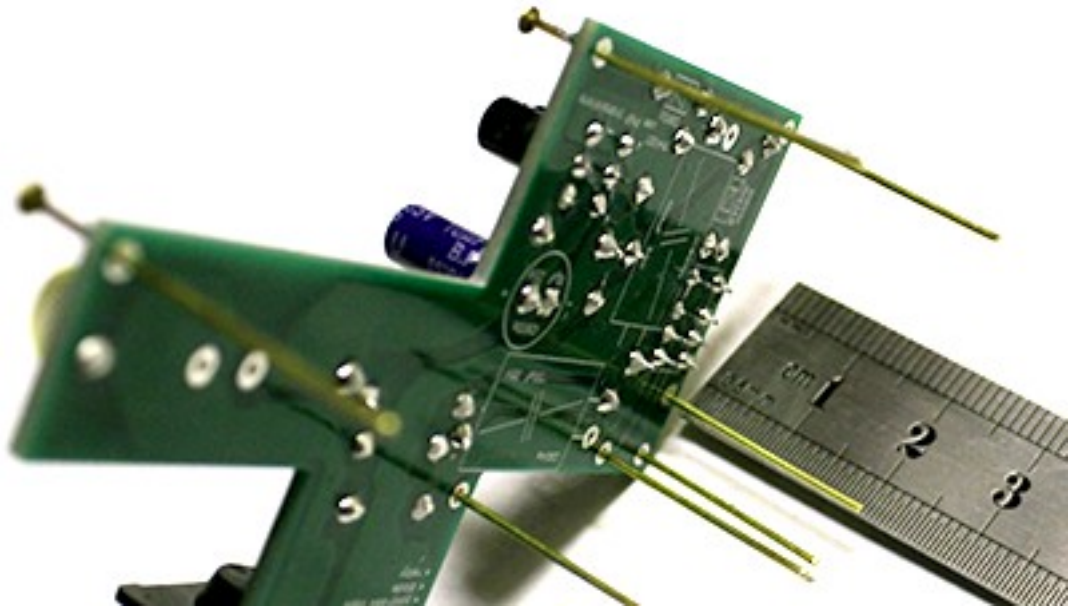


We will then cut off the tops of the PCB pins, and all is done.

Finally we can trim the 'BA' pins to the appropriate length. 10mm is fine.



For the DI PCB:

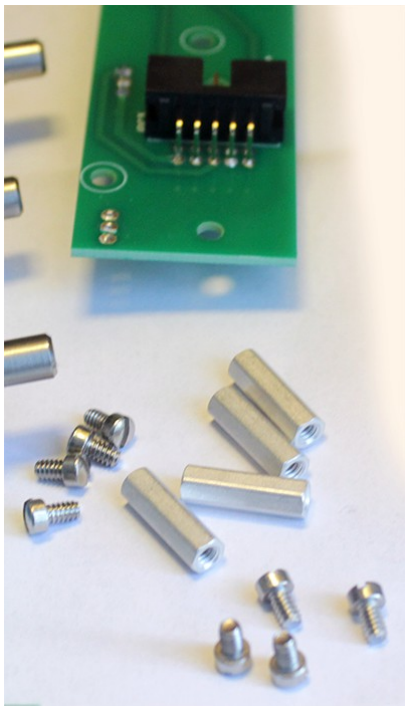


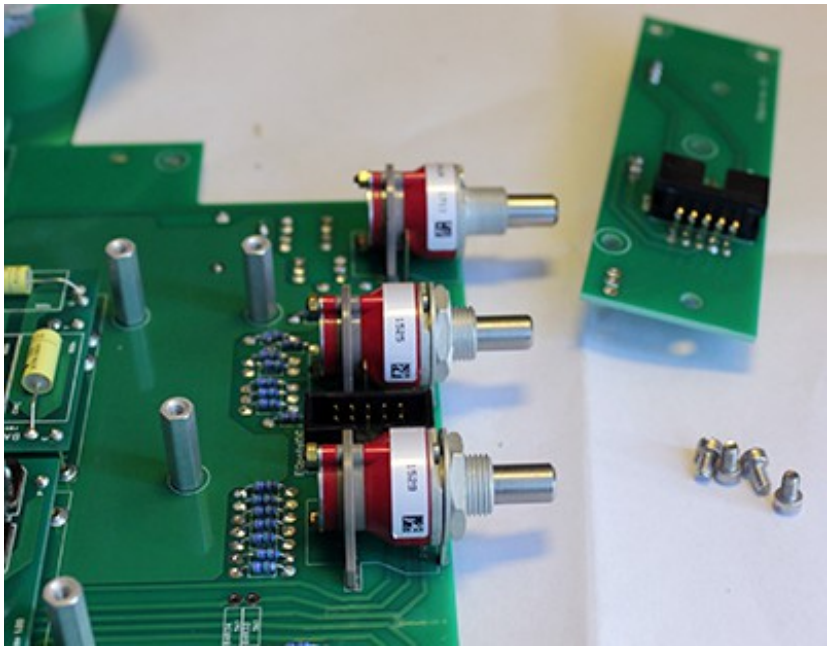
The legs will be longer on the DI PCB, as it needs to align with the DI jack on the back panel. 20mm is fine here.

We will now prepare the PCBs for the metal work.

Standoffs:

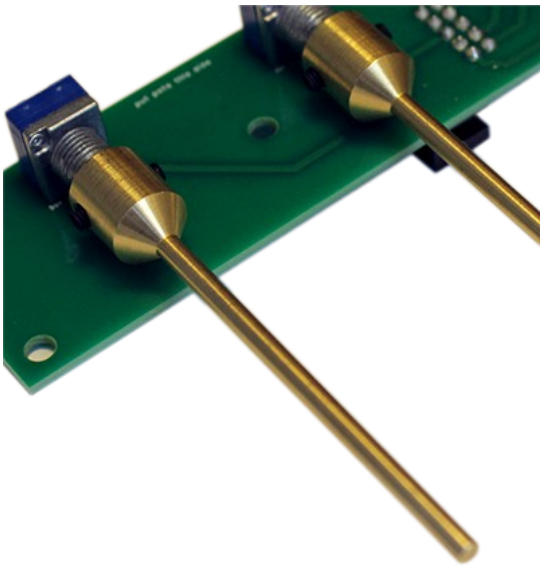
For the EQpots PCB, you will fit the standoffs like this:

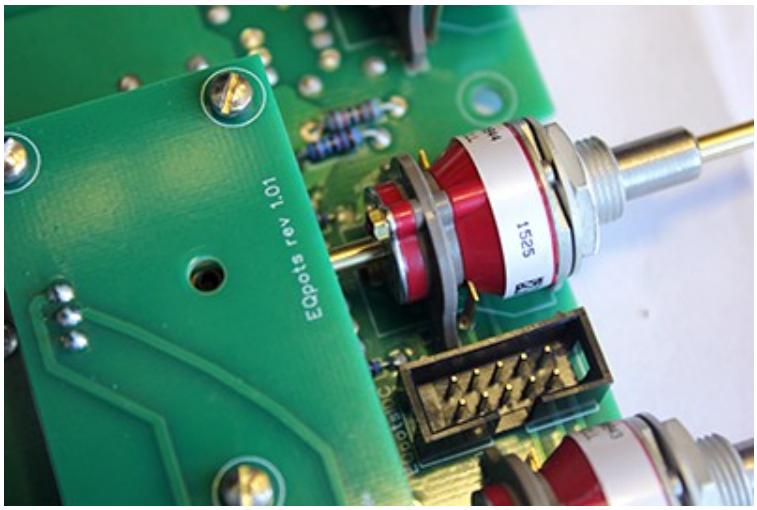




Adapters:

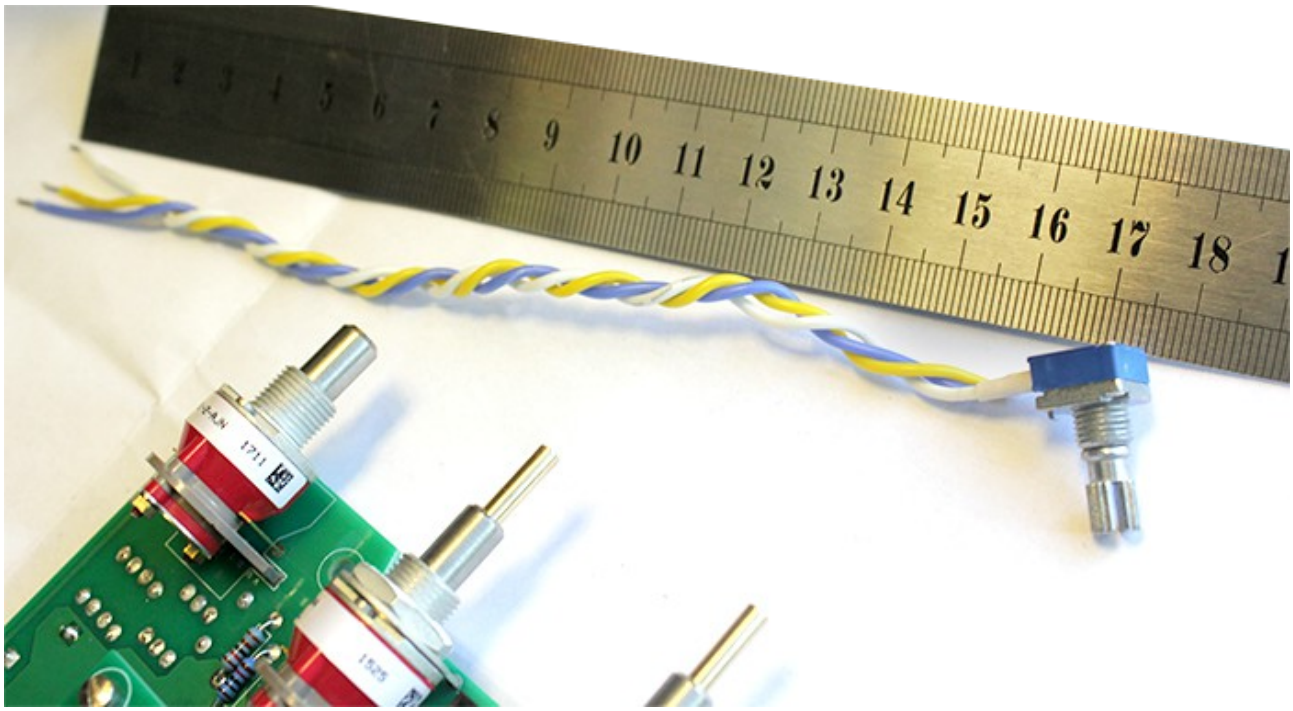
You will fit the adapters on to the pots before screwing the EQpots PCB into the MAIN PCB.

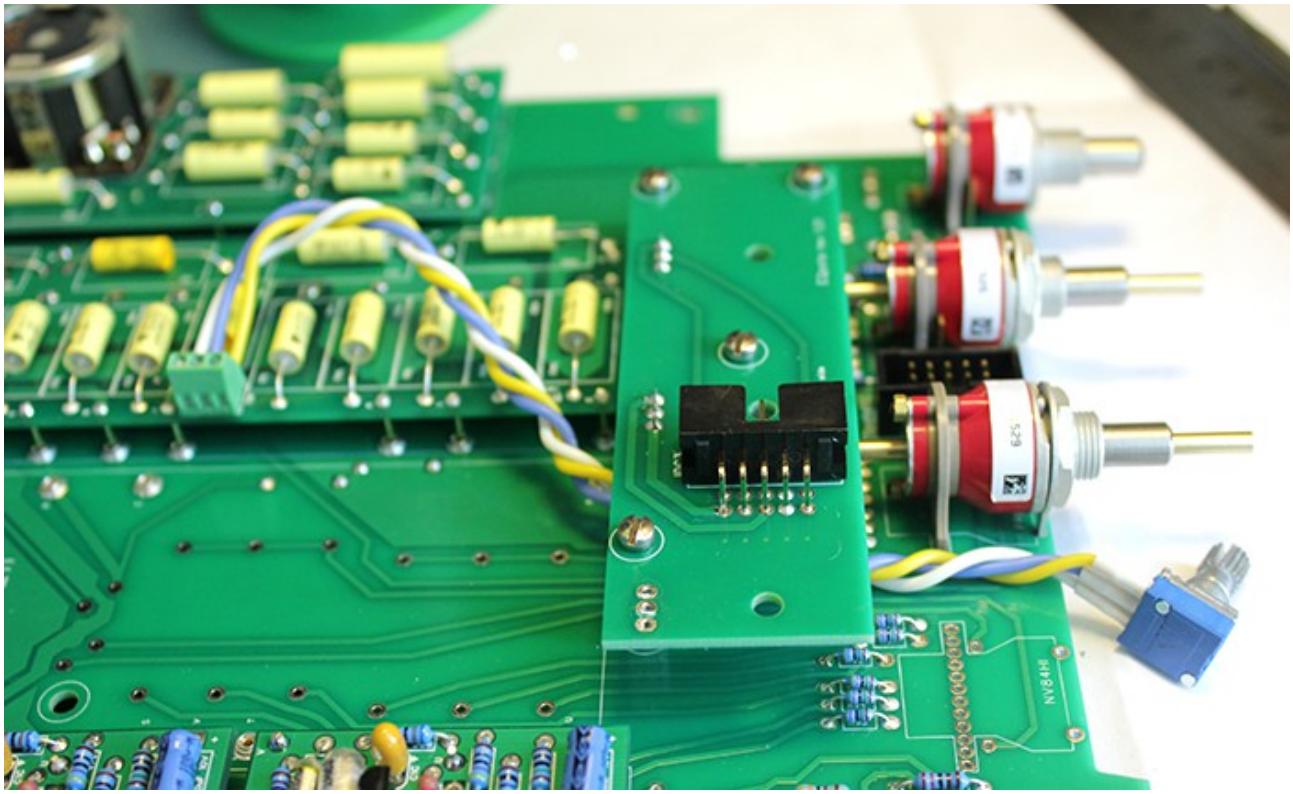




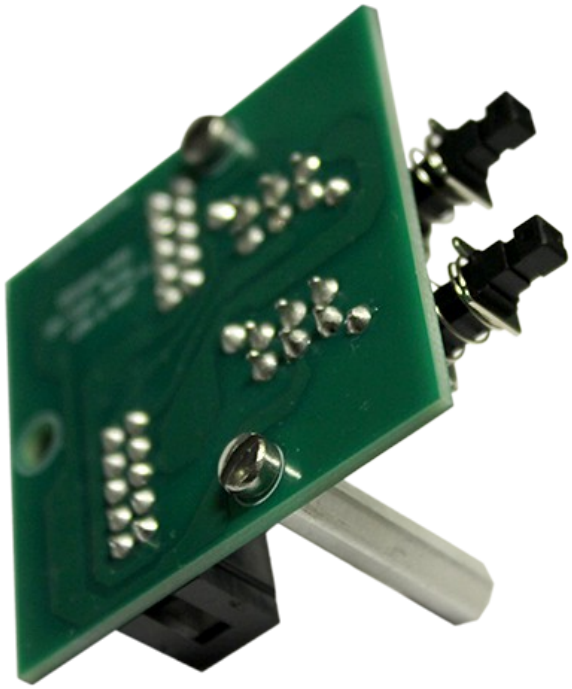
The holes will line up to tighten the grub screws in the adapter.

For the hi shelf pot:

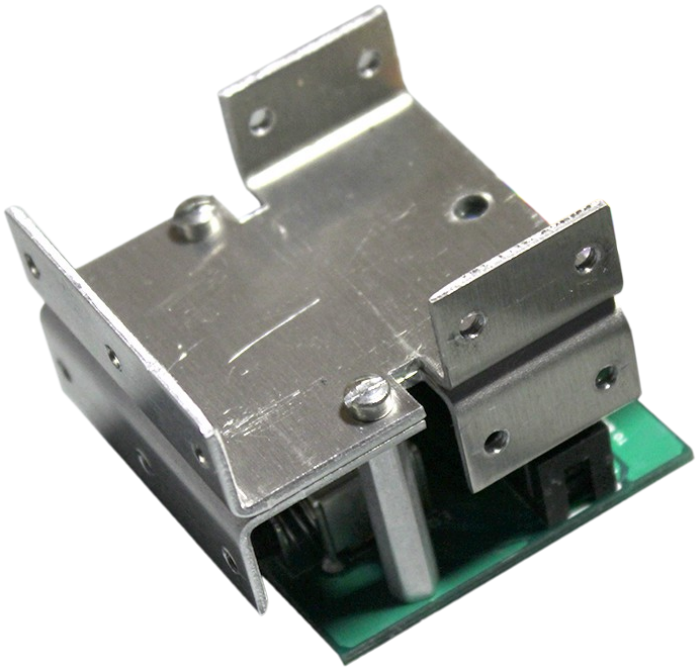




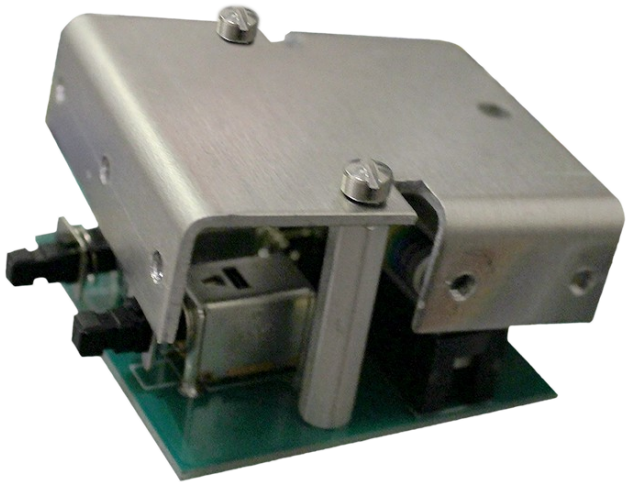
For the Switches PCB you will fit the standoffs and L-bracket like this. Note the difference depending if the unit is for slot 1 or slot 2 in the 2NV-Rack.



The switches PCB in slot 1:



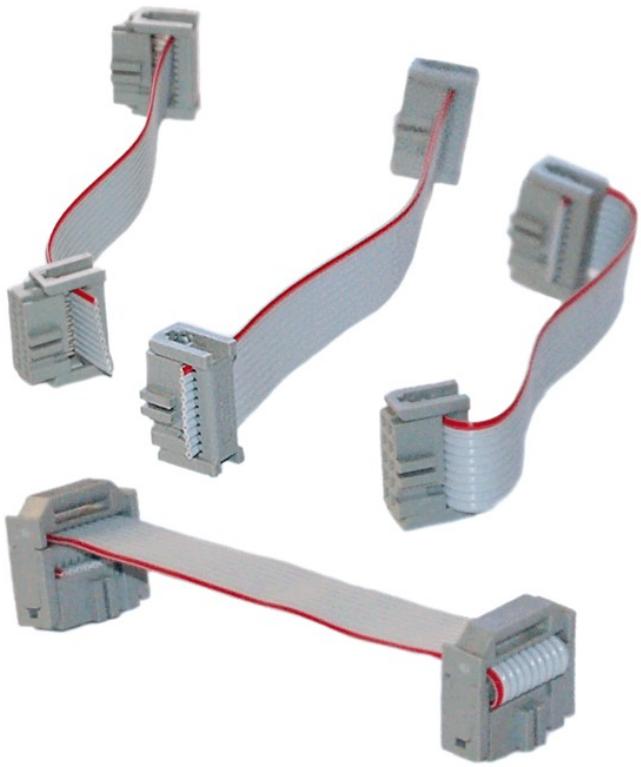
The switches PCB in slot 2:



2. Make ribbon cables

There are three ribbon cables to make for each unit.

All cables will be made the same way. You can use a vice to squeeze the connector in, or a special IDC tool exists too. See the following picture to explain the process.



- Cut the 10way ribbon cable to correct length. Measure length needed & then add 50mm for the two strain reliefs.
  (using scissors, cut straight and not off angle)

- Red is pin 1 as shown.
  Make sure red will connect to pin 1 of the IDC headers.
  (The triangles are pin 1 on the IDC headers.)
  Make sure the headers line up as shown.
  (black will be pin 1 if using a coloured ribbon cable)

- One at a time line up the headers correctly
  (straight so the teeth line up & is not crooked)
  Push down with fingers until it grips and confirm all is lined up.
  Flush or overhanging the edge a little is correct.
  Keep applying firm pressure so it doesn't slip out.

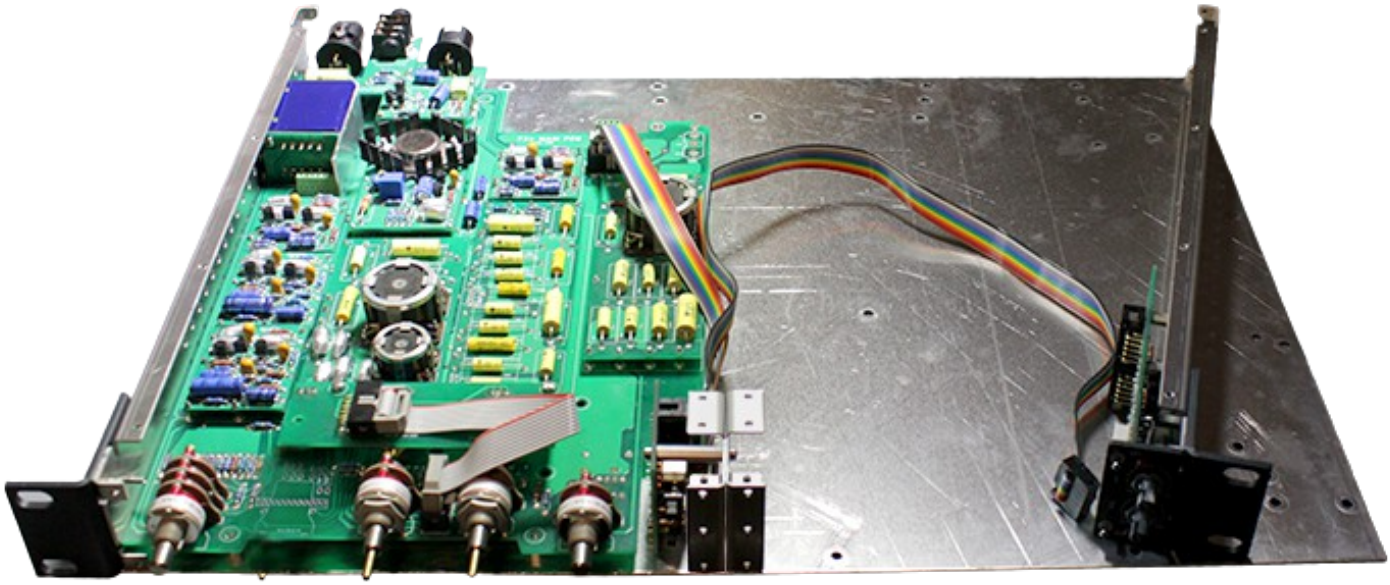
- Squash in a vice or use a handheld IDC tool.
  It will clip into place.
  Confirm the 2 side edge clips pop through.

- Once fitted, bend back the ribbon cable and fit strain relief clips.

The MAIN PCB to EQpots ribbon cable will be the same size no matter which slot it is in.
The other two ribbon cable lengths will depend on which slot they go in the 2NV-Rack.

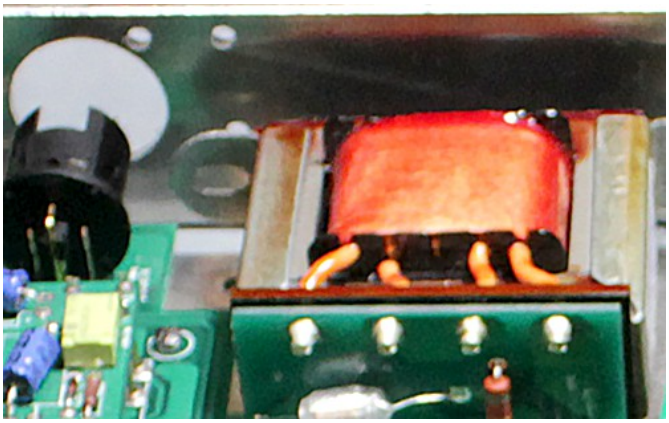
3. Fit in metalwork

Using the metal 0.375” standoffs and 3/16” countersunk screws, you can fit the unit in the metalwork as follows: Note it's more convenient to leave the side panel with pots panel, unscrewed for the moment.



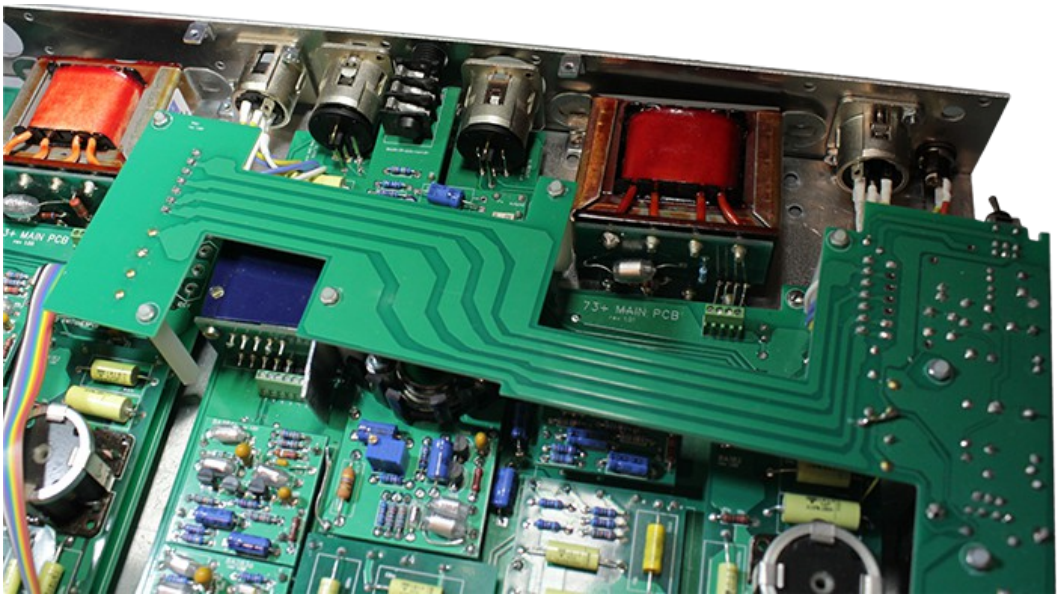
Note if you have two units in a rack, you may want to route the long ribbon cable underneath the unit in slot 2 for tidiness.

At this point, line up the output transformer and cut legs to correct length. You can use the backpanel as a guide. Then screw into the green molex ready for fitting the PSU & backpanel.

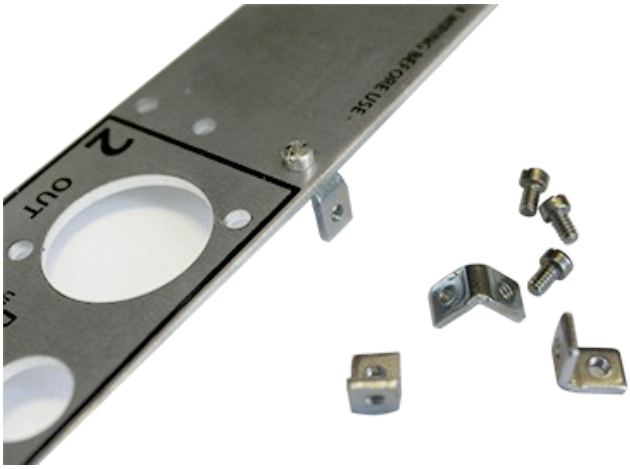


You can repeat with the second unit if applicable.

Now we can fit the PSU PCB.



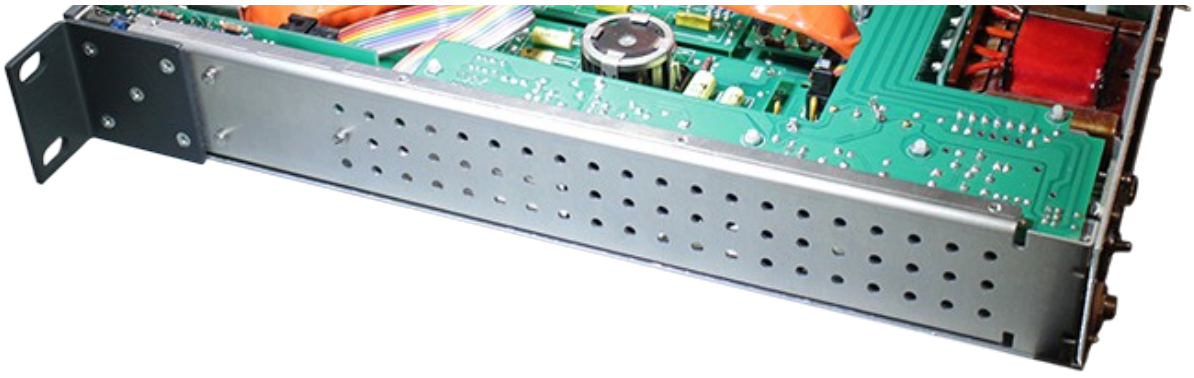
Now we can screw on the back pack panel.



Note: the small Ls for the back panel have an orientation. Make sure they align to the top and bottom of the back panel.

Back panel screwed on:

We can now screw in the other side panel (with the pots PCB)



4. Initial testing

At this point, it's probably worth testing before going to the effort to put on the front panels, knobs etc.

Pre-turn on checks:

i) Check that none of the rails are shorted together
Using continuity/resistance test on your multimeter, confirm that none of the rails are showing as a short to each other.

ii) Check that grounds go where they should
Using continuity/resistance test on your multimeter, confirm that the metal work shorts to 0V.

iii) Confirm that the trim pot on the BA283 PCB is all the way counterclockwise

We are now ready to turn on the unit. We can test the PSU without damaging the micpre by setting the power switch to "test" mode. This powers on the internal PSU but doesn't connect it to the micpre.
So, plug in the 24VAC transformer and test the rails. You should read 0V, 24V and 48V.

If this is ok, we can go ahead and turn on the mic pre itself.
Switch the power switch to 51X or internal PSU depending on your powering method:

AFTER TURN ON:
iv) With one multimeter probe on the metal work and the other on the case of the 2N3055; test the voltage.
MAKE SURE YOU GET A VOLTAGE OF NO LESS THAN 21V. IF YOU DO... TURN OFF IMMEDIATELY AND CHECK THAT YOU HAVE TURNED THE TRIM POT COMPLETELY ANTICLOCKWISE. (YOU SHOULD HEAR A CLICK EACH TIME YOU TURN WHEN YOU ARE AT ANTI-CLOCKWISE)

v) While measuring the voltage of the case of the 2N3055, turn the bias trim pot clockwise until the voltage drops to 22V. It should take quite a few rotations of the trim pot. (multimeter should be on the case of the 2N3055 & ground probe on the B-rail)

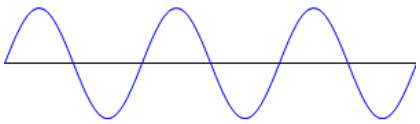
At this point, you are ready to put some audio through it to verify all is well!

5. Set bias

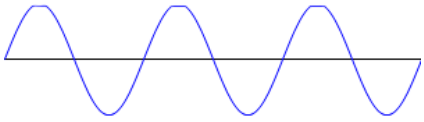
If you do not have access to an oscilloscope then it's not a huge deal, as setting the bias doesn't affect the sound in normal operation..

If you do have an oscilloscope then you will set the bias as follows:

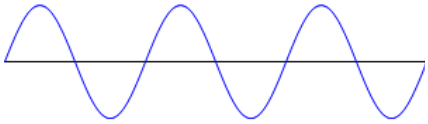
1) Set the micpre at 60dB gain.
2) Set the output pot at around halfway.
3) Disconnect the output XLR (if it's connected to something, this high level may clip the next piece of gear and skew the wave we're looking at.)
4) Connect the DAW to the input of the micpre and set a 1kHz sine wave at around -70dBFS.
5) Connect the oscilloscope to the output of the micpre.
6) Turn up the DAW signal until you see the sine wave *just* start to distort.
7) At this point you will need to turn the bias trim pot to set it so that the sine wave squares off evenly on the top and the bottom **at the initial point of clipping**. You can use the output pot at this point to raise and lower the level to see where the sine wave flattens. Juggling back and forth with the output pot as you adjust the bias trim pot, you should be able to find the point where the sine wave flattens on the top and bottom evenly.
Remember to be careful with this as you are increasing current as you turn clockwise.. so if you are finding yourself turning clockwise a lot, double check that you're setting it correctly.



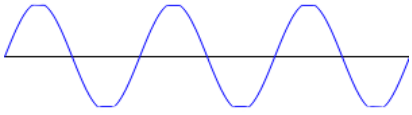
Initially you will see a sine wave like this.



As you increase level, one half will clip. Just as it starts clipping, adjust the bias trim pot.



It will probably then look normal again. At which point increase the level again. Repeat until it starts to clip equally on both sides.



Adjusted correctly.

6. Attach front panel and knobs

Switch caps decal:

For the switch caps, you will cut around the writing of each switch cap. Place them in a small bowl of water until the paper starts to come away from the transparent decal. You will then place the transparent decal onto the switch cap and start to wipe out any bubbles with a cotton bud. At this stage make sure it's on straight and then continue to wipe with the cotton bud until dry.
I recommend also to spray it with a clear varnish to protect the writing once dry.

Now it's time to fit the front panel and knobs.