

the DON classics

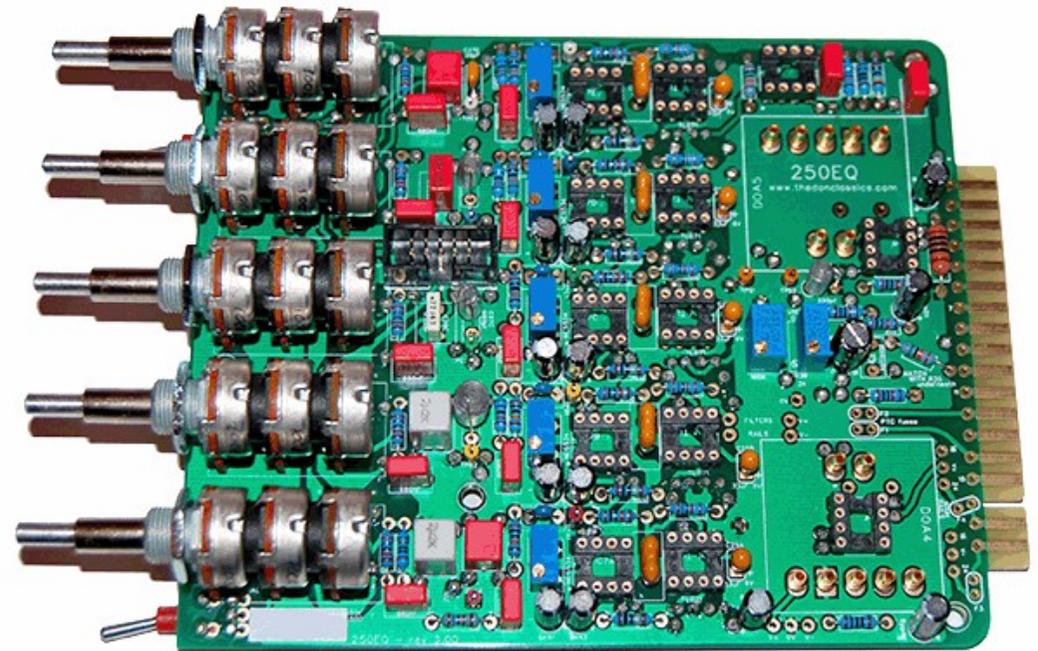
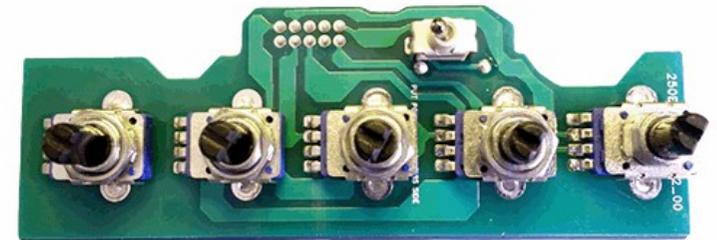
www.thedonclassics.com

250EQ

PARAMETRIC EQ

ASSEMBLY GUIDE

REV: 1:00



QUICK ASSEMBLY GUIDE

7 STEPS TO EQ HEAVEN!

1. **Place/solder parts on PCBs**
2. **Make ribbon cable**
3. **Place PCBs in metal work**
4. **Initial test (check power rails)**
5. **Fit opamps**
6. **Test with audio**
7. **Attach knobs**

Equalise!

Frequently Asked Questions (FAQ)

Q. Can I use two for a stereo pair?

A. Yes, that's exactly how they're best utilised. They excel on mix bus and stereo sources.

Q. I'm at the limit on my 16V rails. Can I use just the 24V rails even with ICs?

A. Yes you can! See page 9 for details...

Q. What is included in the kit?

A. Everything included on [this page](#) is included in the kit from us.

Q. What other orders do I need to make?

A. You need to make 2 other orders as detailed on [this page](#).

Q. Is there a schematic that would be useful?

A. For reference you can download the 250EQ schematic from the DON classics website. [250EQ Schematic](#)
PCB designations reference this.

Q. Who can build this?

A. You!

As long as you have patience and are thorough in your work, anyone can build this add-on. There's no wiring & is quite a quick build. There's lots of support and information and it is tried and tested.

1. Solder parts on PCB

When inserting parts there are 3 resources that will be useful.

- A) **Silkscreen images** (*eg. for any hard to read designations*)
Silkscreens can be downloaded on the manual page: [silkscreens](#)
- B) **General BOM** (*eg. For more info on specific parts/values*)
General BOM can be found on the manual page: [General BOM](#)
- C) **Schematic** (*eg. For general confirmation of circuit*)
Schematic can be found on the schematic page: [Schematic](#)

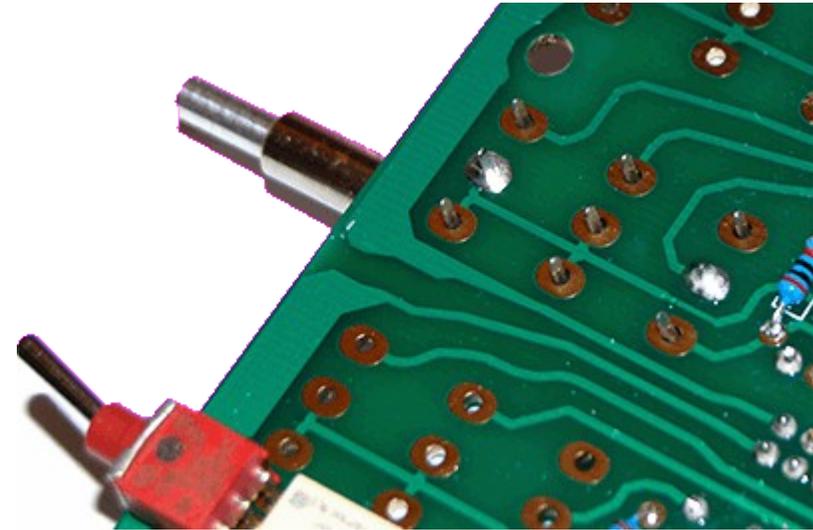
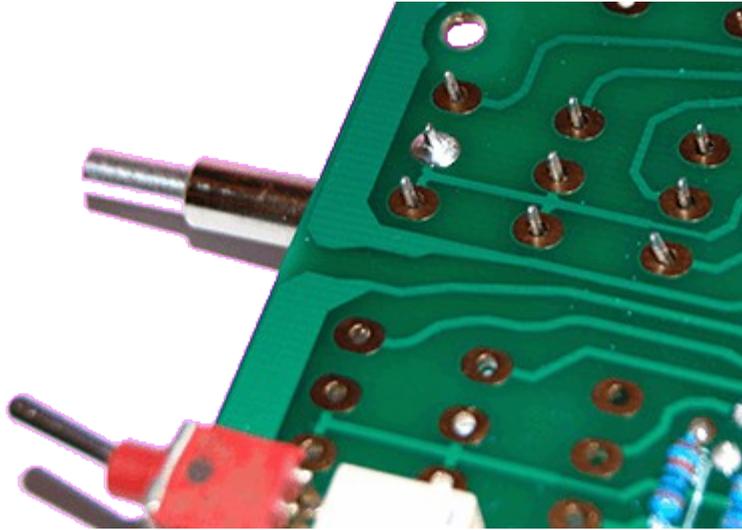
Armed with that info, **let's start!**

Insert all parts on to the PCB as marked on the silkscreen. *All designations and values for parts are marked on the PCB for ease.*

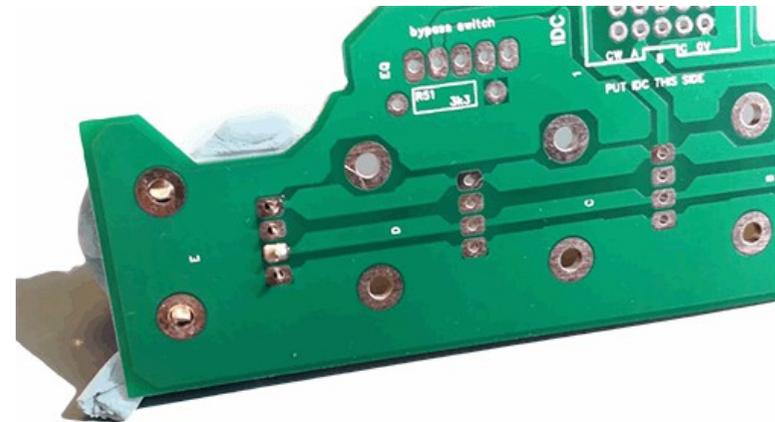
TIPS:

- Plan which voltage rails you'll be using prior to fitting V+ / V- jumpers, PTCs & L1 / L2. *See page 9.*
- Begin with **C23E** as it'll be less awkward than soldering it later.
- Then start with the bottom of the PCB as it'll be less awkward.
- Start with smaller parts (resistors etc.) and work up to the larger parts
- Sort resistor bags into numerical order first. Then you can check the PCB for the part value & search out what you need.
- Solder IC sockets for opamps.
- All the small bypass caps are 0.1uF. All the larger bypass caps are 47uF.
- Fit parts thinking in rows of 5 for the filters section. *Generally* the 5 rows are identical.

- When fitting pots: Make sure to align them straight. Solder one middle leg first and check alignment by eye. This allows you to easily resolder and realign if needed. Then when happy, solder one more middle leg and check again.

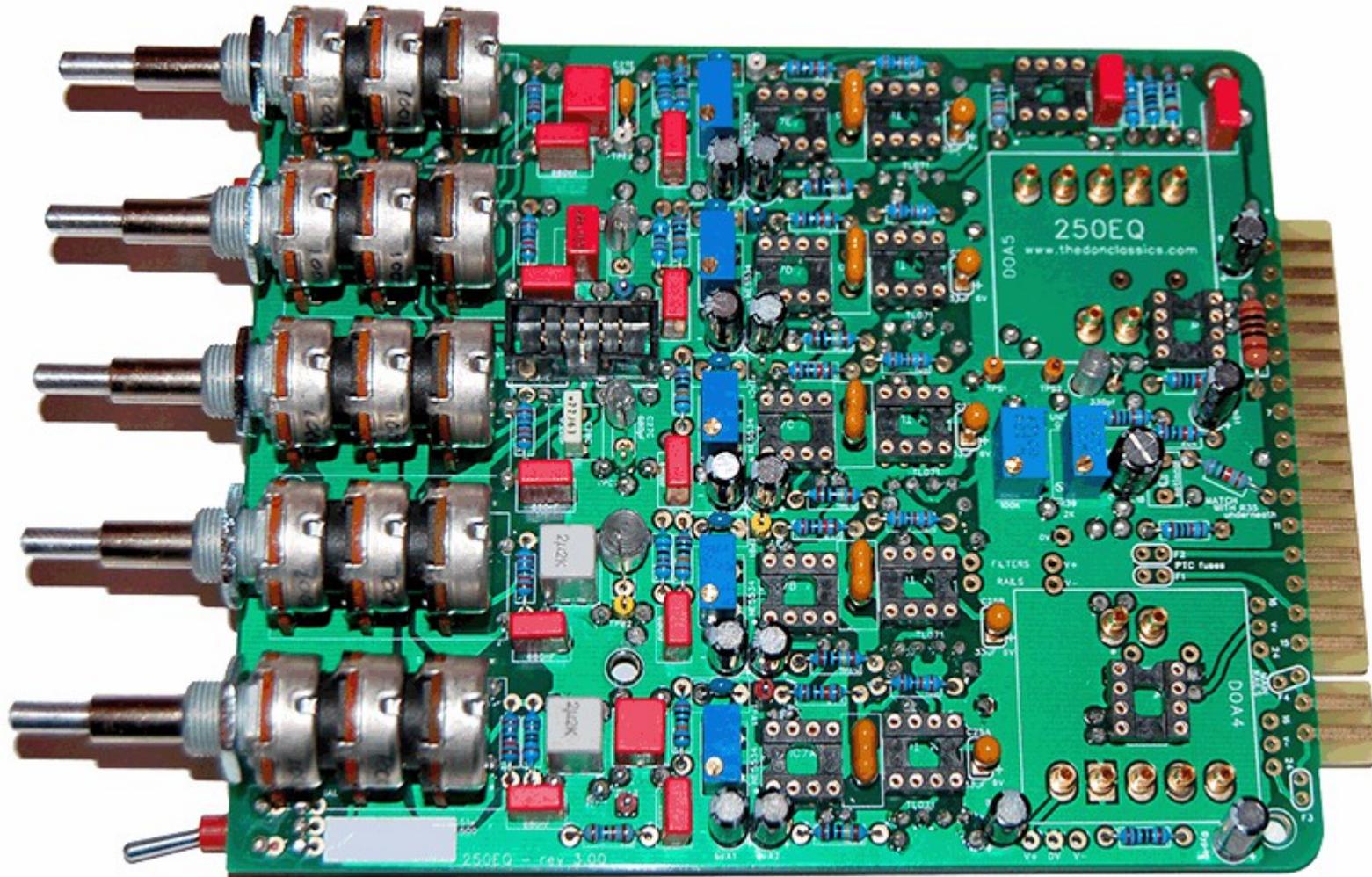


TIP: Blu-tack can be handy to hold in components while soldering.

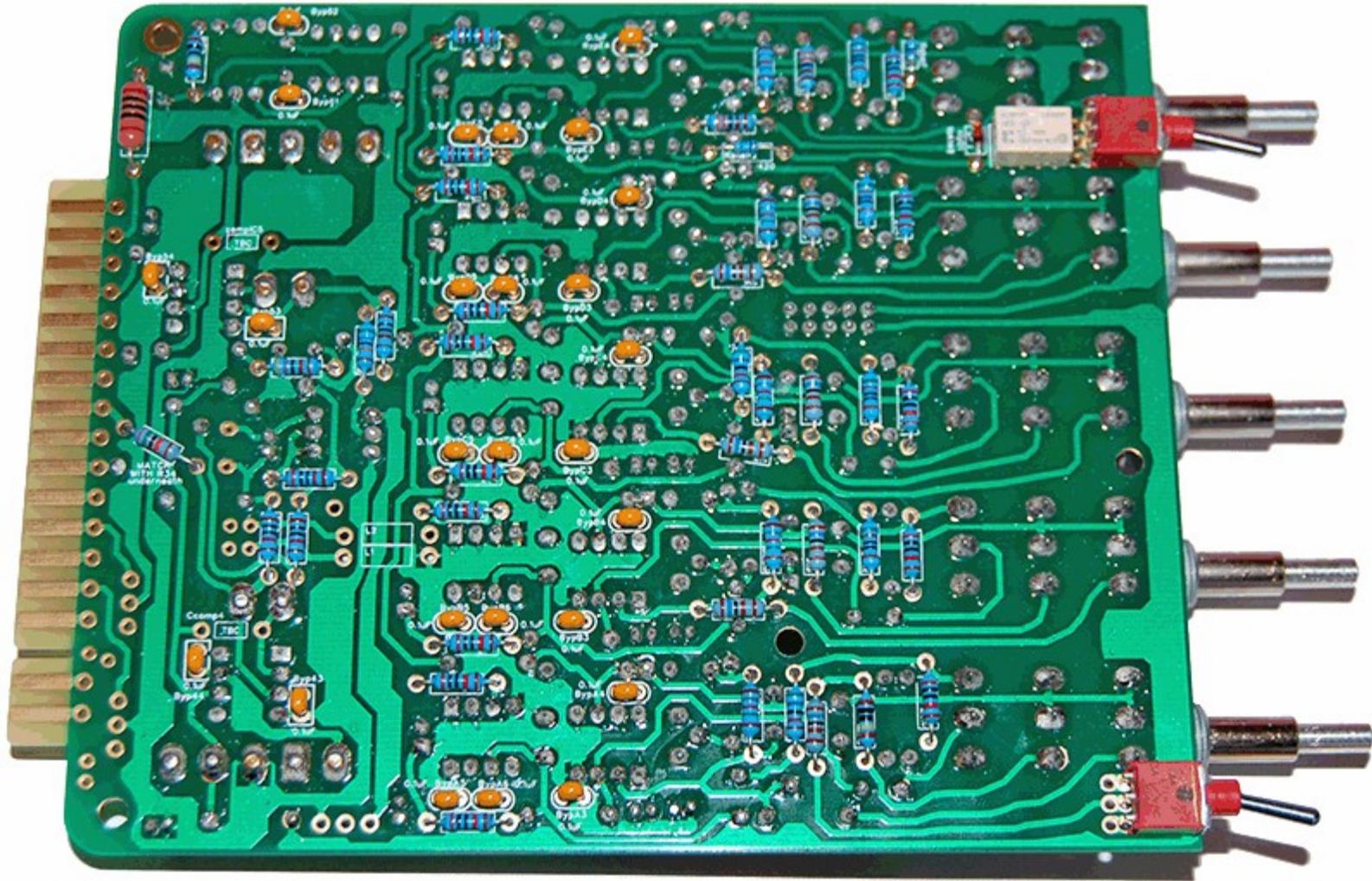


PCBs should end up looking like this...

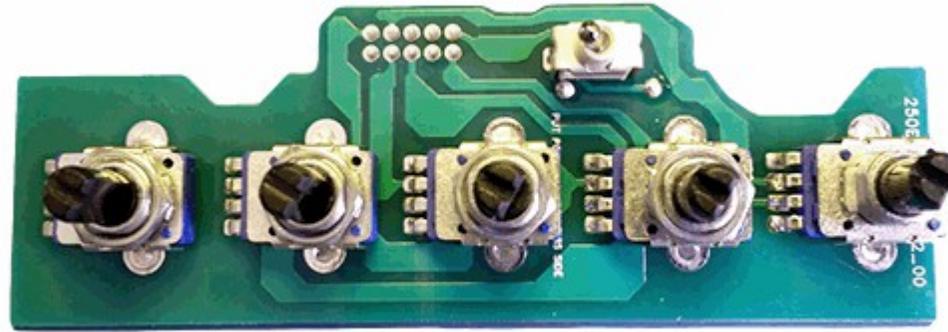
MAIN PCB:



MAIN PCB (underside):



POTS PCB:



POTS PCB (underside):



Set voltage rails

There are 2 sets of power rails in the 250EQ.

- 1) 'MAIN RAILS' for IC4 & IC5.
- 2) 'FILTERS RAILS' for all other ICs.

There are 3 ways to set each of these voltage rails:

- Use only the **+16V** rails of the lunchbox to give us **+16V**
- Use the **+24V** rails of the lunchbox to give us **+24V** (*51X only*)
- Use the **+24V** rails of the lunchbox & use zeners to drop voltage to give us **+18V** (*51X only*)

Why the choice? Two main reasons... using discrete opamps at a higher voltage. And to use less loaded rails of a full lunchbox..

NOTE: We will test voltages before inserting any opamps so we can confirm that the voltage rails are set correctly.

How to choose which is best for you...

- A** I am **500** or **51X** series and want to use only **+16V rails** - **follow instruction A**
- B** I am **51X** & want to use **+24V rails** for my discrete opamps & **+16V rails** for all other ICs – **follow instruction B**
- C** I am **51X** using all ICs but want to use **+24V rails** for everything – **follow instruction C**
- D** I am **51X** & want to use **+24V rails** for discrete opamps & for other ICs too – **follow instruction D**

Instructions to set voltage rails

A) **+ -16V rails only**

As shown:

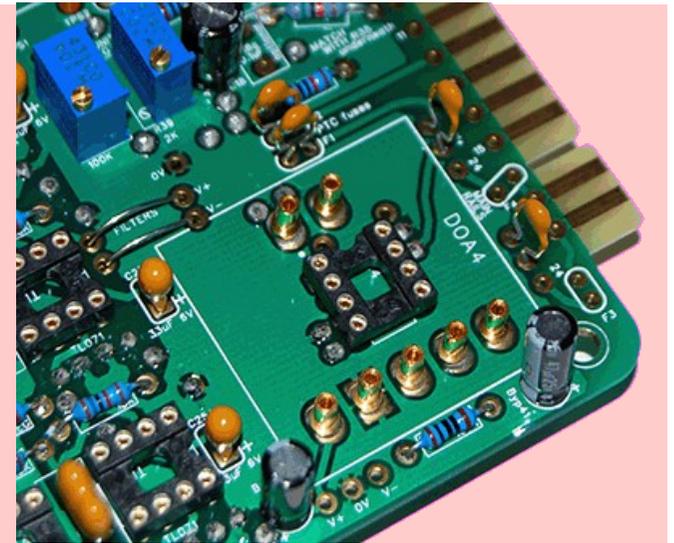
* Set 'MAIN RAILS' to **+ -16V** by:

- 1) Where it says "MAIN RAILS", fit a PTC fuse between V+ and 16.
- 2) Where it says "MAIN RAILS", fit a PTC fuse between V- and 16.

* Set 'FILTERS RAILS' to **+ -16V** by:

- 3) Where it says "PTC fuses", fit F1 & F2 as shown on PCB.
- 4) On the bottom of the PCB, fit the 2 jumpers (resistor legs) in L1 & L2.
(or on top as shown)
- 5) If 500 series, you will need to cut the extra 2 golder fingers.

Note: F3 & F4 are not needed but will do no harm if fitted



B) Set 'MAIN RAILS' to **+ -24V** & 'FILTERS RAILS' to use **+ -16V rails** (51X & discrete opamps only)

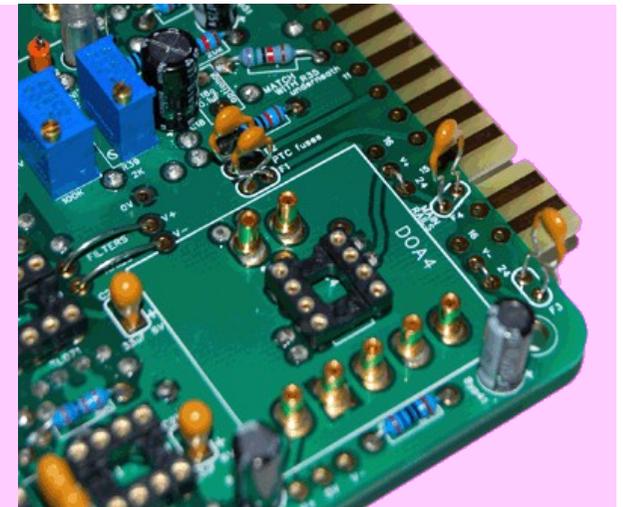
As shown:

* Set 'MAIN RAILS' to **+ -24V** by:

- 1) Where it says "MAIN RAILS", fit a jumper (resistor leg) between V+ and 24.
- 2) Where it says "MAIN RAILS", fit a jumper (resistor leg) between V- and 24.
- 3) Fit 2 PTC fuses for F3 & F4 as shown on PCB.

* Set 'FILTERS RAILS' to **+ -16V** by:

- 4) Where it says "PTC fuses", fit F1 & F2 as shown on PCB.
- 5) On the bottom of the PCB, fit the 2 jumpers (resistor legs) in L1 & L2.



- C) Set 'MAIN RAILS' to **+24V** & use **+24V rails** for 'FILTERS RAILS'
** to use the 24V rails for ICs, we will use zeners to drop the voltage*

As shown:

Set 'MAIN RAILS' to **+24V by:*

- 1) Where it says 'MAIN RAILS', fit a jumper (resistor leg) between V+ and 24.
- 2) Where it says 'MAIN RAILS', fit a jumper (resistor leg) between V- and 24.
- 3) Fit 2 PTC fuses for F3 & F4 as shown on PCB.

Set 'FILTERS RAILS' to use the **+24V rails by:*

- 4) Where it says "PTC fuses", connect a wire from F1 (hole furthest from gold fingers) to (-)24 as shown
- 5) Where it says "PTC fuses", connect a wire from F2 (hole furthest from gold fingers) to (+)24 as shown
- 6) On the bottom of the PCB, fit the two 6V2 zeners in L1 & L2. Orientation as shown (important!)

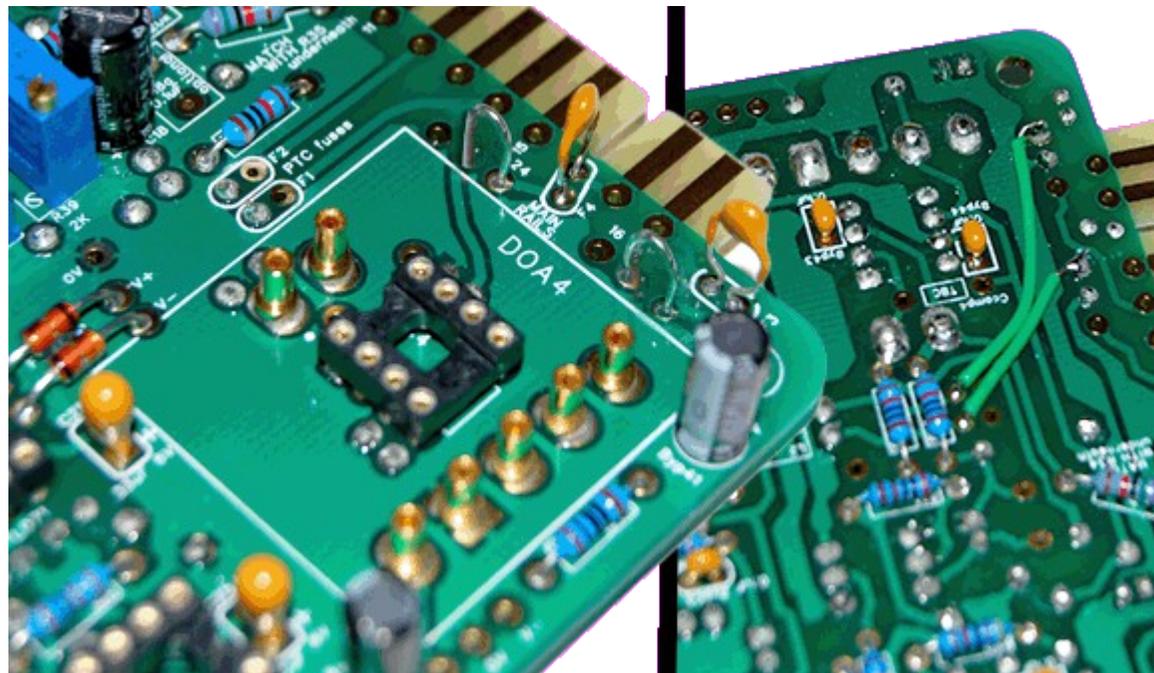
NOTE: The black band of the zeners will always face the higher voltage.

So if it's on the V+ for example then the black band will be at the +24V rail of the lunchbox.

And the anode will be at the V+ rail of our opamps.

If V-, the black band will be at the -V rails of the opamps.

And the anode will be at the -24V rail of the lunchbox.



- D) Set 'MAIN RAILS' to **use +24V rails** & use **+24V rails** for 'FILTERS RAILS'
** As you're using ICs, we will use zeners to drop the voltages on both sets of rails*

As shown:

Set 'MAIN RAILS' to use the **+24V rails by:*

- 1) Where it says 'MAIN RAILS', fit a 6V2 zener between V+ and 24. *Orientation as shown (important!)*
- 2) Where it says 'MAIN RAILS', fit a 6V2 zener between V- and 24. *Orientation as shown (important!)*
- 3) Fit 2 PTC fuses in F3 & F4 as shown on PCB.

Set 'FILTERS RAILS' to use the **+24V rails by:*

- 4) Where it says "PTC fuses", connect a wire from F1 (hole furthest from gold fingers) to (-)24 as shown
- 5) Where it says "PTC fuses", connect a wire from F2 (hole furthest from gold fingers) to (+)24 as shown
- 6) On the bottom of the PCB, fit the two 6V2 zeners in L1 & L2. *Orientation as shown (important!)*

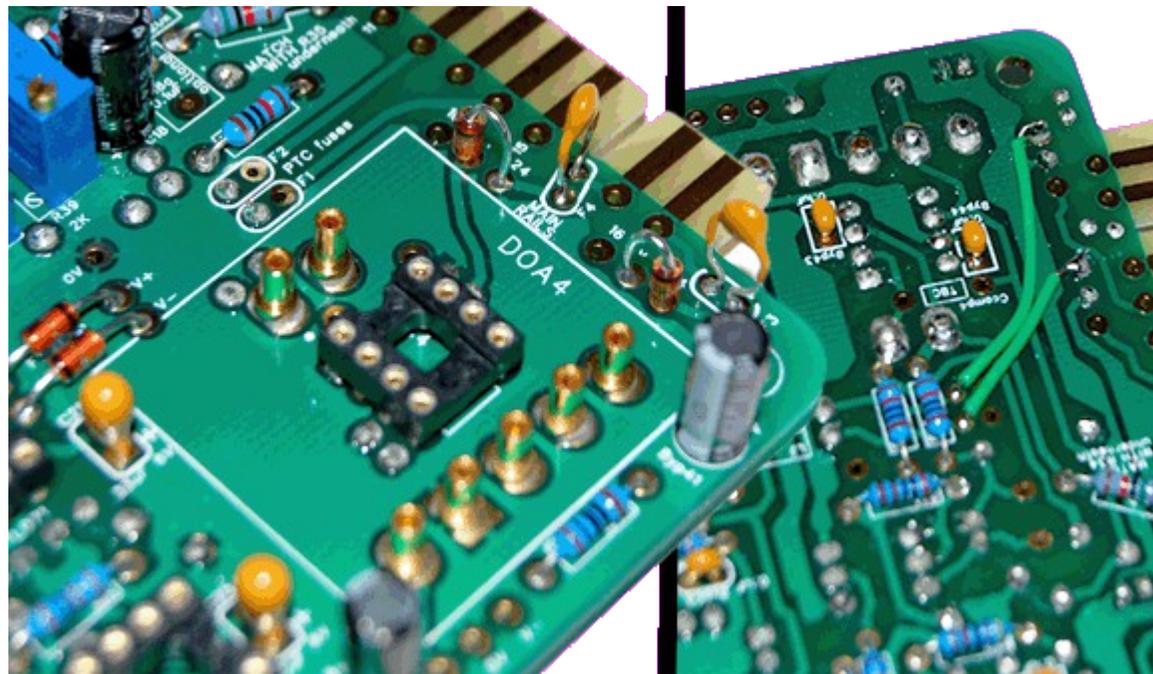
NOTE: The black band of the zeners will always face the higher voltage.

So if it's on the V+ for example then the black band will be at the +24V rail of the lunchbox.

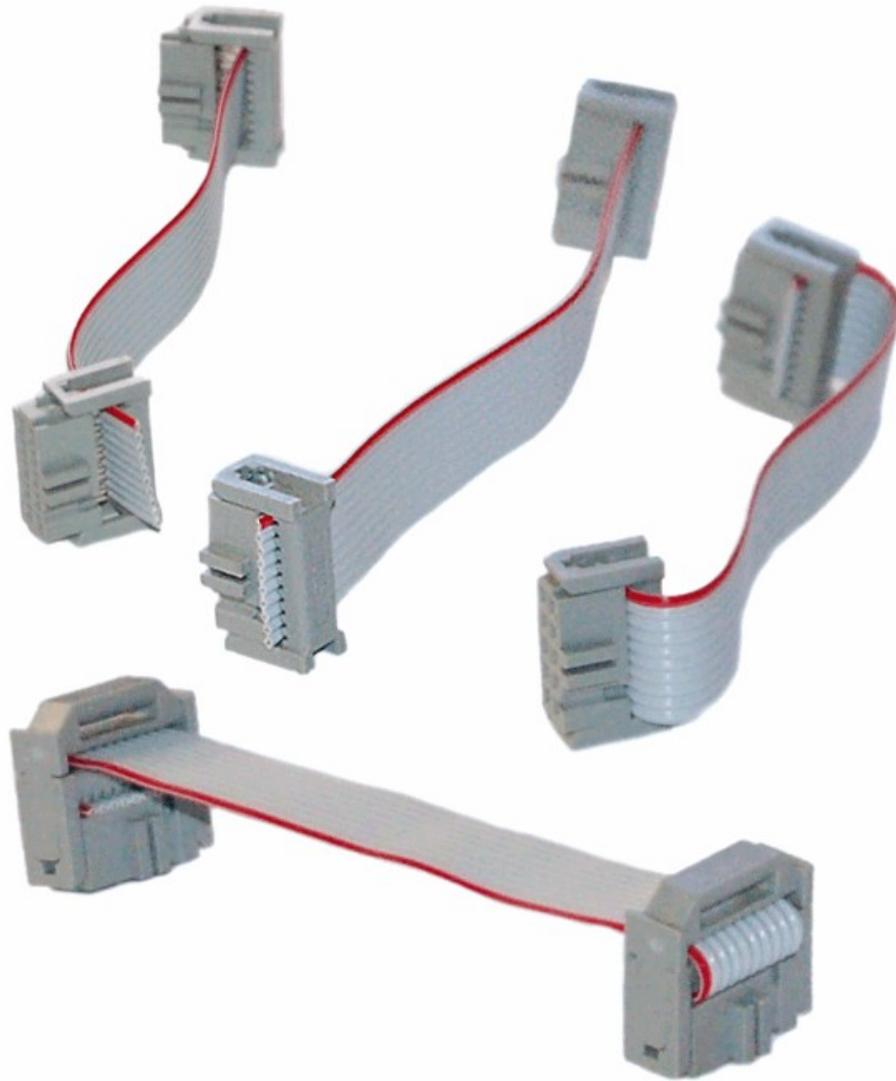
And the anode will be at the V+ rail of our opamps.

If V-, the black band will be at the -V rails of the opamps.

And the anode will be at the -24V rail of the lunchbox.



2. Make ribbon cable

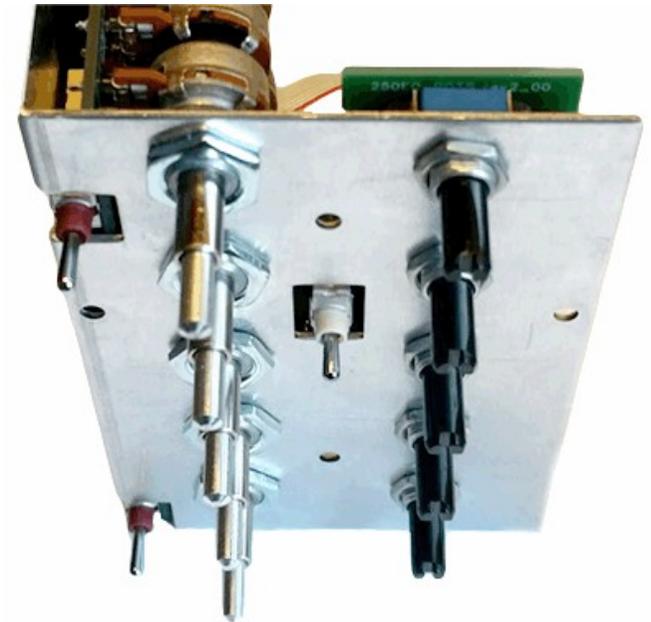
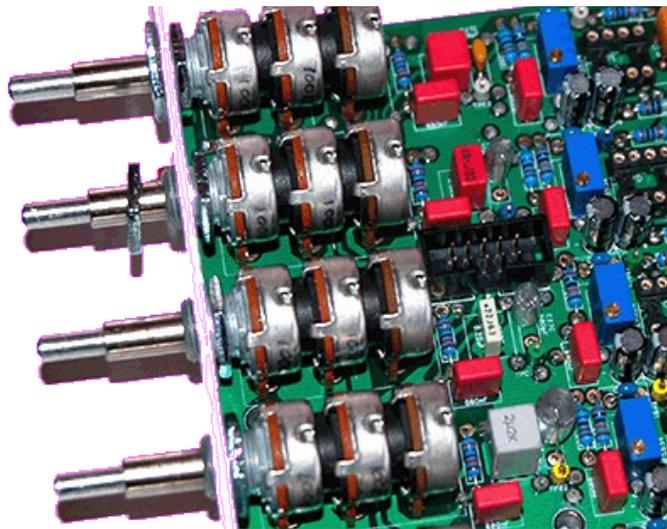
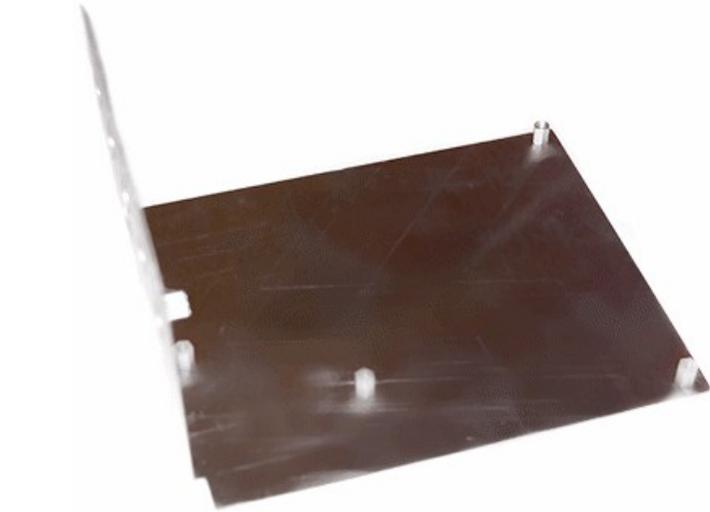


- Cut the 10way ribbon cable to 10cm length
(using scissors, cut straight and not off angle)
- Red is pin 1 as shown.
Make sure red will connect to pin 1 of the IDC headers.
(The triangles are pin 1 on the IDC headers.)
Make sure the headers line up as shown.
(black will be pin 1 if using a coloured 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.

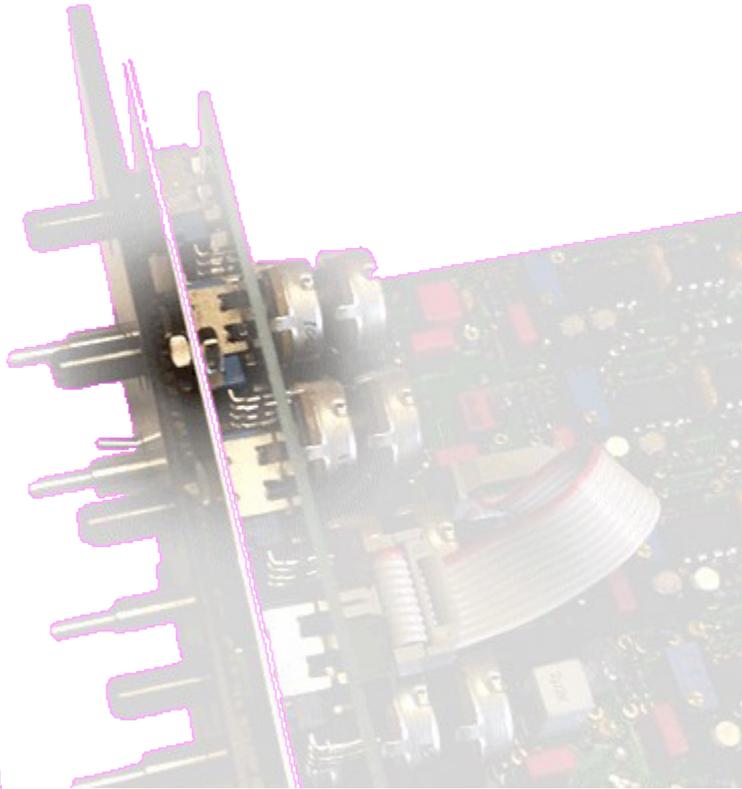
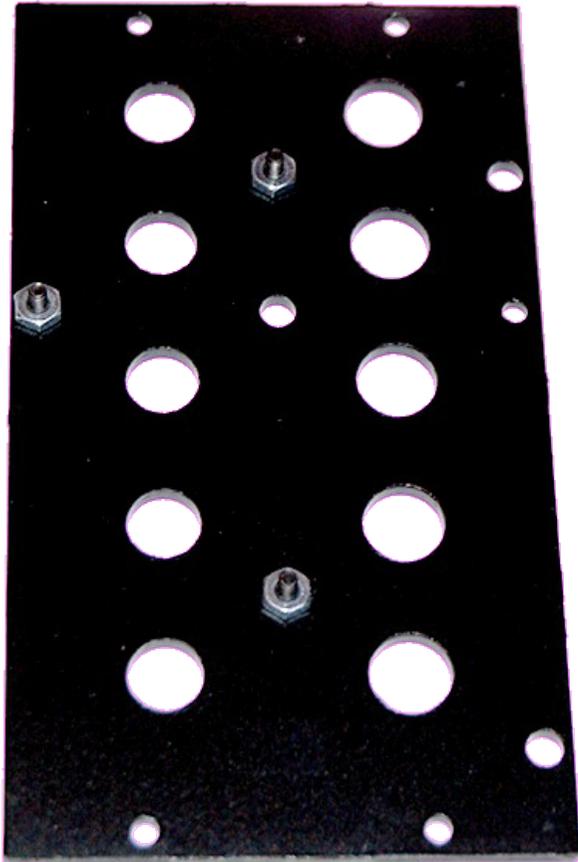
3. Place PCBs in metal work

- **Take the L-bracket and fit the standoffs using the small countersunk screws.**
Fit the one metal standoff, near the edge connector fingers pin 1.
And the other nylon standoffs in the other holes.
- **Screw one extra nut on all the Omeg pots before putting in to the metalwork.**

- **Insert main PCB and screw into the L-bracket using the small round head screws.**
- **Screw on another nut on the Omeg pots and tighten the two nuts against the L-bracket.**
- **Insert the pots PCB and fix to the L-bracket with the nuts of the pots. Don't over tighten.**
- **Fit ribbon cable.**



- Prepare the front panel by inserting 3 black screws & tighten with the large nuts as shown. Insert onto L-bracket and tighten with the large nuts on to the L-bracket. Don't tighten them up yet.
- Insert the final black screw on to the front panel & fix with the small nut. (use needle nose pliers with access through the side of the L-bracket. Tighten all 4 nuts of the front panel together so it aligns correctly.



4. Initial Test

◆ **Before turning on, check with a multimeter that there is no short between power rails.**

* To test the 'MAIN RAILS', the test points V+ , 0V & V- near the bottom of the PCB are a convenient place to check.

* For the 'FILTERS RAILS', use the IC sockets as a convenient place to check. *Pin 4 (V-) pin 7 (V+)*

* Also check that the gold fingers power rails are not shorting to each other or ground.. *(pins 12, 13, 14, 15, 17 & 18)*

Once confirmed, we are ready to turn on. *(reminder: we have not inserted the opamps yet)*

◆ When the unit is turned on, confirm that both sets of rails read the correct voltages.

So 16V or 18V if you are using ICs. Or 24V if you are using discrete opamps.

Again, use the test points stated above.

NOTE: As we are not drawing much current at this stage, expect that they read up to 1V too high. This is normal.

Confirm that you are reading correct voltages, then turn off the unit and proceed to the next step.

5. Fit opamps

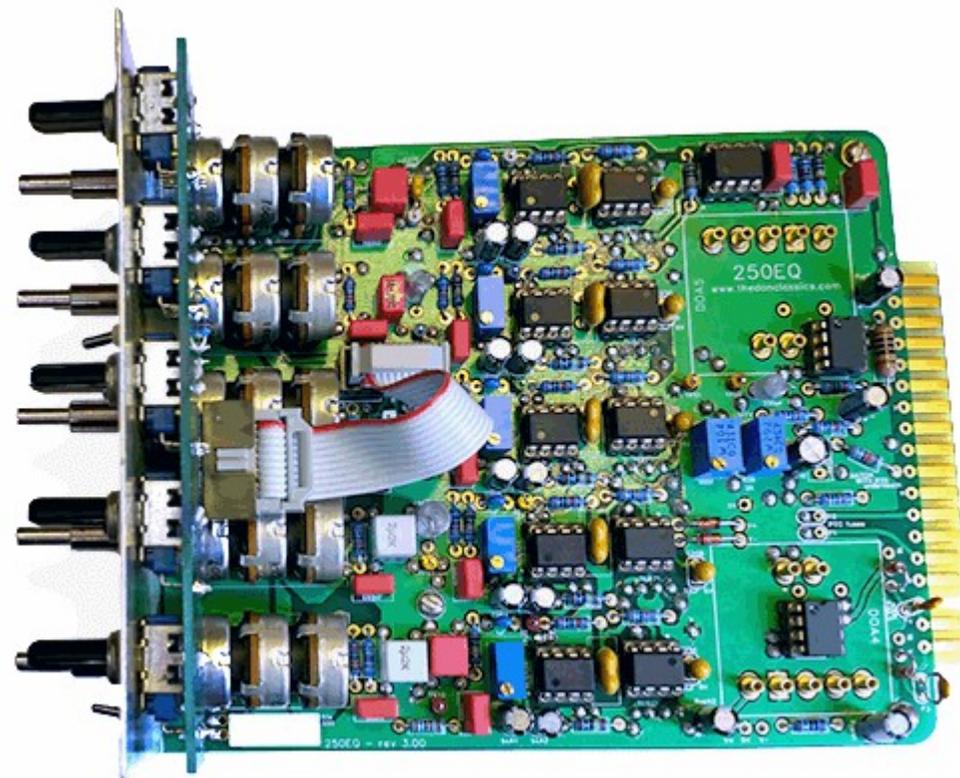
Having turned the unit off, we can now fit opamps.

Fit the opamps now. Note that the TL071 & NE5534 do not face the same direction. The dots are pin 1 and marked on the PCB & the opamps.

NOTE: Be delicate when handling the opamps. If possible use an ESD mat & wrist strap. Or if you do not have these, use other basic ESD precautions.. ie. touch something grounded prior to handling ICs. Bare foot is also best for not building up a charge..

Give the legs of the ICs a delicate squeeze prior to inserting into the sockets to ensure they fit smoothly. Caress rather than use brute force!

Once all the opamps (ICs & DOAs) are in, we are ready to put some audio through it!



6. Turn the unit on!

Once the unit is on, measure to make sure you are still reading correct voltages on the rails.

If confirmed, we will do the set up..

- 1) On each filter section (A to E) there are 2 test points. Put a multimeter across these test points whilst on mVDC reading and trim the R70(a-e) trim pot to read 0mV. Do this for all 5 filter sections.
- 2) Whilst EQ is out, put your multimeter across test points TPS1 & TPS2 & trim R83 for 0mVDC.
- 3) Put a sine wave through the unit. The value isn't important, but somewhere around 400Hz at -18dBFS would be fine. Using your DAW, monitor the signal going and returning and set the unity gain trim pot. ie. The level on the input is the same as the level on the output.

Run some audio through the unit with EQ on and off and check that it sounds good and all controls work correctly.

Make sure there is no buzz or hum from the unit.

If all is well then we can fit the knobs...

7. Attach knobs

- Allow a little distance between the knobs and the front panel so the knobs don't rub against the front panel.
- Use a slim M7 nut socket for the large knobs. Or you can use needle nosed pliers to tighten the nuts of the knobs.
- Make sure the small knobs are not pushed in to the large knobs too much or they'll rub against each other..
- Fit multicoloured knob caps

Congratulations! Get recording & mixing!



* Further troubleshooting

For more in depth troubleshooting tests, it may be worthwhile to build or buy a little jig to test units without having to root around in a lunchbox. eg. An EDAC attached to long wires attached to a PCB with the 15/18 gold fingers to insert to the lunchbox. (One source of card edge connectors and edge adapters is Jeff's excellent store [classicAPI](#))

