VU Meters

Build Guide

Dannysound

1 Introduction

The Dannysound VU Meters is designed to be used with 2 x Dynamics modules. The modules connect internally via 2x3 pin ribbon cables. The meters provide a visual representation of various signals within the Dynamics modules making settings easier to dial in.

Features:
- External input sockets for monitoring external sources.
- Switch to select high or low meter sensitivity or off if the clicking needles get annoying!
- Monitoring of the compression/expansion amount.
- Monitoring of the unprocessed input level.
- Monitoring of the compressor/expander output level.

Note that the compressor/expander output is not the EQ OUT of the Dynamics module. If you want to monitor the EQ OUT you can connect it to the EXT IN via a splitter cable.

Controls For Each Channel:
3 position toggle switch:
1. C/E OUT – Monitor compressor/expander output.
2. INPUT – Monitor Dynamics input level or external input if it's used.
3. C/E AMT – Monitor Dynamics compression/expansion amount.

3 position toggle switch:
1. HI SENS – High sensitivity setting, best for monitoring the C/E OUT signal of percussive sounds and drums etc.
2. OFF – If you want to turn meters off. Note that this stops the needles moving but the backlights will stay on.
3. LO SENS – Low sensitivity setting, best for monitoring the C/E AMT signal or anything that overloads the HI SENS setting.

Connections:
Inputs
2 x External inputs

Width
8 HP

Depth
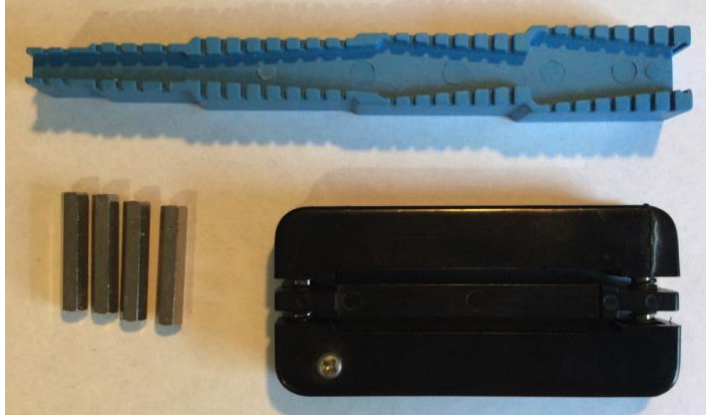45mm (Internal depth measured from panel)

Current
+5V = 2.4mA
+12 = 0.03mA
-12 = 83mA

2 Construction Tips

These tools come in very handy, especially if you do a lot of DIY projects. They should be available from most electronics hobbyist stores.


The blue bending guage is for bending the resistor and diode legs to the right size.
The black IC straightener is for straightening pins of op-amps etc.
The silver standoffs are 25mm Female to Female.

You can use this setup with the 25mm standoffs for inserting the resistors and diodes.
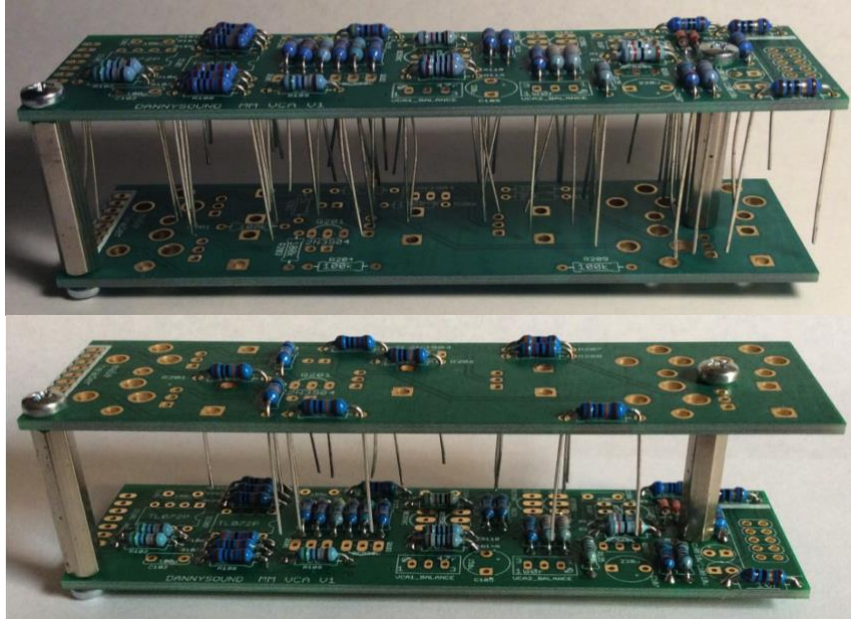
The top picture is for stuffing the Outer Board. It has the advantage of being much quicker to place all the resistors etc and it's easy to fix any mistakes. You can then solder everything from the top in one go (make sure you have decent temp. solder iron with not too fat tip!). Then unscrew the standoffs and clip all the legs. Reverse both boards as in the lower picture for the Pots Board.
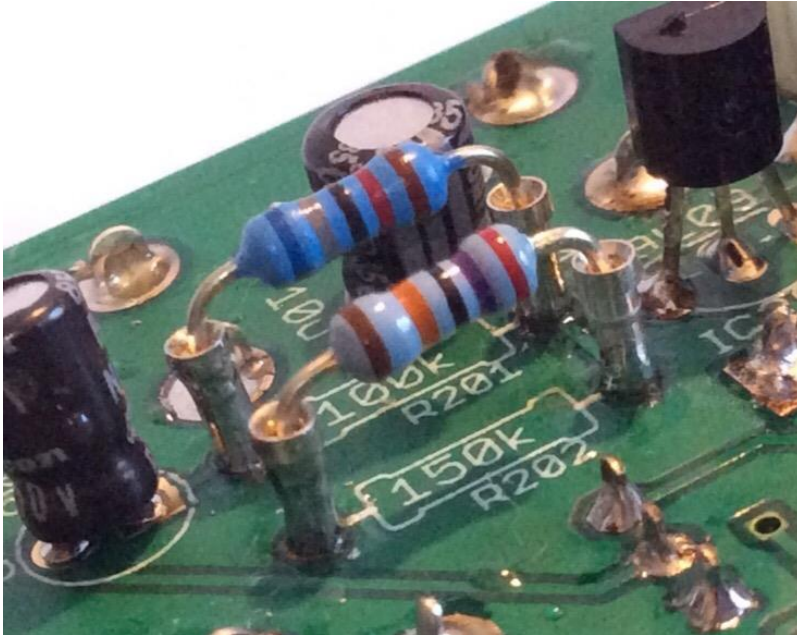
Cutting the pins from a SIL connector and soldering as shown above is useful for experimenting with different component values if you want to try out any of the modification.

3 Parts Lists

VU METERS OUTER PARTS LIST		
RESISTORS		
10r	3	R104 R106 R107
22r	1	R105
1k5	2	R103 R108
10k	4	R101 R102 R109 R110
CAPS		
100n MKT polyester box - 5mm pitch leads	2	C102 C107
10u electrolytic	3	C104 C105 C106
33u electrolytic	2	C103 C108
DIODES		
1N4148	8	D101 D102 D103 D104 D105 D107 D108
OPAMPS		
DG202	2	IC101 IC104
PIC 12F629 PRE-PROGRAMMED MICROCONTROLLER	2	IC102 IC103
DIL SOCKETS		
8 PIN	2	
16 PIN	2	
VU METERS		
TR35 NISSEI	2	
HEADERS		
1 X 7 FEMALE	2	
Shrouded 2 x 3 power socket	2	
Shrouded 2 x 8 power socket	1	
TRIMMER		
50r 25 turn trimmer	1	

VU METERS MID PARTS LIST		
RESISTORS		
1k	2	R201 R203
10k	2	R202 R204
TRIMMER		
4k7 Side adjust 25 turn trimmer	2	CH1_TRIM CH2_TRIM
HEADERS		
1 X 9 FEMALE	2	
1 X 7 MALE	2	

VU METERS V8 SWITCHES PARTS LIST		
SWITCHES		
DPDT Centre off toggle switch	4	
SOCKETS		
PJ301	2	
HEADERS		
1 X 9 MALE	2	

VU METERS HARDWARE	
STANDOFFS	
M3 MALE-FEMALE 5MM	8
M3 FEMALE- FEMALE 11MM	8
M3 MALE-FEMALE 11MM	4
SCREWS	
M3	12
KNOBS	
RED TOGGLE CAP	2
WHITE TOGGLE CAP	2
2X3 RIBBON CABLE	2

4 Outer Board
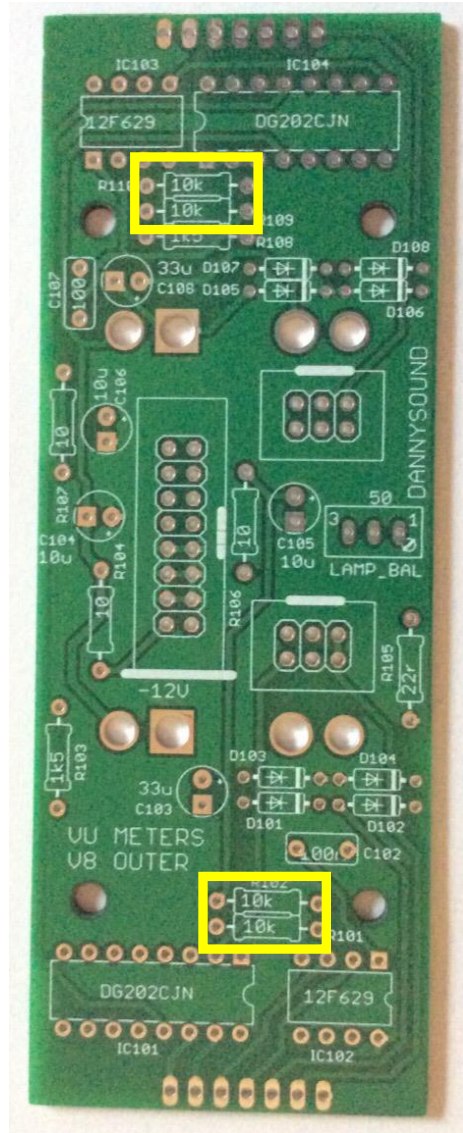
RESISTORS
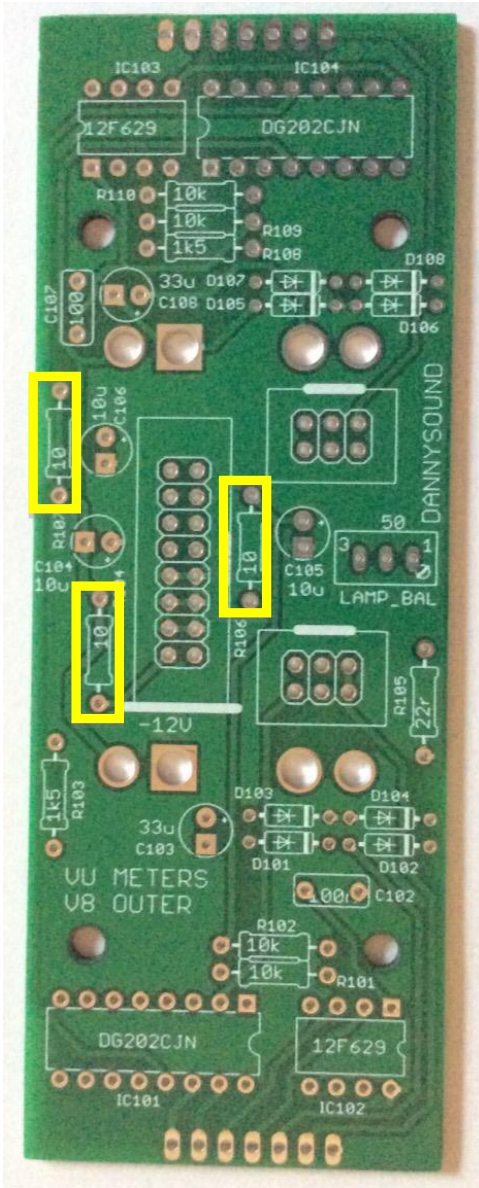
1) – 3 x 10r (R104, R106, R107)   **2) – 1 x 22r** (R105)
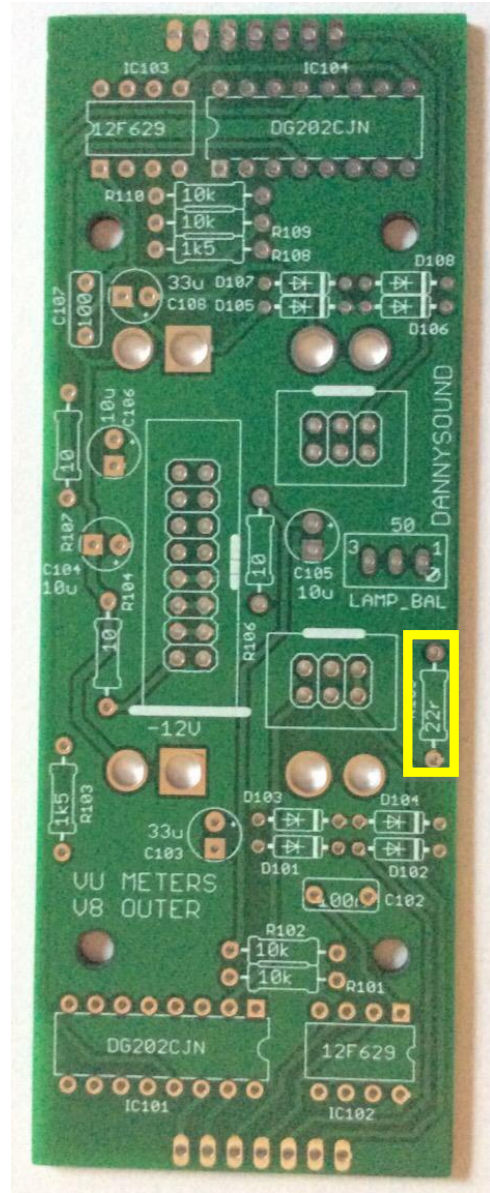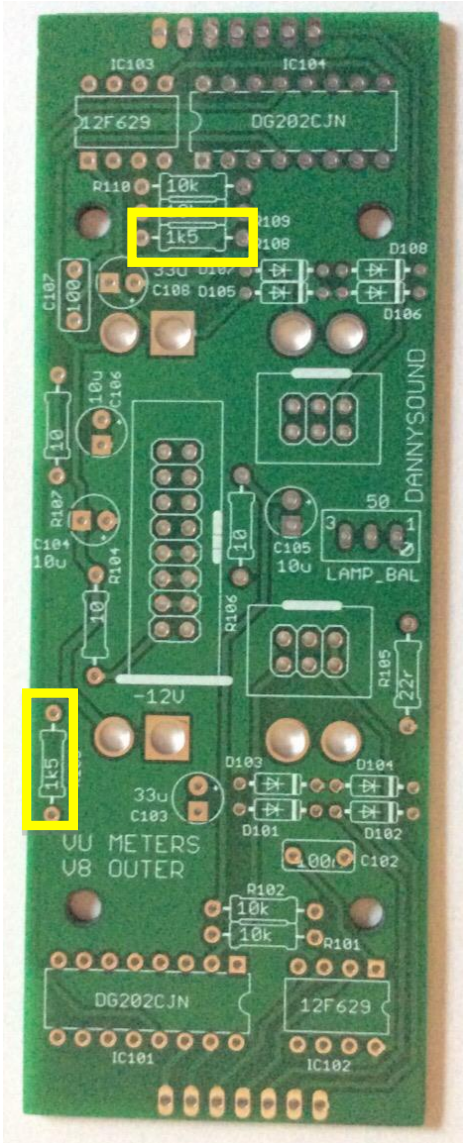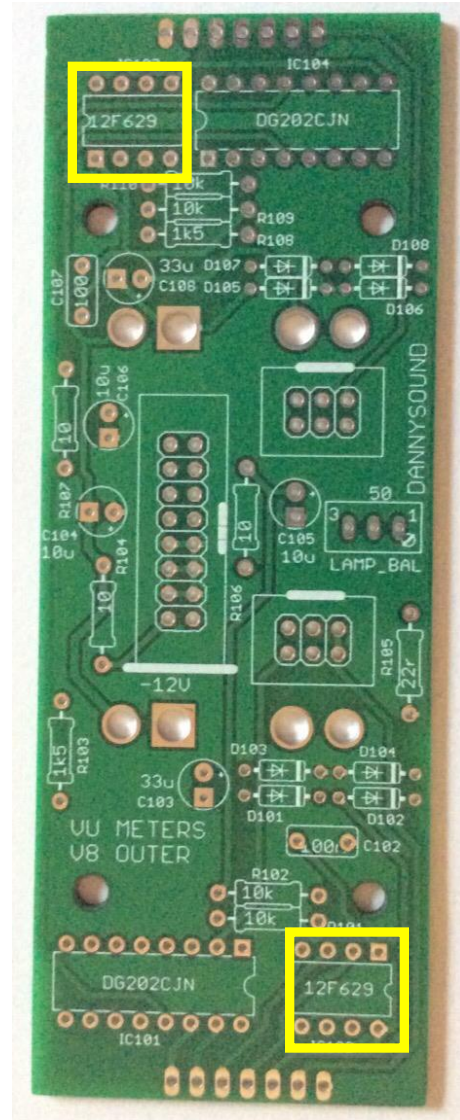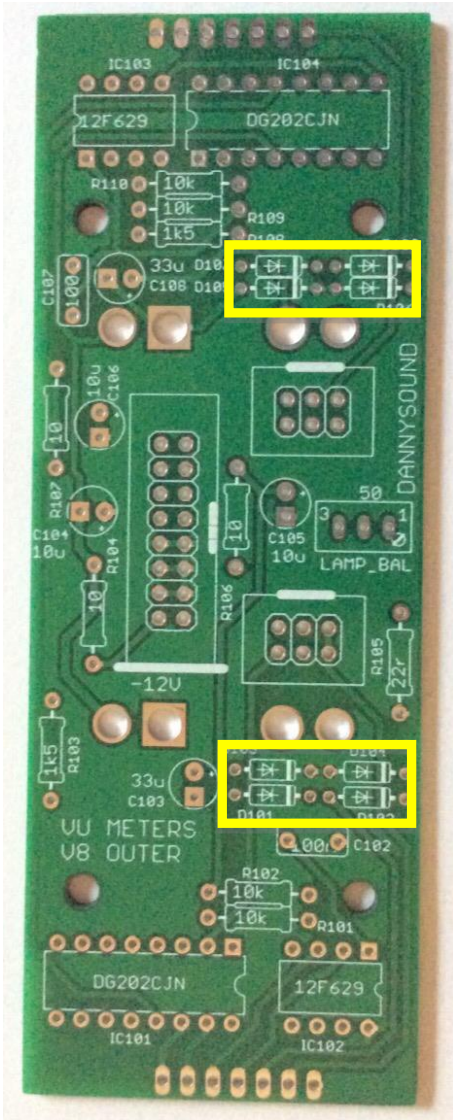
3) – 2 x 1k5 (R103, R108)   **4) – 4 x 10k** (R101, R102, R109, R110)
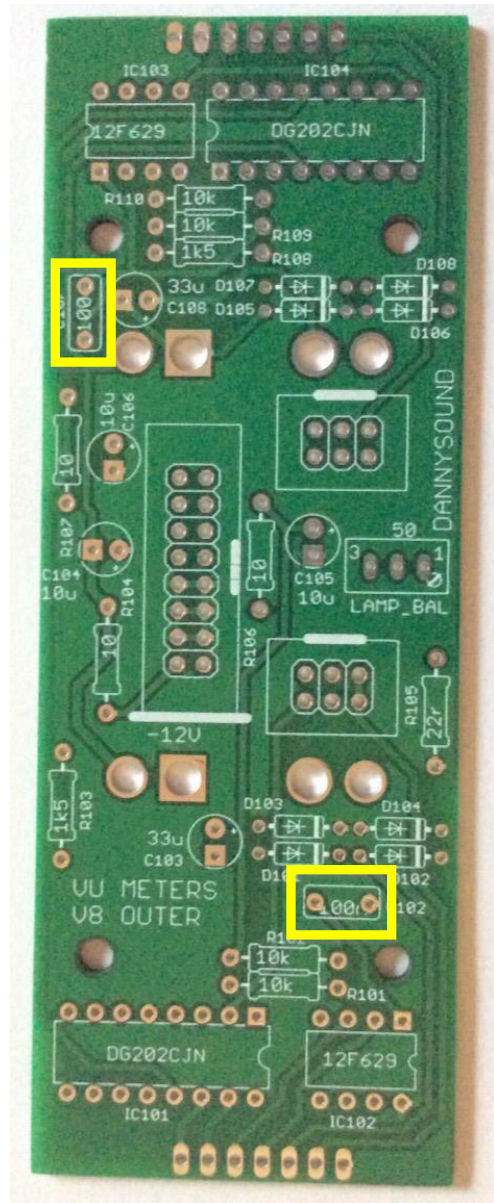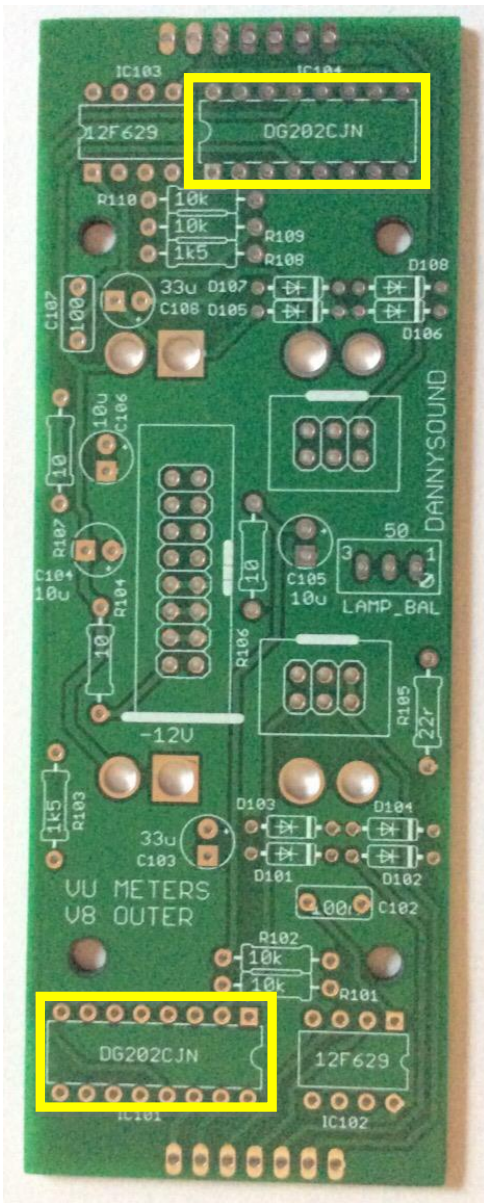
IC SOCKETS

5) – 8 x 1N4148 Diodes
(D101, D102, D103, D104,
D105, D106, D107, D108)

Note: orientation of the diodes is
vital - be sure to match the black
line on the component with the line
on the PCB silkscreen.

6) – 2 x 8 Pin IC sockets

Note: Mind orientation – match the
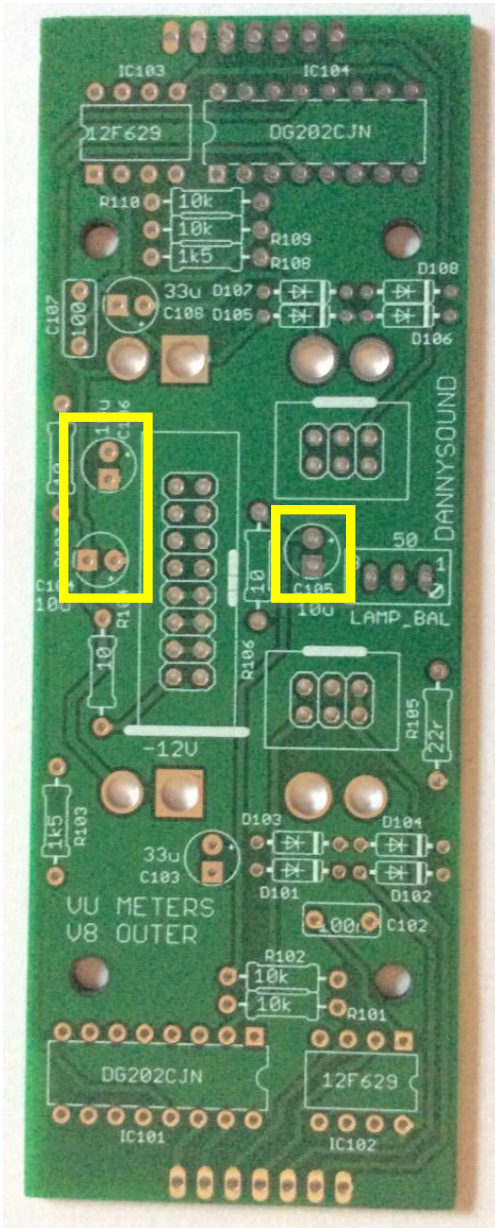notch on each socket with the notch
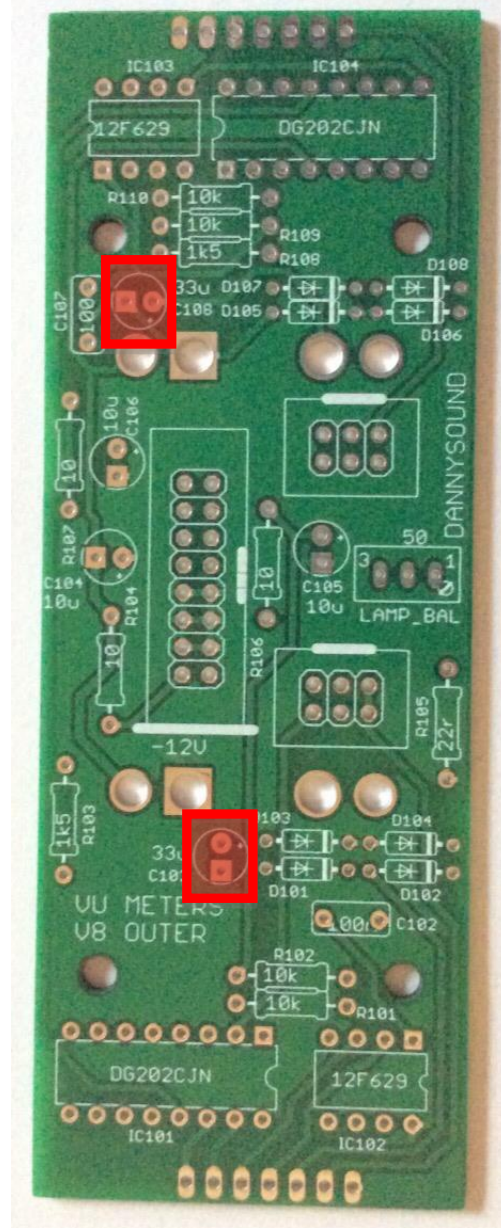on the PCB silkscreen.

CAPS

7) – 2 x 16 Pin IC Sockets

8) – 2 x 100n film (C102, C107)

Note: Mind orientation – match the notch on each socket with the notch on the PCB silkscreen.
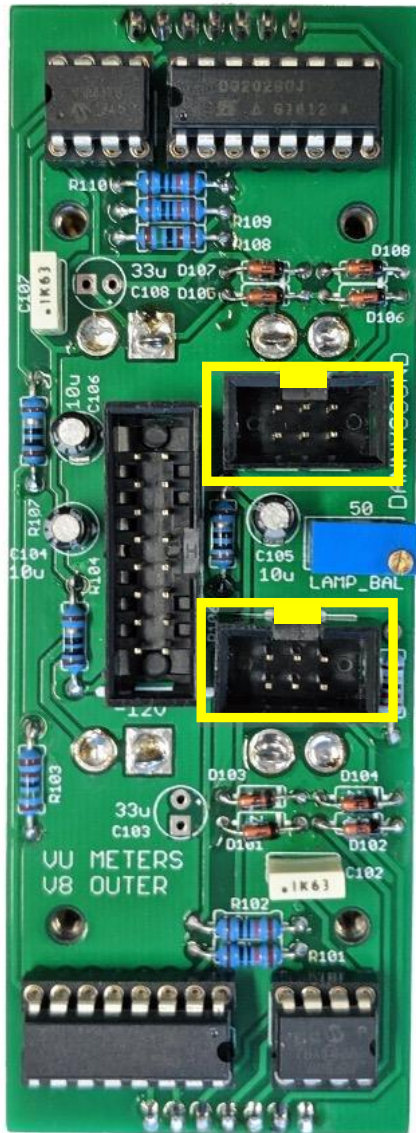
9) – 3 x 10u electro
(C104, C105, C106)

10) – 2 x 33u electro Do Not Insert*
(C103, C108)

Note: mind polarity - the negative short lead
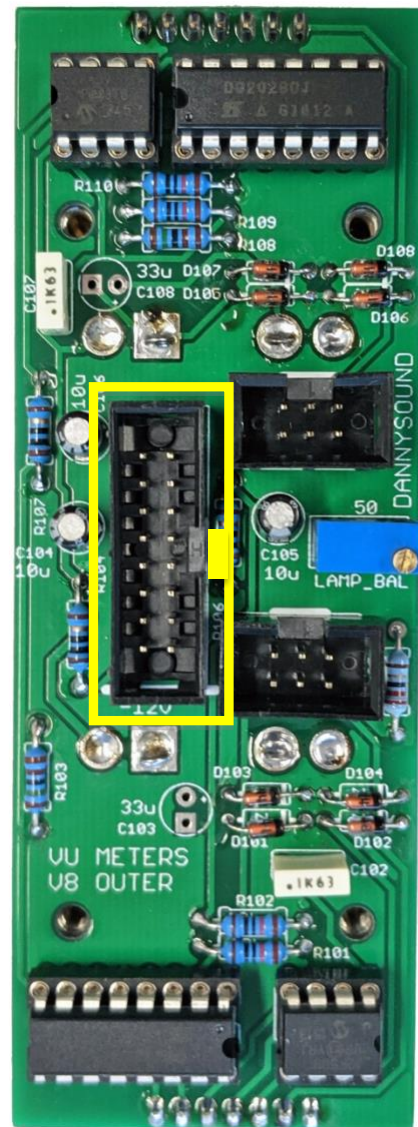should go to the square pad on the PCB.

*See modifications section at the end of this document for more information on the
33u capacitors.

SHROUDED HEADERS

11) – 2 x 2x3 Shrouded Sockets

Note: orientation of these header sockets is vital! Make sure that the slot in each socket faces the thick line on the PCB silkscreen.

**12) – 1 x 2x8 Shrouded Socket**

Note: orientation of the header socket is vital! Be sure that the slot faces <u>towards</u> the other sockets – as indicated by the thick line on the PCB silkscreen.
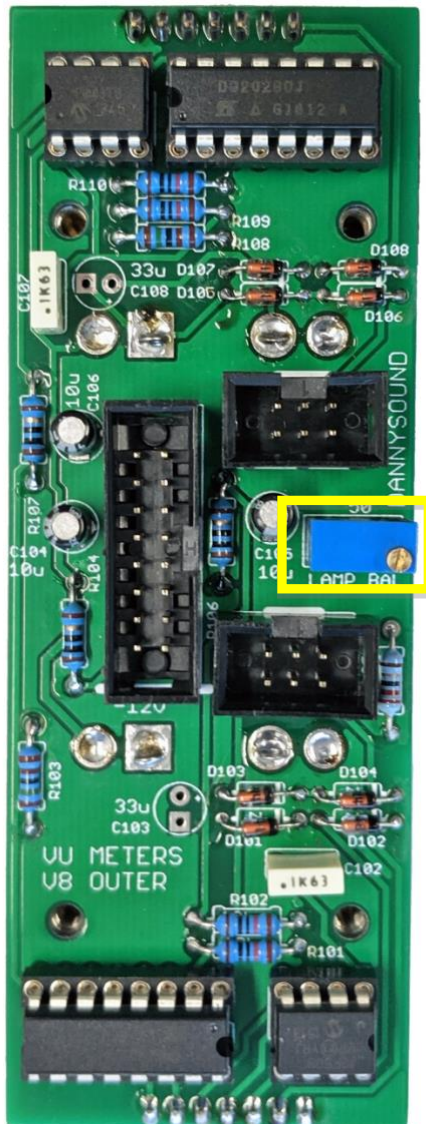
13) – 1 x 50r blue trimmer (LAMP_BAL)

Note: Polarity is vital! The screw of each trimmer should face <u>towards</u> the edge of the PCB.

Note: be careful not to overturn this trimmer when calibrating, if you feel increased resistance and a light click, then you have reached the end of the trimmer and should stop turning.
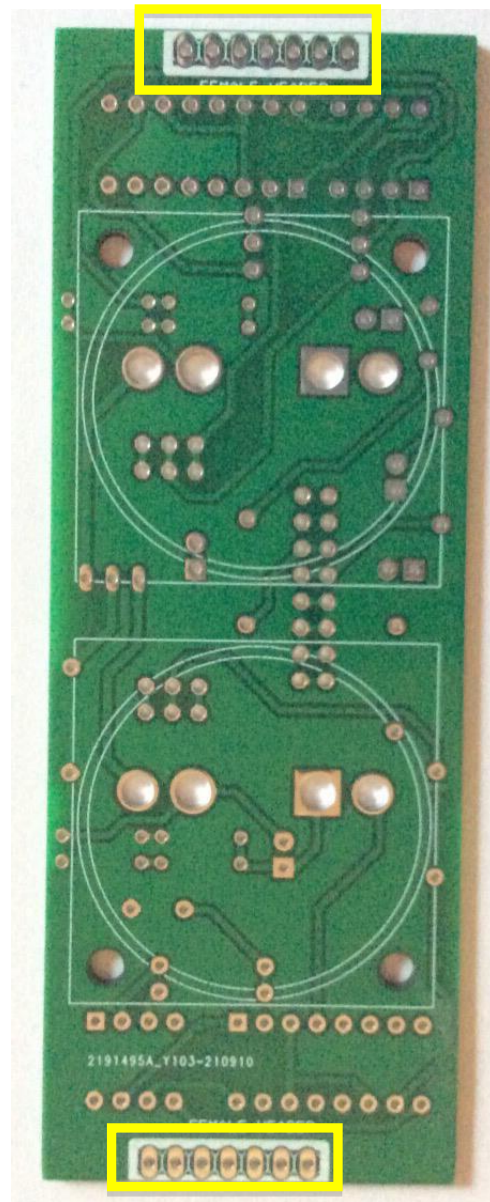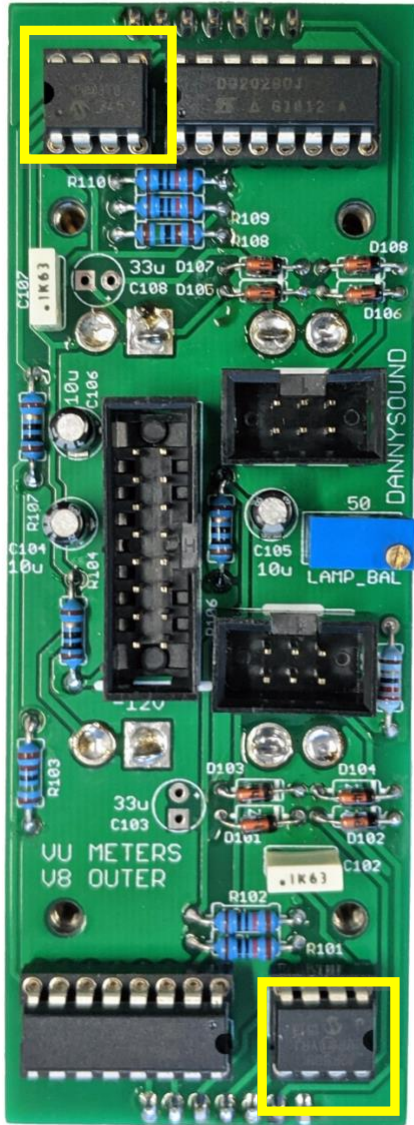
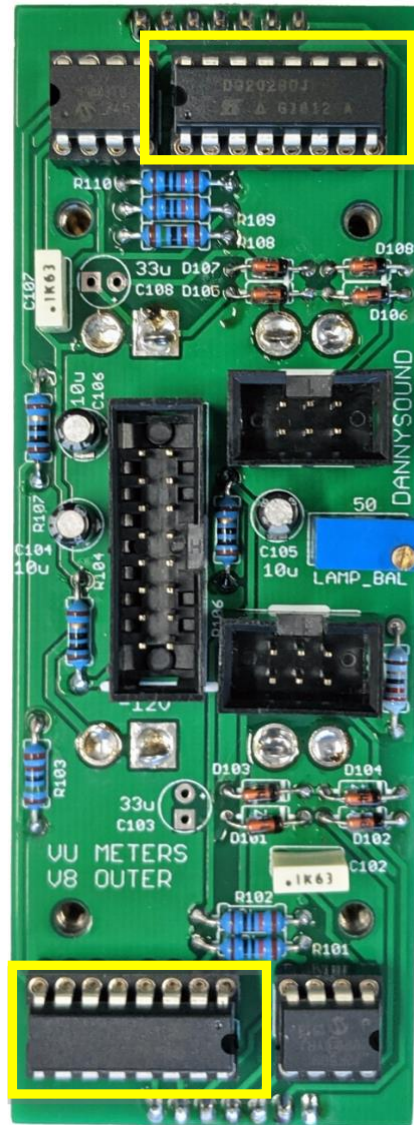**14) – 2 x 7 Pin FEMALE**

Note: These headers are placed on the <u>opposite</u> side to all previous components on this PCB.

Remove 1 pin from the 8 pin headers to convert them into 7pin

ICs

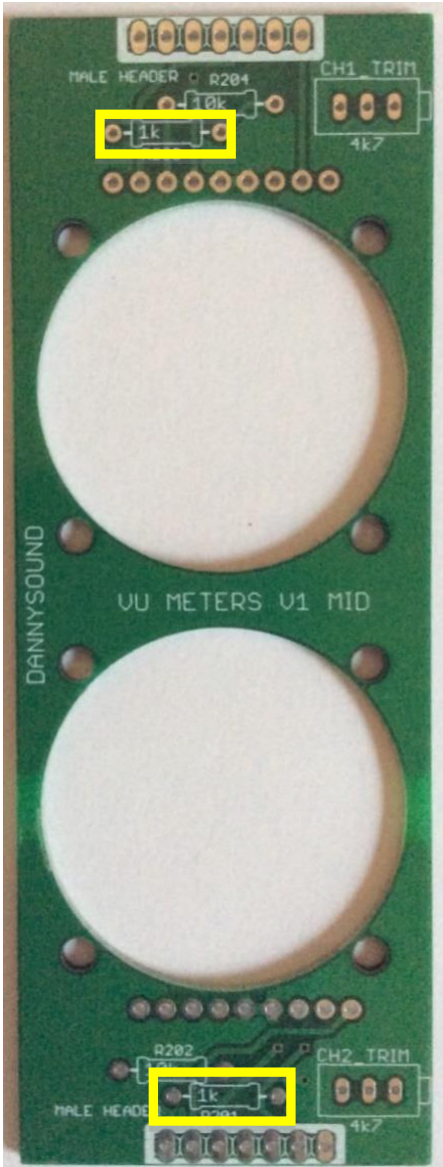**15) – 2 x Pre-Programmed PICs   16) – 2 x DG202**

Note: Mind orientation – match the notch on each chip with the notch on PCB silkscreen and IC socket as shown above.
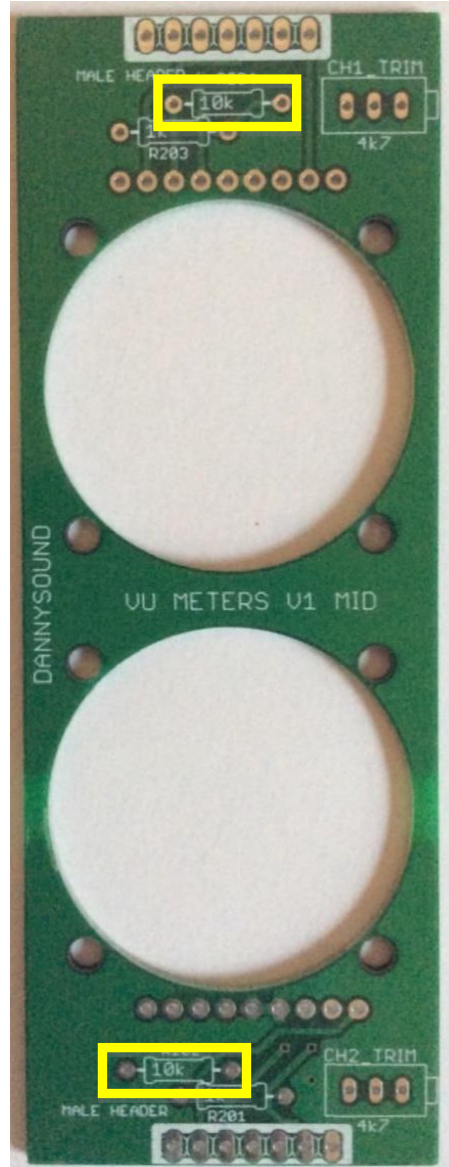
The programmed PICs are packed with the PCB set

5 Mid Board

RESISTORS

17) – 2 x 1k (R201, R203)

18) – 2 x 10K (R202, R204)

MALE HEADERS

TRIMMERS

20) – 2 x 7 Pin MALE

Note: These male headers are placed on the <u>same</u> side as the resistors.

19) – 2 x 4k7 blue trimmers

Note: Polarity is vital! The screw of each trimmer should face <u>towards</u> the edge of the PCB.

21) – 2 x 9 Pin FEMALE

Note: These female headers are placed on the underlined opposite side to all previous components on this PCB.

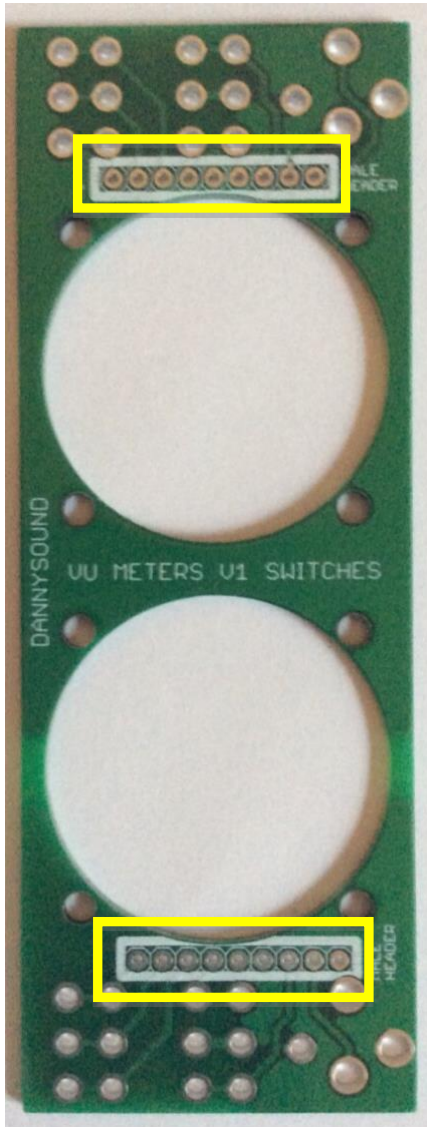Remove 1 pin from the 10 pin headers to convert them into 9 pin

The MID PCB is now fully soldered

6 Switches Board, Panel Components and Final Assembly

To make sure the panel fits correctly only solder one pin of each of the jack sockets and one pin of each of the switches to enable easy re-positioning when fitting the panel.
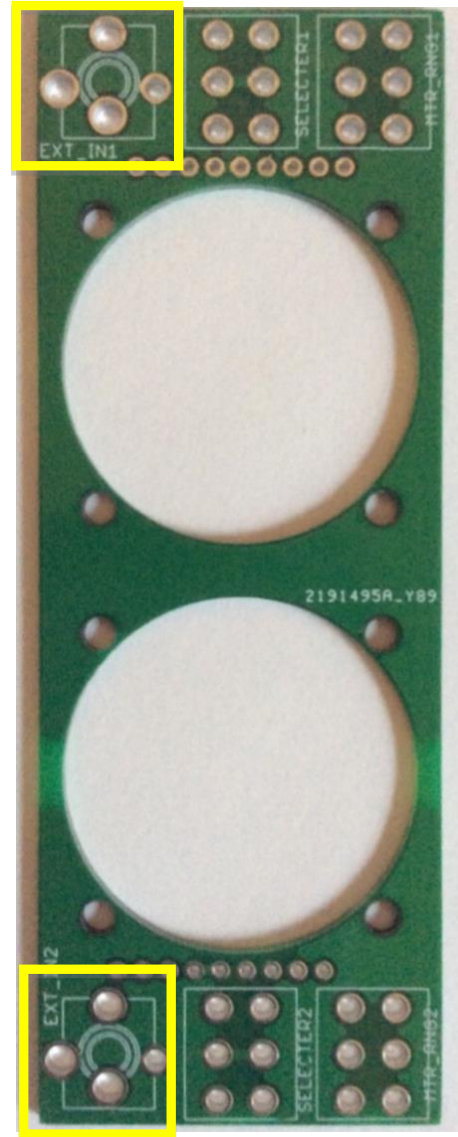
HEADERS   SWITCHES

22) – 2 x 9 Pin MALE

Note: These male headers must be placed on the PCB side with white outline as shown above
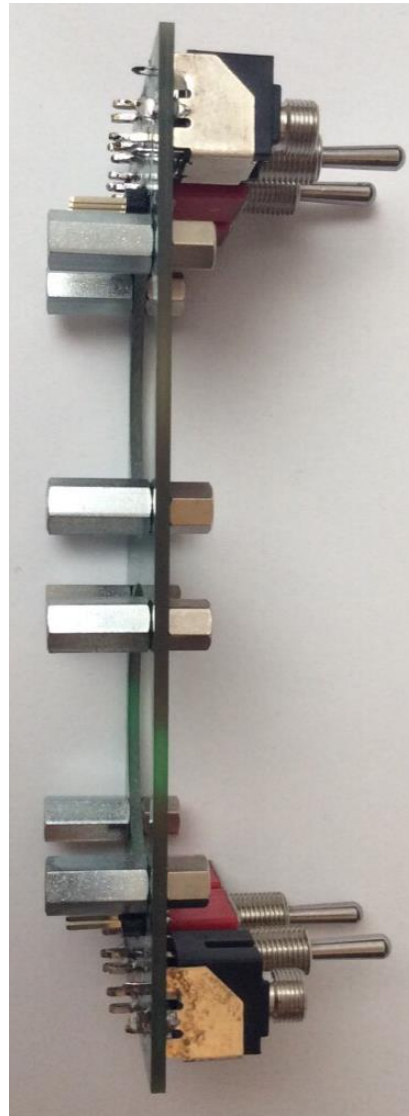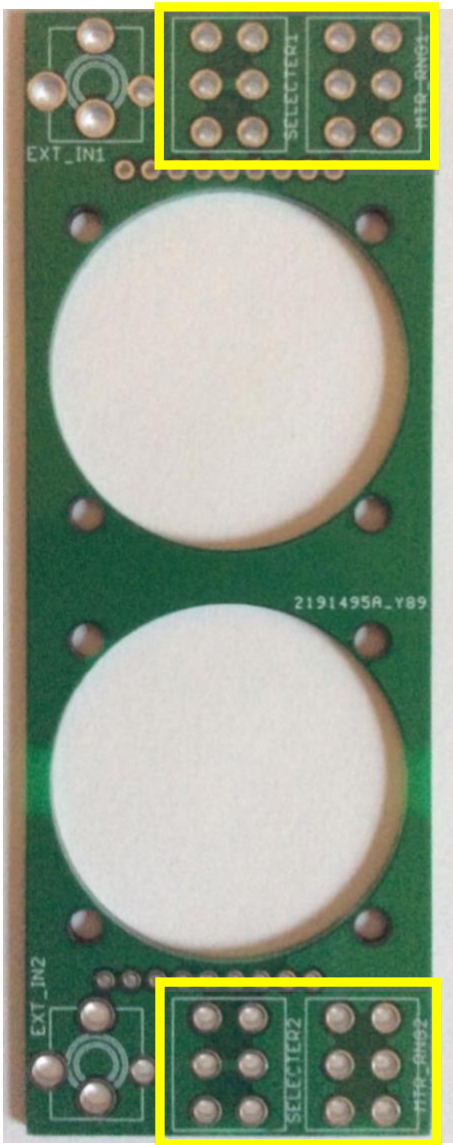
23) – 2 x Jack sockets

Note: The jacks are placed on the opposite side to all previous components on this PCB - solder one pin only on each jack for now

JACK SOCKETS   ST

24) – 4 x Switches

The switches are placed next to the jacks – solder only one pin on each switch for now

25) – Attach the 5mm male-female standoffs and 11mm female-female standoffs as shown above**.** There are 8 of each.

5mm M-F   11mm F-F

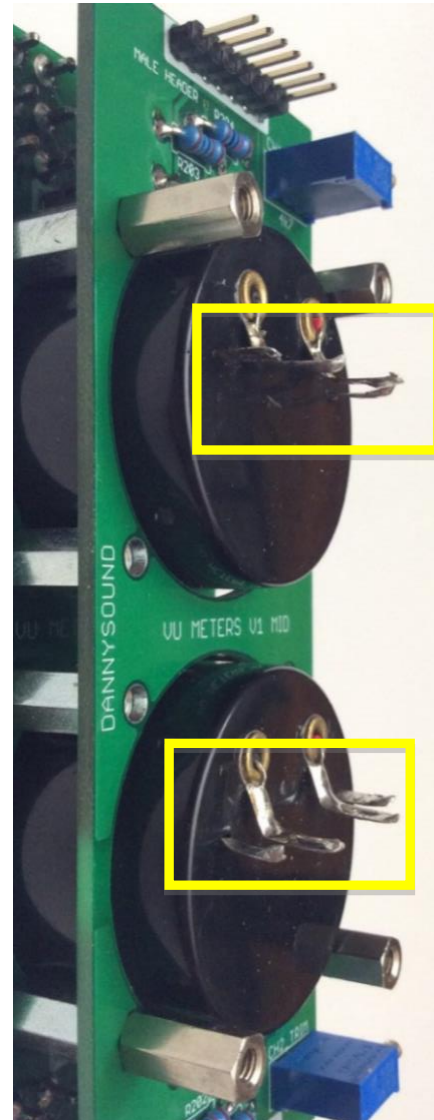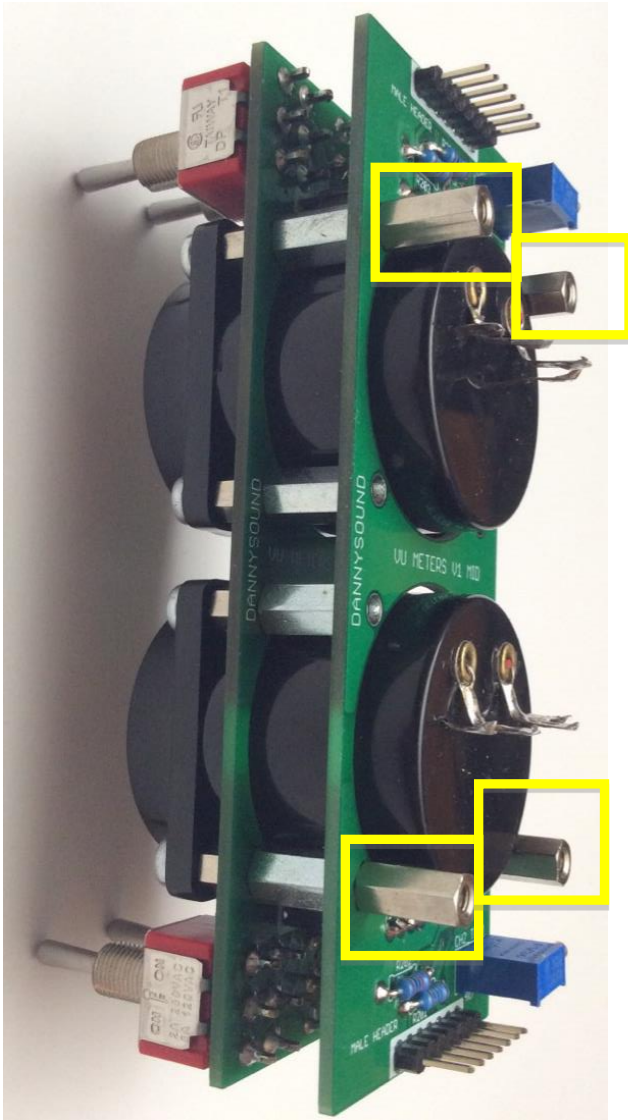**26) – 2 x VU Meters**

Screw the VU Meters onto the 5mm standoffs as shown

NOTE: ORIENTATION IS VITAL!
Ensure the meters are placed as shown above with the dials facing upright

27) – Fit the front panel and attach the nuts to the jacks and switches to make sure everything lines up. Now solder the rest of the pins on the jacks and the switches. After soldering remove panel again.

**28) –** Next add the Mid PCB as shown and screw the 4 x 11mm MALE – FEMALE standoffs.

29) – Bend the solder tabs on the VU as shown. This is done so that they can line up with the holes on the Outer PCB.

IMPORTANT: Thonk kits include 10mm standoffs. Add the supplied washers to the male side of the standoff as shown.

Add 2 x nylon washers onto each of the 4 standoffs

Do not add the standoffs without placing the washers!
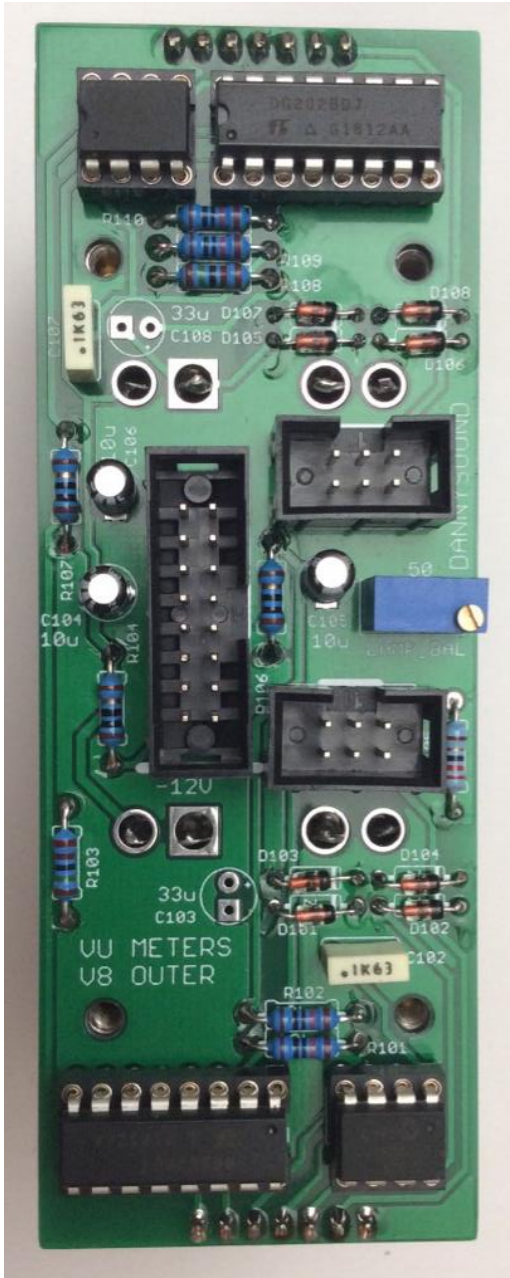
30) – Attach the outer PCB and secure the standoffs with 4 screws.

Now solder the VU meter tabs.

Note: if the tabs don't line up with the holes in the PCB then be sure to check that the dials are orientated correctly

31) – Add 1 x crinkle washer to each switch.
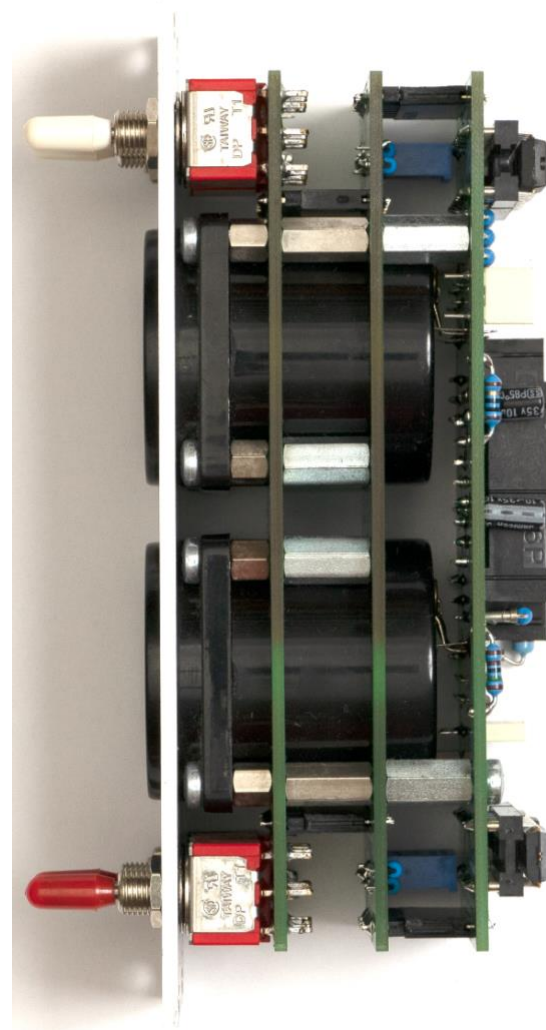
32) – Add panel, toggle caps and nuts for the switches and jack sockets.

33) – The build is finished! Read on for calibration details.

Connect to LEFT Dynamics module

Connect to RIGHT Dynamics module

CH1_TRIM

LAMP_BAL

CH2_TRIM

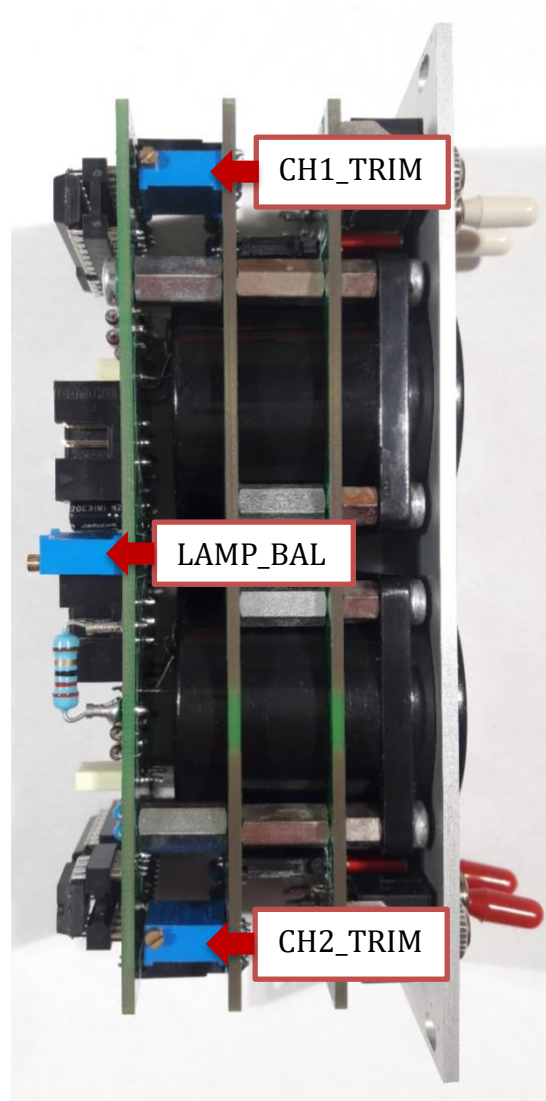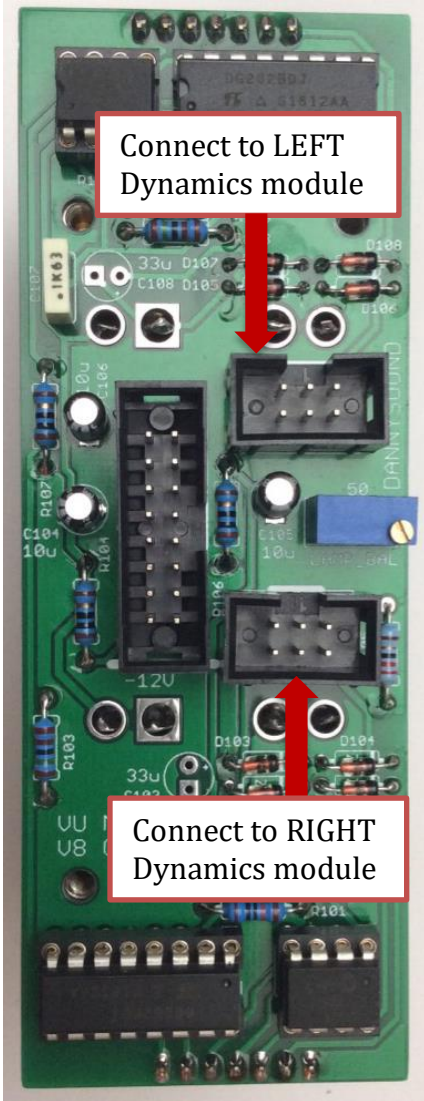# 7 Calibration and Testing

Ensure that the power cable is connected and the 2x3 pin interconnecting ribbon cables are connected to the Dynamics modules. It won't harm the module if the interconnecting ribbon cables aren't fitted though so if it's easier you can plug them in after the calibration procedure.

CALIBRATION:
1. Let the lamps warm for a couple of minutes.
2. Adjust the LAMP_BAL trimmer so the backlight of each VU meter looks the same. **Note:** be careful not to overturn this trimmer, if you feel increased resistance and a light click, then you have reached the end of the trimmer and should stop turning.
3. Set the switches on both channels to INPUT and LO SENS.
4. Connect a +/- 5V SINE wave to the EXT INPUT on LEFT/CHANNEL 1.
5. Adjust the CH1_TRIM so the VU meter reads 0.
6. Connect the +/- 5V SINE wave to EXT INPUT on RIGHT/CHANNEL 2.
7. Adjust the CH2_TRIM so the VU meter reads 0.

TESTING:
1. Ensure all interconnecting ribbon cables between VU Meters and Dynamics modules are connected.
2. Set VU Meters switches on both channels to C/E AMT and LO SENS.
3. Adjust LEFT Dynamics module INITIAL LEVEL up and down and ensure the meter follows the changes.
4. Adjust RIGHT Dynamics module INITIAL LEVEL up and down and ensure the meter follows the changes.
5. Set the INITIAL LEVEL on both channels so the VU meters read 0.
6. Set all other controls to 12 o'clock.
7. Play some drums or something rhythmic through the Dynamics modules. If possible, use the same source for both LEFT and RIGHT channels to make sure the VU meters respond the same.
8. Turn the COMP/EXP control to 0 on both modules and ensure that the VU meters register the compression being applied.
9. Set the switches for both channels on the VU Meters to C/E OUT and HI SENS.
10. Ensure the VU meters are registering the output.
11. Set the switches on the VU Meters to LO SENS and ensure the VU meters are registering the output but at a lower amount.

8 Modifications

The only real modification is to connect the 33uF capacitors. These caps filter out some of the faster transients, so you get a more averaged representation of the signal. This was found to be a little annoying though as lag between the beat and the needle moving was too much.