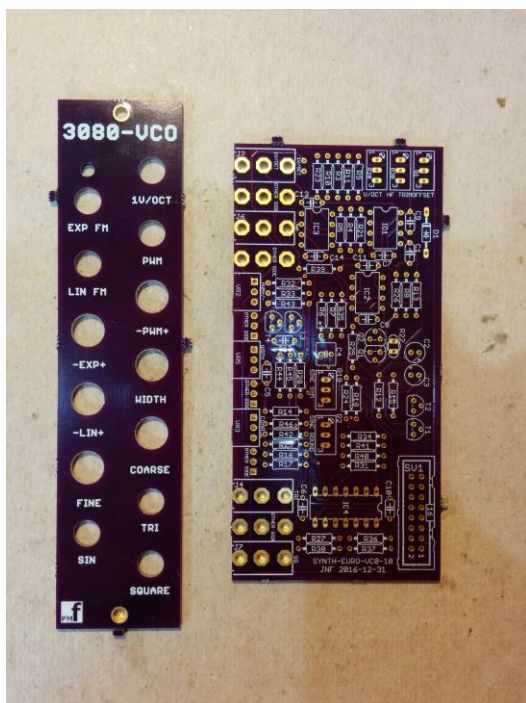


3080 VCO v1.2 – Assembly Guide

Thank you for purchasing this module! This is a complicated build with tightly packed components and precision integrated circuits. It is not recommended for the beginner.



The module is designed and sized for **Euro rack** systems. You will need a 16 pin euro rack power ribbon connector with $-12/0/+12$ which is connected to a synth power supply.

Follow the parts lists, these instructions and the PCB silkscreen text to build the module.

The module consists of 1 PCB board and a front panel.

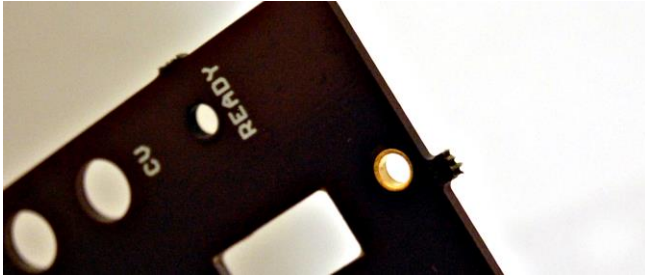
There are components installed on BOTH sides of the boards. Please ensure that you place the components on the correct side. When referring to the TOP of a board we mean the side with the **pmF** logo. The BOTTOM has no logo.

You may need to clean up the board edges with wire cutters and/or a file to remove the remains of the tabs from the fabrication process. This is particularly important for the edges containing the jacks. These edges will need to mate flush with the front panel.

You must follow the order of assembly as described below since some components will be soldered underneath other components.

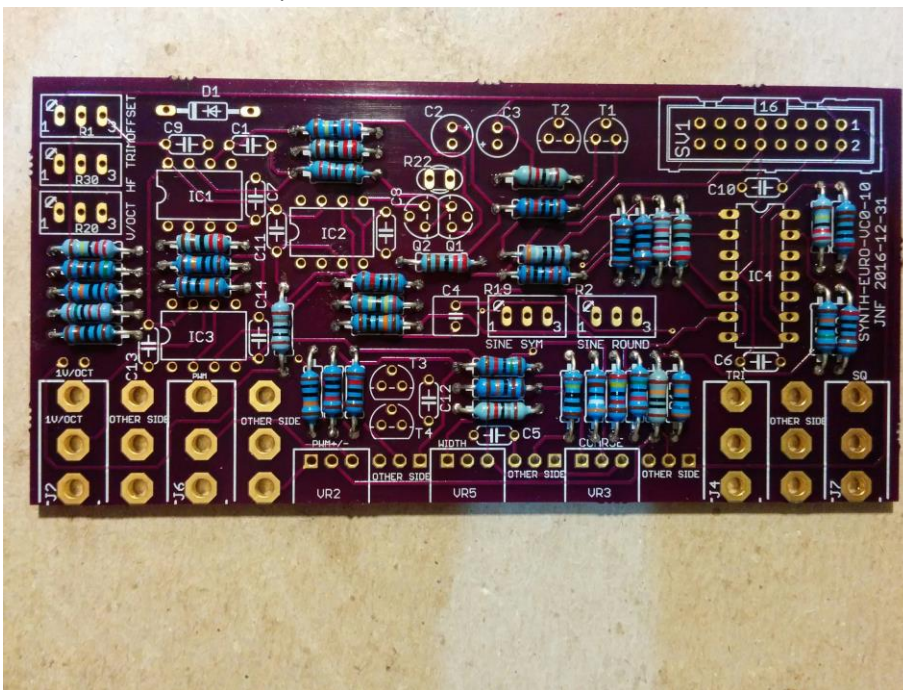
Constructing the board

1. Clean board edges with wire cutters and/or file to remove the manufacturing tabs.



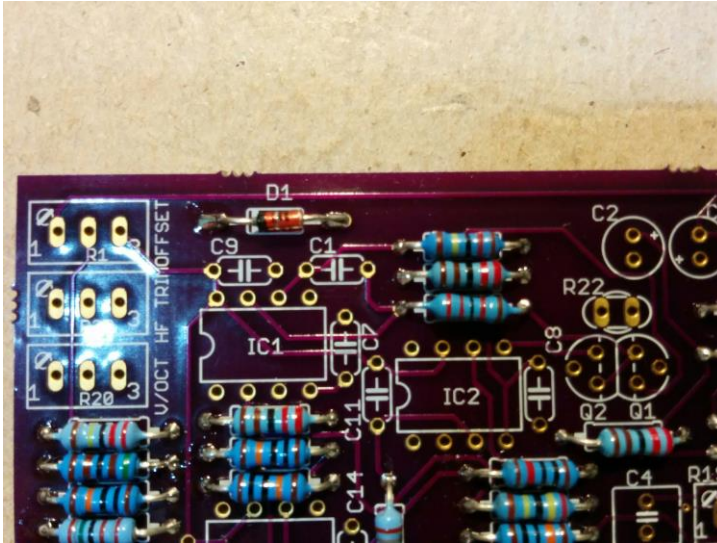
2. Resistors

Install the flat resistors on the TOP of the board. The resistors between IC sockets for IC1 and IC3 are a tight squeeze! Please ensure you can get the sockets in before you solder these three resistors. Solder and clip the leads.



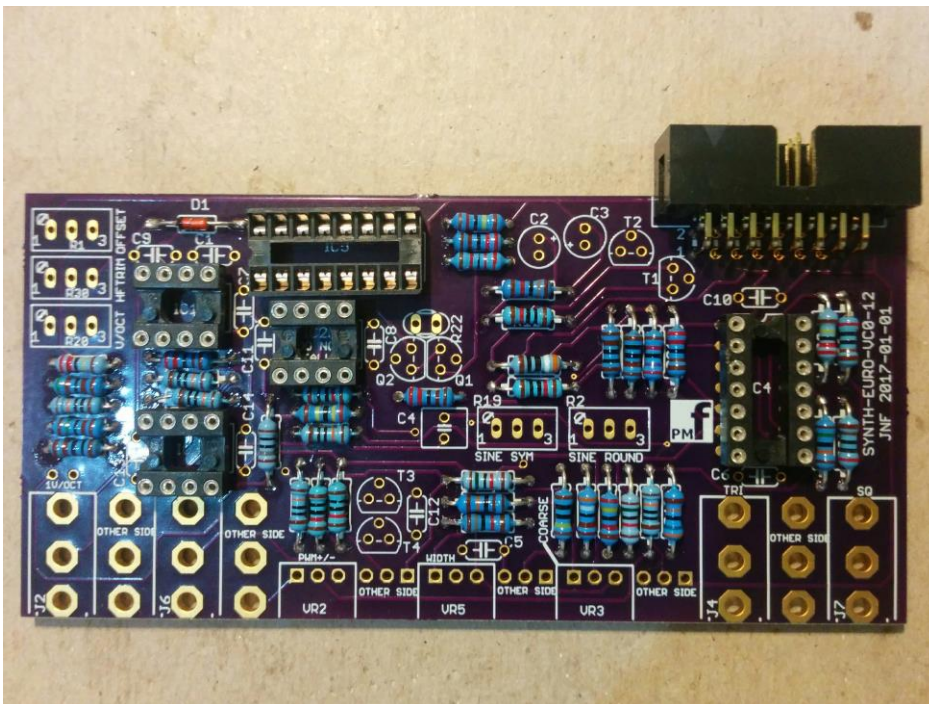
3. Diode (not LED)

Install the diode (but not the LED) on the TOP of the board. These are polarized components. Align the stripe on the diode with the stripe marked on the board. Solder and clip the leads.



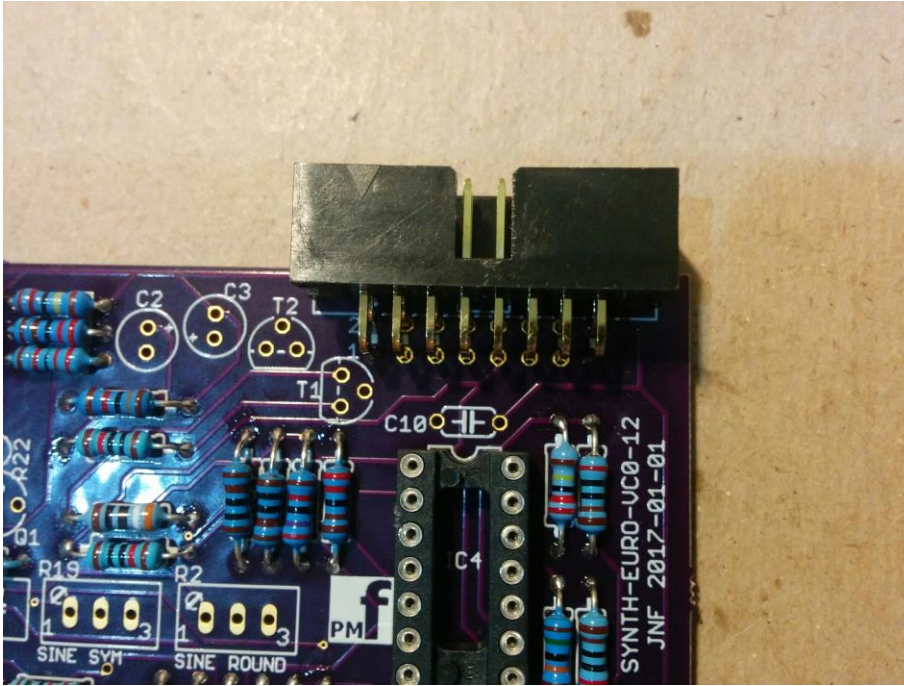
4. IC Sockets

Install the sockets on the TOP of the board. This module uses either a CA3080 (IC2) OR a LM13700 (IC5). If you will only use one or the other, you do not need to install the IC socket for the alternate part. Observe the notch or mark on the sockets and align with the notch or mark on the board. The sockets for IC1 and IC3 are a tight squeeze next to three resistors! Solder.



5. Power socket

Install the 16 pin power socket on the TOP of the board. Some boards have a straight socket and some a right angle socket. The straight socket should be installed with the notch facing outwards. The opening in the right angle socket should face OUT from the board as shown in the photo. Solder.

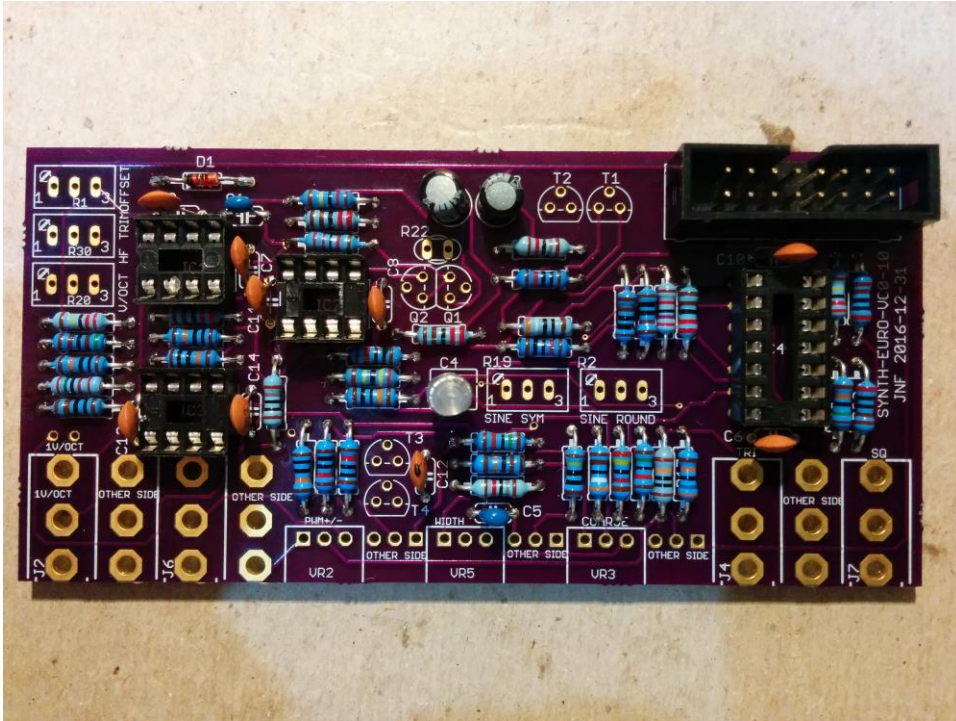


6. Ceramic/film/polystyrene capacitors

Install the ceramic/film capacitors on the TOP of the board. The 1000 pf polystyrene is C4. Solder and clip the leads.

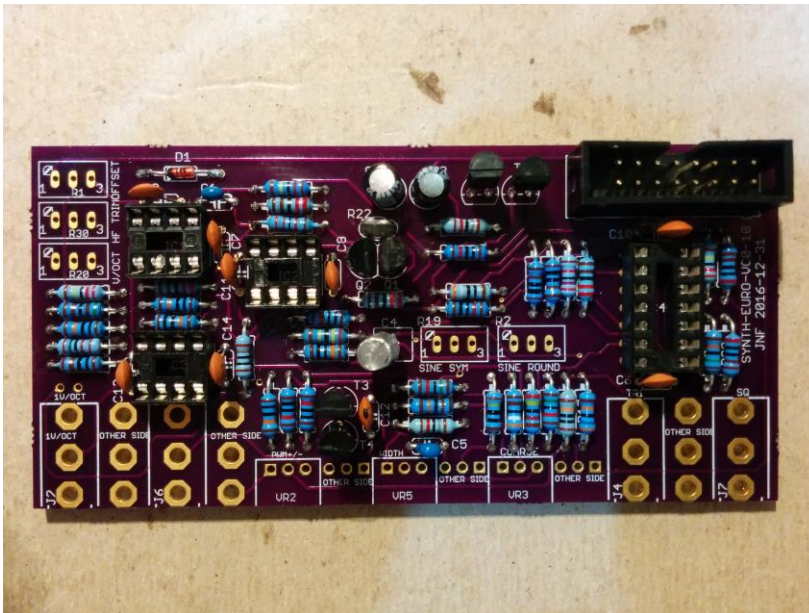
7. Electrolytic capacitors

Install these on the TOP. Make sure you orient these capacitors correctly. The longer lead and/or the lead marked with a + needs to be inserted into the hole that has the "+" marking near it. Leads marked with "-" go in the board hole WITHOUT the "+". Solder and clip the leads.



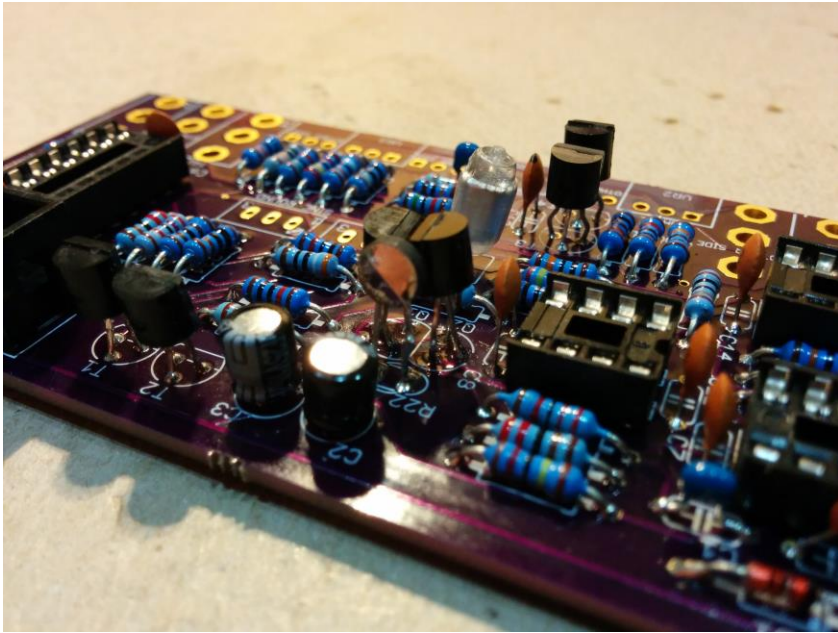
8. Transistors

Install the transistors on the TOP of the board. These are polarized components. Align the outline with the outline on the board. They should be raised off the board surface slightly and at the same height. Solder and clip the leads.



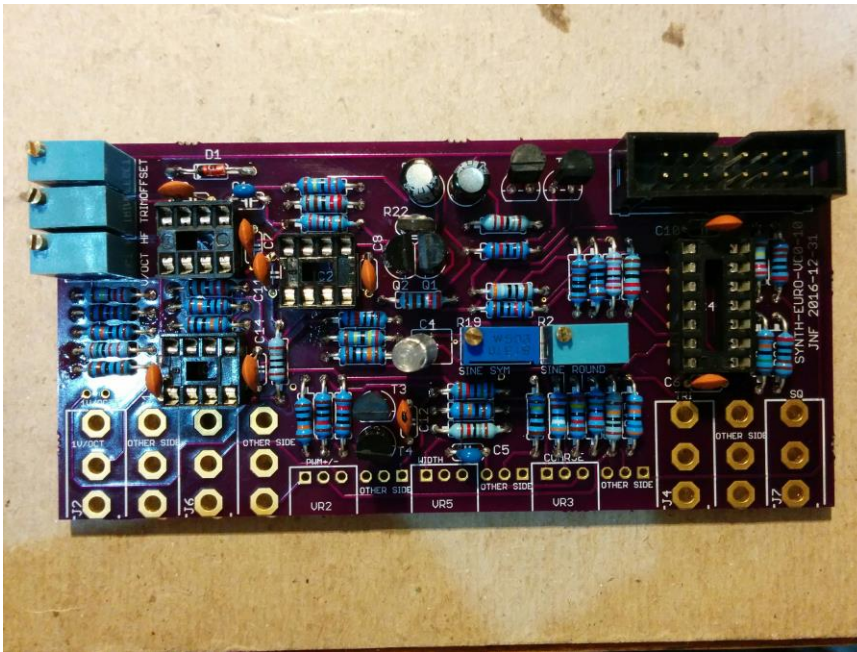
9. NTC thermistor

Install the thermistor on the TOP of the board. It should be raised off the board surface slightly and at the same height as the adjacent transistors. Try and move the two transistors and the thermistor close together and tie them together with a small zip tie or with epoxy. Solder and clip the leads.



10. Trimmer resistors

Now populate the trimmer pots on the PCB. Make sure they are oriented so that the screw is above the circle on the silk screen.



11. Potentiometers

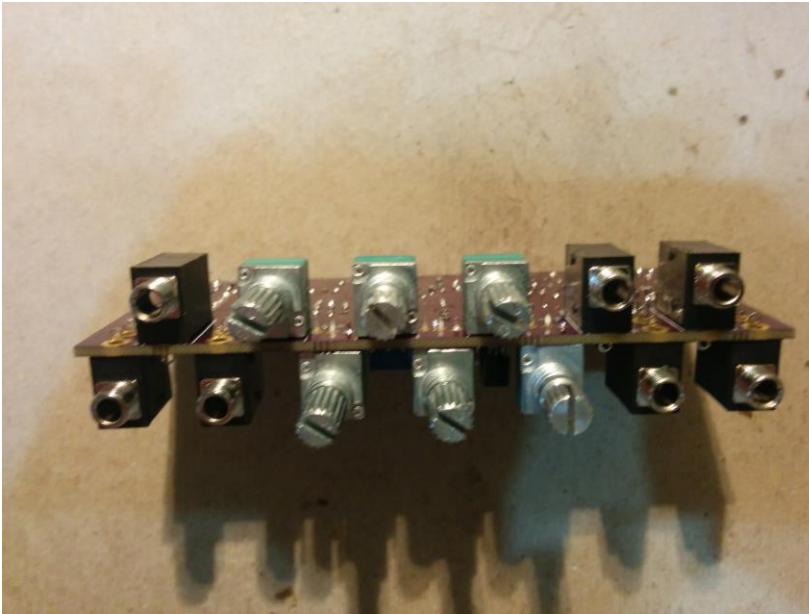
If the pots have positioning lugs on the front, cut these off with a sharp pair of flush cutting pliers. The front of the pot (where the shaft protrudes) needs to be flat.

Install SOME pots on the top and SOME on the BOTTOM. Tack one pin only with solder. These will be finalized later. Please ensure they are on the CORRECT SIDE OF THE BOARD. See Photo.



12. 3.5mm Jack Sockets

Install SOME jacks on the top and SOME on the BOTTOM. Tack one pin only with solder. These will be finalized later. Please ensure they are on the CORRECT SIDE OF THE BOARD. See Photo.



13. Alignment

1. Place a washer over each pot shaft.
2. Place the front panel over the board so that the pots and 3.5mm jacks align with the holes in the panel.
3. Put nuts on the jacks and pots and FULLY TIGHTEN all of them. Do not overtighten!
4. Now fully solder as many pins as you can reach of each jack and pot.

5. Remove the front panel and solder all the remaining pins on the jacks and pots.

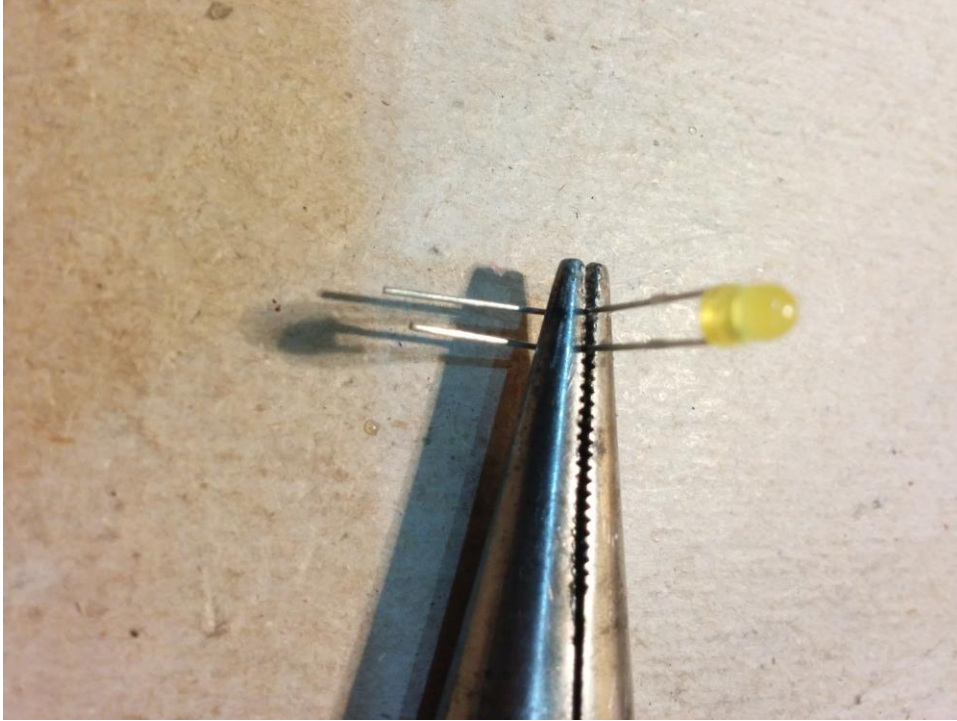


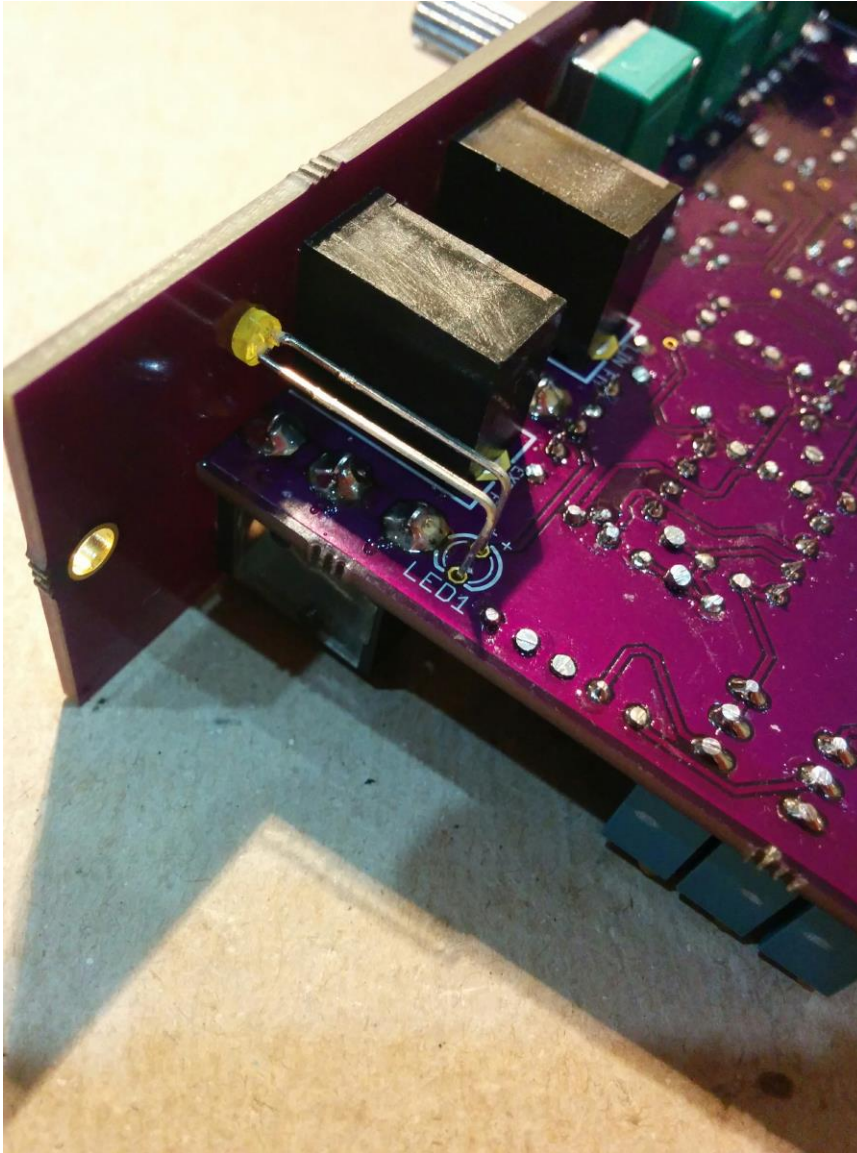
14. LED

Bend the pins of the LED as shown in the photo. The bend is at 17mm (11/16") from the underside of the LED. Note the location of the longest lead.

Install the LED loosely on the BOTTOM of the board. Place the anode (longer lead) into the pad with the '+' marking next to it.

Place the panel over the jacks and pots and position the LED in the hole. Solder and clip the leads.





15. Do not install the ICs until the voltage tests are complete.
16. If you do not trust all your soldering and connections, carry out the voltage tests below before installing the ICs

Voltage tests

1. You do not have to do these tests if you are completely happy with your soldering and are sure there are no bridges or incorrectly placed components. However, these tests will ensure that the correct power supplies are sent to the IC pins to ensure they will not be damaged on power up.
2. Plug in the power supply and connect the –VE probe of a multimeter (set to the 20V DC range) to one of the GROUND pins of the jacks. The GROUND pin is nearest to the edge of the board.
3. Check the voltage at the following points on the board:
 - a. At IC1 pin 8 approx = +12V
 - b. At IC1 pin 4 approx = -12V
 - c. At IC2 pin 7 approx = +12V
 - d. At IC2 pin 4 approx = -12V
 - e. At IC2 pin 3 = 0V
 - f. At IC3 pin 7 approx = +12V
 - g. At IC3 pin 4 approx = -12V
 - h. At IC4 pin 4 approx = +12V
 - i. At IC4 pin 11 approx = -12V
 - j. At IC4 pin 3 = 0V
 - k. At IC5 pin 6 approx = -12V
 - l. At IC5 pin 11 approx = +12V
4. If any of these tests fail to match the readings given, you should check the components and soldering before progressing

Final Assembly

1. This module uses either a CA3080 (IC2) OR a LM13700 (IC5). These are ALTERNATIVE devices. If you are using IC2, DO NOT INSTALL IC5. If you are using IC5, DO NOT INSTALL IC2. Place the ICs in place by aligning the notch with the notch graphic on the PCB Silk Screen and notch on the sockets. DO NOT INSTALL BOTH IC2 AND IC5.
2. Place a washer over each pot shaft.
3. Place the front panel over the board so that the LED, pots and 3.5mm jacks align with the holes in the panel.
4. Put nuts on the pots and jacks and fully tighten.

5. Install the knobs.



6. NOW READ THE USER GUIDE.