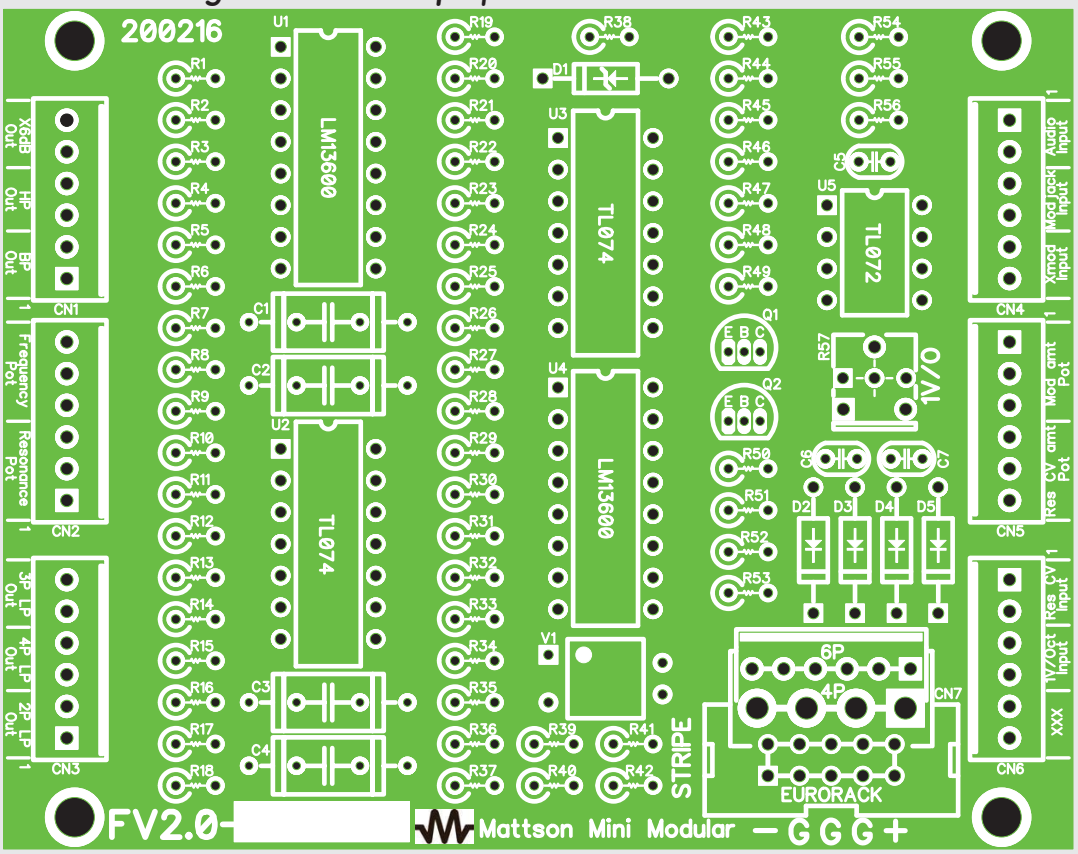
# Mattson VCF 2 DIY Board assembly



☐ 1

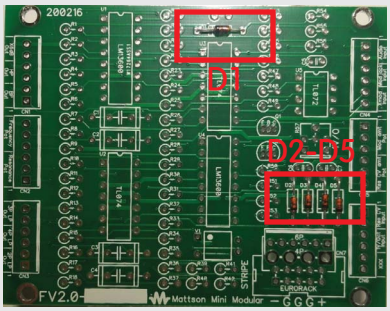
***I hereby swear that I have read and understand the Mattson Builders notes before starting this awesome project.***




**Refer to this graphic for parts placement**

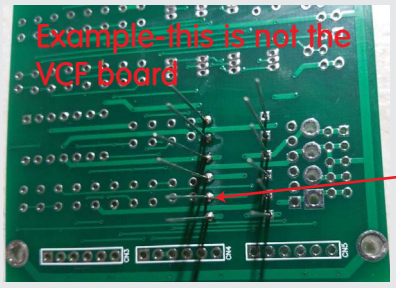
☐ 2

## Diodes




Note that diodes are directional devices and the striped band on one end of the diode has to be matched with the stripe on the diode graphic on the board.

Insert diodes **D2-D5** -1N914 0r 1N4148. Diodes D2-D5 form a full wave bridge rectifier to prevent reverse voltage issues.. Actually, if V+ and V- are reversed, these will put the voltages in the correct polarity so, you won't even know you reversed it. This works if the 4P or Euro 10P are reversed. If the 6P is reversed, all power pins hit non-connected pins. So, you just parked it... Insert diode **D1**. This is a 5.1V zener diode used as a voltage reference. DON'T get it mixed up with the other diodes.




Once all of the diodes are placed in the proper locations in the proper orientation, solder them to the board.

I like to solder one side of each and check to make sure they're against the board. Then, solder the opposite leads.

Clip the excess leads when all of the leads are soldered.

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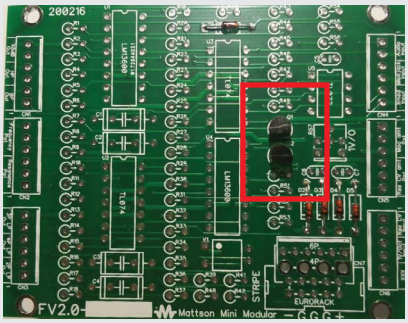



## Transistors

Transistors are 3-legged devices with a round body that have a flat side. When inserting, **align the flat side with the flat on the graphic.**

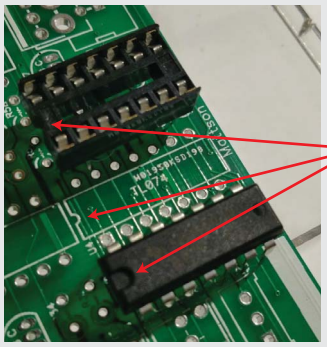
Place **Q1 and Q2**- 2N3906 PNP transistors onto the board.

Verify the correct component type and orientation.
Flip the board and solder the pads.

> Be very careful not to bridge the pads with solder. They won't work if you do. The pads are close together and minimal solder is required.

Clip the leads.

4

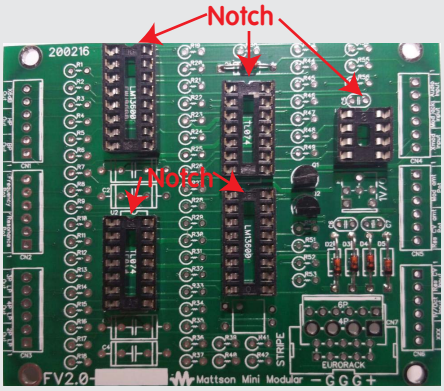



## IC socket orientation

The IC sockets, IC graphics and ICs all have an orientation notch to indicate the proper placement position
Some ICs will have just a small circular indent off center in a corner near pin 1. That is the "notch" end of the IC. Some ICs have a big notch and a small, circular indent centered on the other end. Ignore the small indent and follow the large notch.

> Please make sure they're lined up properly. A majority of ICs have symmetrically opposing power pins. If the IC is reversed, its power polarity is reversed and will kill the IC in an instant. Not good. Heads up!

5



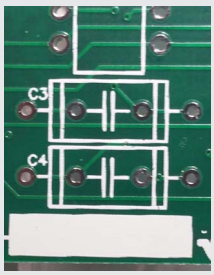

## IC socket install

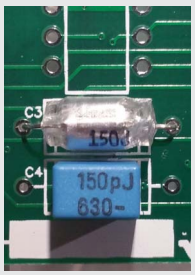
Locate the **2, 16-pin, 2, 14-pin and 1, 8-pin IC sockets.**
Insert them into the board in the **U1-U5** locations. (align the notches...)
**Make sure the pins fit in all of the holes and aren't bent.**
Flip the board and verify that every IC socket pad has a pin in it before soldering. Then, solder the sockets. Verify that every socket pad is occupied with a pin while soldering.

> I usually solder opposing corners to hold them and check to see if they're seated before soldering the other pins. if not, putting a small bit of pressure on a raised corner while heating the pin will seat it. Don't burn your finger!

It's not necessary to clip the leads. They're short.

6




## Polystyrene or Polyproylene capacitor pads

There are 4 capacitor pads utilized for **C1-C4**. Two species of capacitors can be used. One is the Polystyrene 150pF capacitor. Or, the Polypropylene 150pF capacitor. The lead lengths are different. But, we designed a pad to utilize either style of capacitor as shown.

If using the silver, Polystyrene version, be aware that it is just a metal foil on styrofoam with wires attached. Be very careful when soldering or the polystyrene will melt, destroying the capacitor function..

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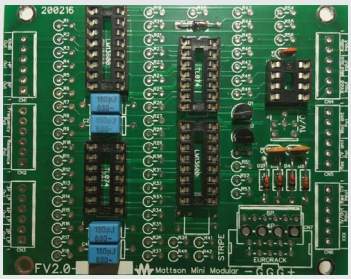


## Capacitors

Locate the following 3 ceramic capacitors. Insert them into the proper pads.

**C5: 100pF** (Code 101)

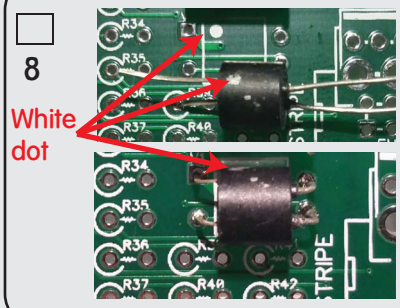
**C6, C7: 0.1uF** (Code 104)

Locate the four Polystyrene or Polypropylene capacitors. Insert them into the proper pads.

Flip the board and solder the leads. Trim where necessary.

These caps aren't polarized. I like to orient them where it's easiest to see their value code when installed.

☐ 8




## Vactrol install

Locate the Vactrol **V1**. It is a black cylinder with two leads protruding from each end. There is a white dot near one of the leads.

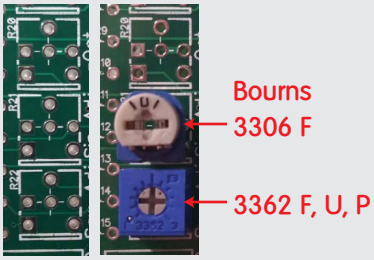
Locate the pad for V1 near the bottom-center of the VCF 2 PCB.

The lead near the white dot is placed in the pad with the white dot. The other leads are inserted into the pads as shown.

Once installed, flip the board and solder the leads. Clip the excess.

A vactrol is just an LED and a photoresistor combination.

☐ 9




## A word about the trim pot pad

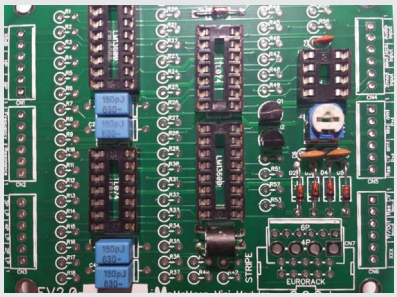
The trim pot pattern contains six pads. Only three of the pads will be used for each trim pot.

The pads were designed to accept either Bourns 3306 F series trim pots or Bourns 3362 F, U and P series trim pots.

Each have different pinout patterns, but will fit properly within the trim pot outline. Just make sure that pin 1 is on the left as shown.

Note that the pin 1 pads are square.

☐ 10



## Trim pot (single turn)

Insert Trim pot **R57**. Verify the proper value before installing.

Ensure that the trim pot Pin 1 is inserted into one of the square pads and that the trim pot is installed within the square component outline.

**R57 - 10K (code 103)**

Once the above listed trim pot is placed in the proper location in the proper orientation, solder it to the board.

Clip the excess leads if necessary.

☐ 11

## Initial trim pot setting

Center the trim pot setting. That should get it close.

# Mattson VCF 2 DIY Board assembly



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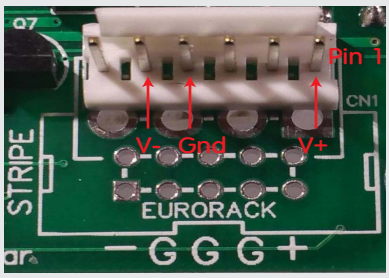
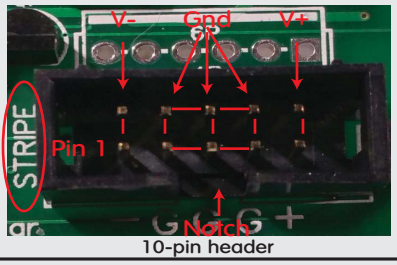



6-pin header




10-pin header

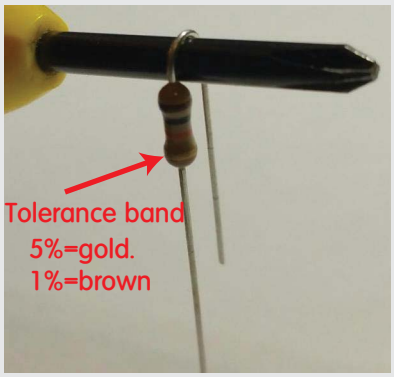
## (6-pin or Euro power if using these options)

If you have chosen to use the **+/-15V, 6-pin power header (Dotcom or MMM)** or the **+/-12V, 10-pin (Eurorack)** power header, Locate the position of the chosen connector on the multi-power pad and install it as shown.

Pay attention to the orientation. Backward power is not good. However, there is a bridge rectifier (D3-D6) that sorts it all out if the power is reversed. The circuit won't notice and carry on like nothing was wrong for the 10-pin or 4-pin headers. The 6-pin is designed so that if the power connector is reversed, the power pins connect to pins that don't connect to anything. Trim pin 2 on the 6-pin if it will be used with a Dotcom system.

If you plan on using the **4-pin power header**, (most 5U), skip this step. It will be installed later.

13



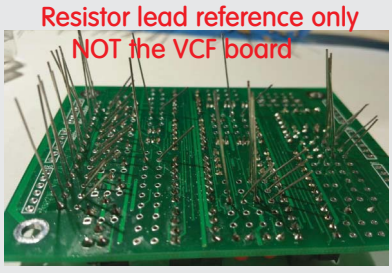

## A word about resistors

Because of the board density of this project, the resistors are all end mounted on the PC board.
As mentioned in the builder notes, it helps to use a small screwdriver shaft or pen cartridge as a bending jig.

I like to bend the lead furthest from the tolerance band end so that all of the resistors face the same direction. When mounted tolerance-band-down, it makes it much easier after construction to scan the resistor values from the top-down. It really hurts trying to adjust to reading them when the orientations alter randomly. Of course, the electrons don't care what direction they face.


The resistor silkscreen has a circle where the base (tolerance band) is placed and a small resistor symbol pointing toward the associated pad for the bent lead.
The resistor reference number is usually above the silkscreen symbol.

There are 41 resistors in this project.
I have broken them down into 2 groups. One group of 22, 5% resistors (including two 1% resistors) and a group of 19, 5 % resistors.
You may wish to break it into smaller groups prior to soldering if it makes the task easier for you.




After stuffing a group of resistors, I bend the short leg at an angle to hold the resistors onto the board.
This also gets them out of your way, allowing you to solder all of the longer legs. It makes it easy since they're in neat rows.
After soldering the long legs, I clip the soldered leads, turn the board over and check that they're all seated against the board. (reflow while pushing on the resistor to re-seat).
Then, I line up the resistors neatly before soldering the short legs. Only because I'm OCD about it and it looks prettier...

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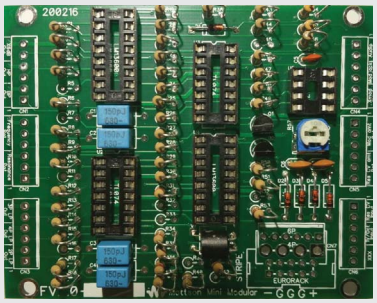
☐ 14



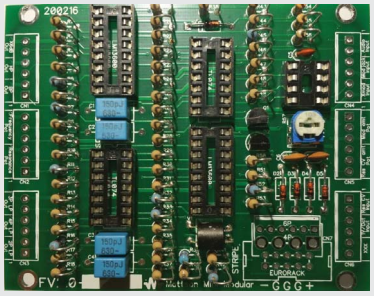
## Resistors 5% group 1

Look at the BOM and place the 46 Group 1 resistors in their proper space.

Solder as described on step 13. Or, however you usually do it.

The picture shows the PC board with the Group 1 resistors installed.

☐ 15

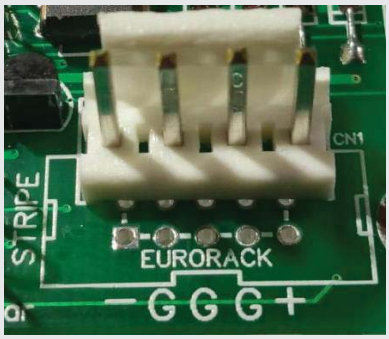


## Resistors 1% group 2

Continue with the 10 Group 2, 1% resistors.

**Phew!** Done with the resistors.

☐ 16



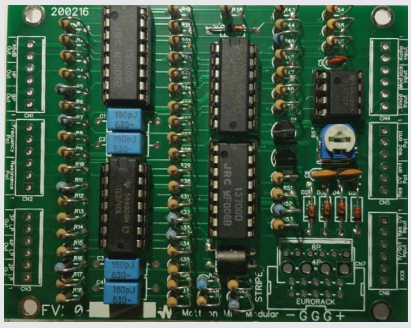

## (4-pin power connector if using this option)

If you chose to install the **4-pin power header** instead of the 6-pin or 10-pin headers, install it now as shown.
Pay attention to the locking ramp position.
Solder it to the board.

If you chose none of these options, you can just solder your power leads directly to the proper pads.

**If you have already installed a power connector, skip this step.**

☐ 17



## ICs

### U1-U5: ICs.

Now it's time to install the Integrated Circuits. Or, ICs.
All of the notches/pin-1 indents point away from the power connector pad.
If you don't have an IC inserter, you may have to bend the pins inward slightly. I do it by holding the IC at each end, putting the leads flat on the work bench and gently rock the IC to bend the pins in just a touch.
Then, repeat with the other side.
Make sure the pins line up and fit in the socket prior to seating the IC into the socket.
**VERIFY** after seating that the pins all socketed and didn't bend flush to the bottom of the IC.

**U2, U3: TL074**, 14-pin.
**U1, U4: LM13600 (or 13700)**, 16-pin.
**U5: TL072,** 8-pin.

## Congratulations, you have finished installing all of the board components.

Now, double check your work, component orientation, part values, look for solder connections that may be messed up, raise a toast to the good solder connections and.....

Go to Panel Component wiring