

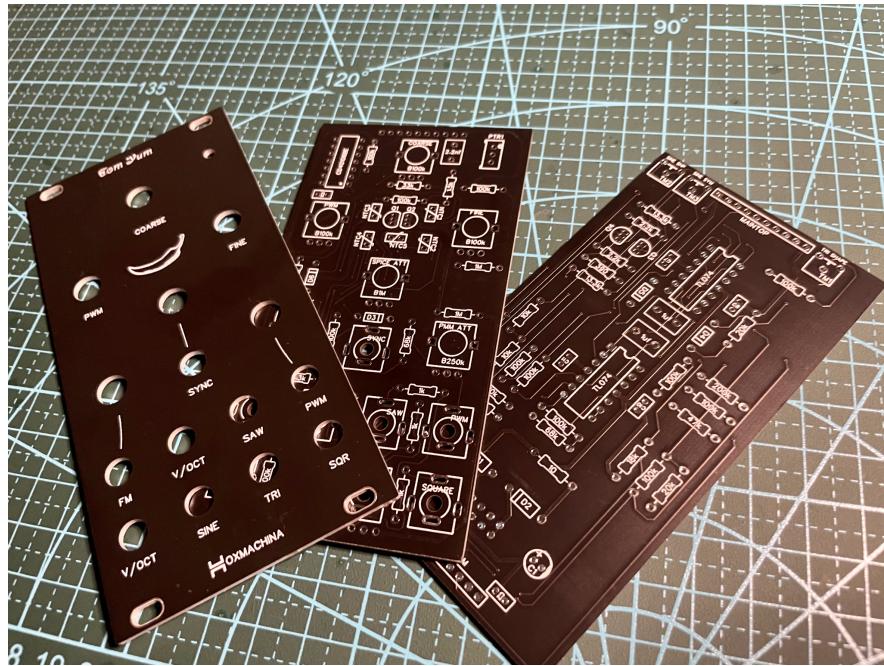
Tom Yum - DIY Eurorack VCO



Specs:

- 12 HP
- Power: 15mA from both power rails (+12 and -12)
- Saw core oscillator with four waveform outputs and four cv inputs for FM, PWM and SYNC modulation

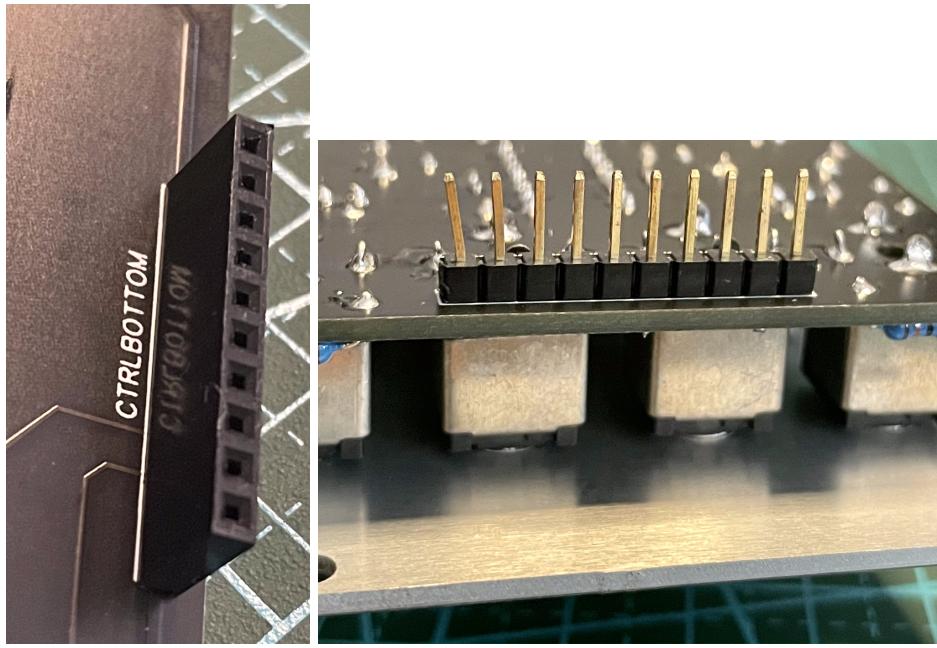
Build Instructions



Please check the BOM file (Bill of Materials) where you can find all the components you'll need in order to build this module, alongside some notes as well.

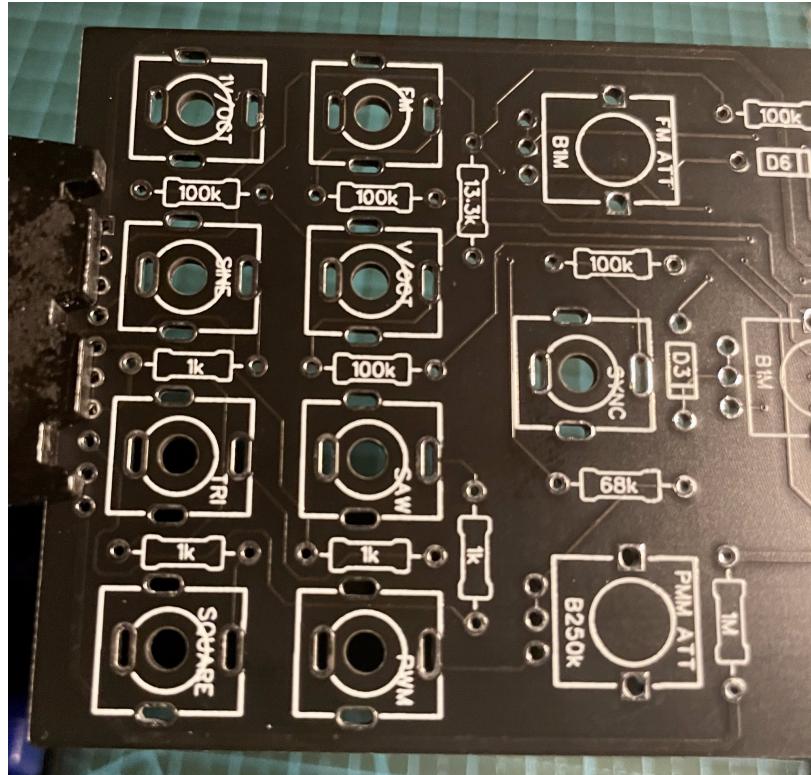
This module is built upon two PCBs plus the front panel. I recommend starting by soldering the control board first, which is the one holding all controls, like potentiometers for the front panel.

The pins are to connect both PCB boards, make sure you solder them easily so that they stay in the right position, don't forget the **pins on the control board are mounted on the back**.



Boards PINS Connectors

Control PCB Board



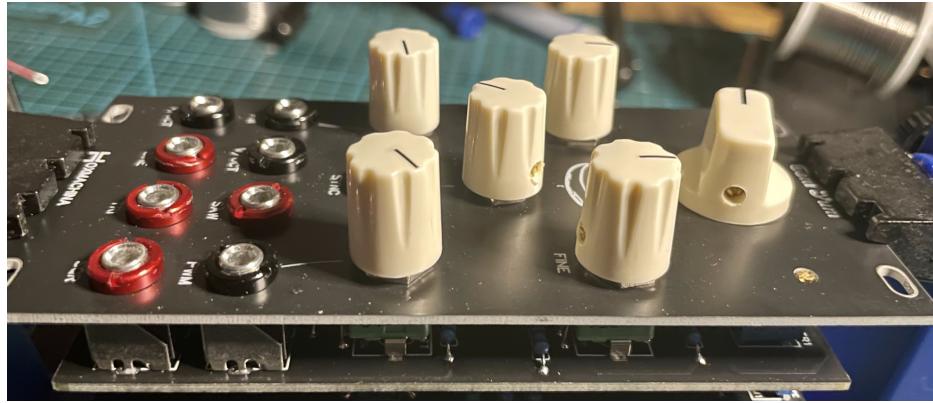
All the components are very well marked down on the boards, if possible with the exact value, except for some smaller ones where you can see the indicator, like "D6", and for those ones just consult the BOM file and check for the value and notes.

I recommend placing all the resistors first, for this you won't even need to look at the guide or BOM file, as their values are directly noted down on the board, afterwards the diodes to which you'll have to check the BOM file for their values, and once all down on the pcb fitted and ready to solder, start with a tiny dash of soldering directly on the top, quickly, smaller, this will keep all of these on the right position right away, then go to the back finish the ones who need more solder and trim down the wires.

Continue to the capacitors and transistors, don't solder the trimmer for the v/oct calibration just yet, for that one we'll solder it once we attach the front panel, to make sure everything stays in the right place.

Solder the IC socket as well, leave to the very end to place the IC chip in case for example if you want to clean the PCBs before the final assembly.

Now for the potentiometers, jacks and the pitch calibration trimmer we are going to firstly place the front panel installed, just place those components in the PCB without soldering, so we'll attach the panel and make sure everything will be soldered in the right place.



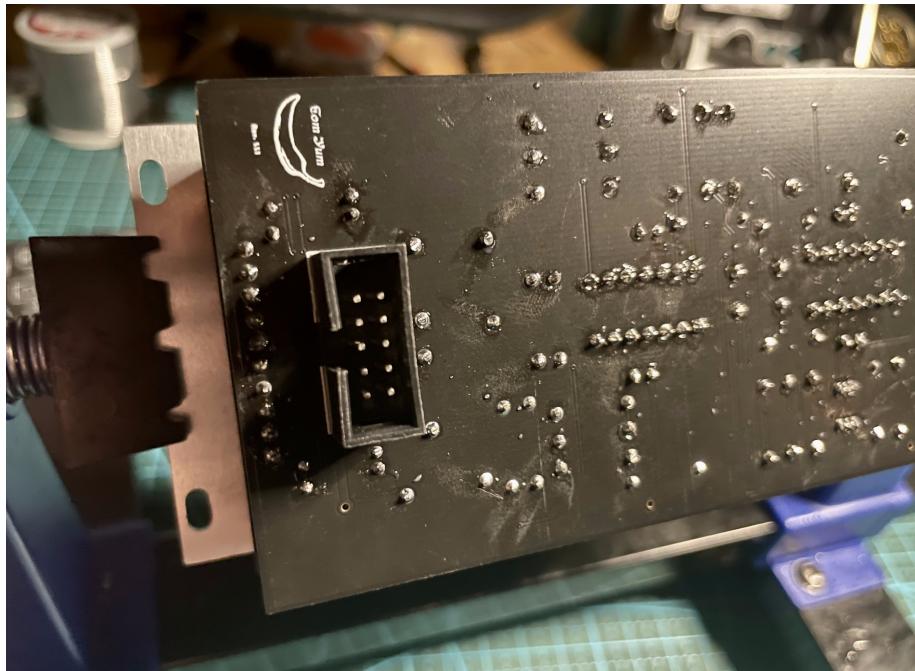
Once you attach the front panel, make sure you do the needed adjustments so that all front facing components are accessible, once done turn to the back of the PCB and solder away all the remaining components.

Main PCB Board

Follow the same approach for the second PCB board, just two details you need to know for this board.

Firstly if you want to match the height on the power capacitors (2x 47uf) they need to be max 7mm height which can be tricky to find, but in any case if you have taller ones you just need to either bend them a bit so they fit before soldering or you can as well solder them through the back, just make sure they are in the right position.

The last thing is to note and don't forget that the power connector gets soldered in the bottom layer of the PCB:

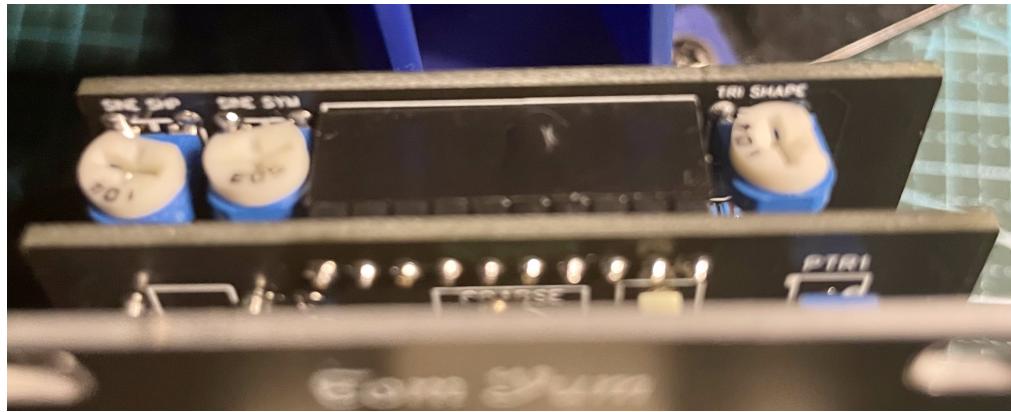


Calibration

You'll notice that you have three trimmers mounted looking at the top, these are for calibrating the triangle and sine waves. For the wave calibration you'll need an oscilloscope and a regular tuner for the pitch calibration (v/oct).

From left to right:

- Sine Shape
- Sine Symmetry
- Triangle Shape



The front little facing trimmer with the small screw is to calibrate pitch. (v/oct)



Triangle Wave Calibration

You will be screwing the “TRI SHAPE” trimmer, it’s the first one from the right.

Slowly and gently turn the trimmer until you have a good looking triangle shape.

Sine Wave Calibration

You will be screwing the “SYN SHAPE” and “SYN SYM” trimmers, it’s the first ones from the left.

Slowly and gently turn the trimmers until you have a good looking sine shape, for this one will require some patience to get it right, my advice is to make very small adjustments on each trimmer one at a time slowly until you see the desired shape.

Pitch Calibration

This is a great video to teach you how to tune your VCO:

https://youtu.be/MMif8sz_6Cc?t=375

Grab a tuner!

Here's my advice and process:

1. Manually tune your vco to C2
2. Connect a keyboard/sequencer capable of sending correct key note pitch information
 - a. Play C3
 - i. If the note you're seeing in the tuner is lower than C3 then decrease the pitch softly with the trimmer on the pcb panel (I know it's counter intuitive, but it will work)
 - ii. If the note is higher, then increase the pitch on the pcb trimmer
 - iii. Play C2, again manually (Coarse Potentiometer) tune your VCO to match C2
 - iv. Repeat this process until you have two fine octaves
 - b. Repeat this process starting on C3 and compare to C4
 - c. And repeat for as long as you'll desire, the module has tested good pitch balance between 5 and 7 octaves.
 - d. As a final step try and go through all the octaves one by one and fine adjust to make it cover a good number of octaves.