

Bill Of Materials

Part	Quantity	Link
Self-Tuning VCO V2 PCB & panel	1	https://duskwork.net/shop.html
AS3340D (SOIC-16)	1	https://www.thonk.co.uk/shop/alpha-as-series-ic-chips/
10K Trim Pot	2	https://cpc.farnell.com/bourns/3296w-1-103lf/pot-trimmer-10k-25turn-10/dp/RE06690?st=10k%20trim%20pot
100k Potentiometer	3	https://www.mouser.co.uk/ProductDetail/317-2090F-100K
3mm Green LED	1	https://cpc.farnell.com/multicomp-pro/mc1034bt/led-3mm-32-amber/dp/SC15407?st=3mm%20led
Momentary Push Button	1	https://cpc.farnell.com/unbranded/sw05491/push-button-switch-no-black/dp/SW05491?st=momentary%20switch
3.5mm Socket (PJ-392)	2	https://www.banggood.com/10Pcs-PJ-392-3-Pin-3_5mm-Stereo-Headphone-Audio-Video-Jack-Socket-Plug-With-Nut-p-1015146.html?rmmds=myorder
2*5 header (eurorack power)	1	https://cpc.farnell.com/multicomp/2213s-10g/header-2-row-vert-10way/dp/CN14515
2*3 header (ISP programming header)	1	https://cpc.farnell.com/multicomp/2213s-06g/header-2-row-vert-6way/dp/CN14513
300K ohm resistor (1/4w through hole)	1	https://cpc.farnell.com/multicomp/mf25-300k/resistor-0-25w-1-300k/dp/RE05330?st=300k

Tools required

Soldering Iron (with a small tip for the surface mount components!)

Solder

Flat blade screwdriver (to adjust the trim pots)

Tuner (phone app will do)

Side cutters

Multimeter

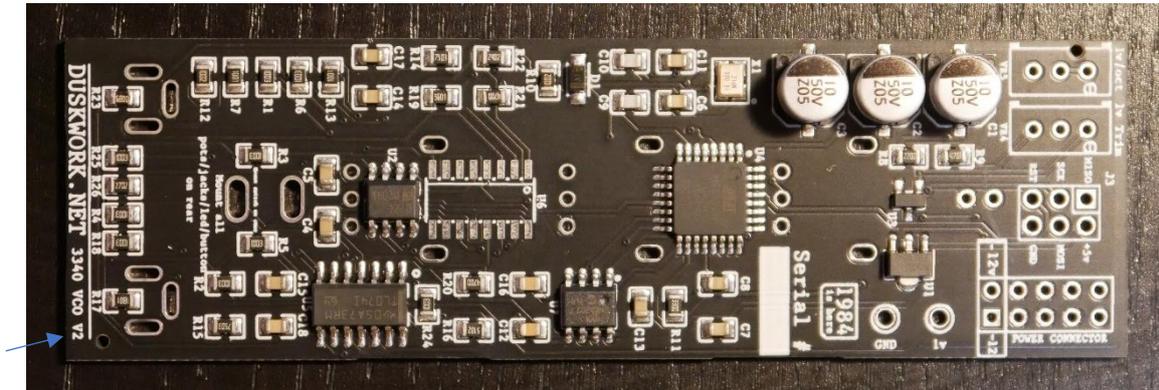
USB ISP Programmer

Link for programmer:

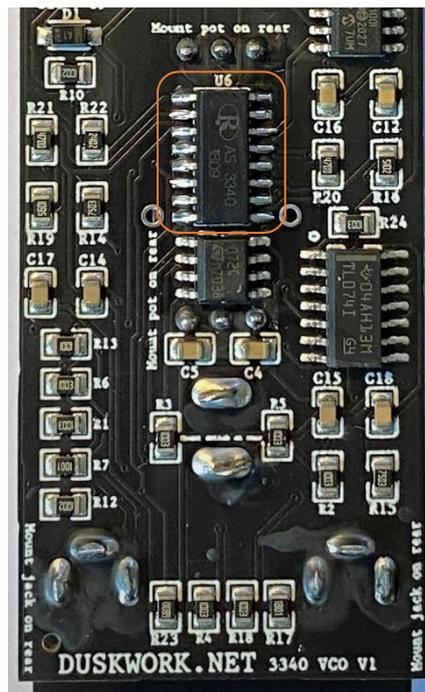
https://www.ebay.co.uk/itm/332322897546?ViewItem=&item=332322897546&utm_source=unp&utm_medium=email&utm_campaign=PPX000608&utm_unptid=ad85aee2-3e66-11eb-8356-b875c0273b33&ppid=PPX000608&cnac=GB&rsta=en_GB&cust=9PN24195TF195052M&unptid=ad85aee2-3e66-11eb-8356-b875c0273b33&calc=2088e73f025d0&unp_tpcid=email-receipt-auction-payment&page=main:email:PPX000608:::&pgrp=main:email&e=cl&mchn=em&s=ci&mail=sys&xt=104038&unp_adv=false

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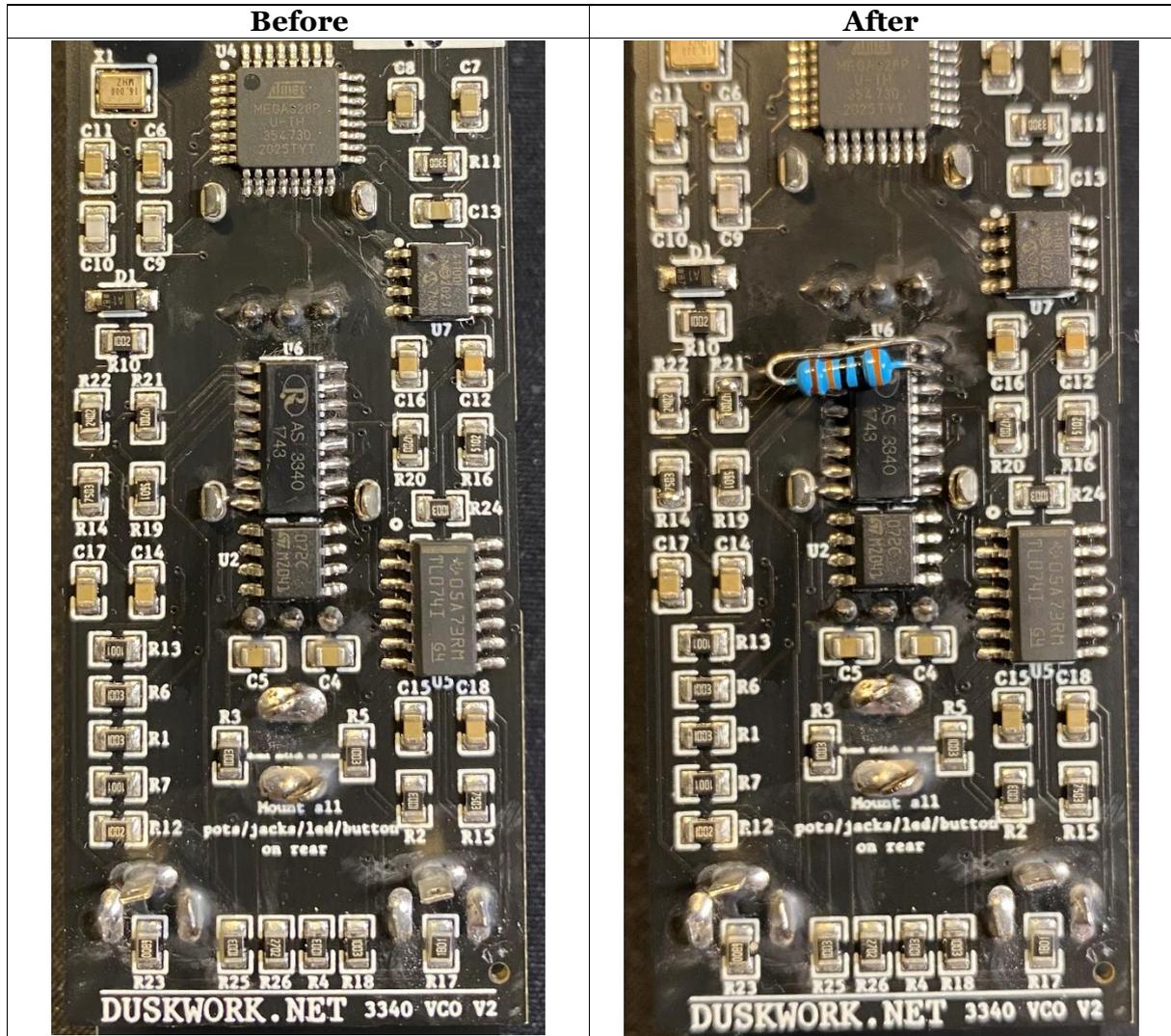
Step 1: Check the version of board that you have. The version number is found at the bottom of the main PCB with all the components on. This build guide is for V2 only, check website for other revisions.



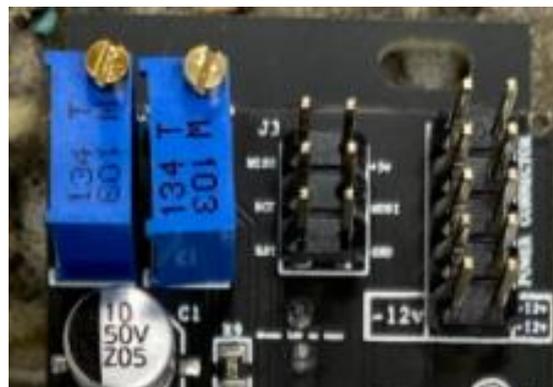
Step 2: Solder the surface mount 3340 VCO chip into U6. Pin 1 is marked by a white dot at the top left of the chip (you can just see it below the “R” on this one). Make sure to get the orientation correct on this. I used the Alfa AS3340D (SOIC-16) version on mine. Make sure to use a small soldering iron on this to avoid making shorts between pins!



Step 3: Next, you'll need to add 1 x 300KΩ 1/4w resistor between pins 15 + 16 of the AS3340 IC. It's important that this doesn't short anywhere else on the PCB or other components. The best way to do this is to bend one leg against the body of the resistor to reduce the size of its footprint. See photos below for to visualise how it should sit.



Step 4: Now it's time to start soldering the through hole components. Start with the 2 x 10K trim pots at the top of the board. One is to adjust the 1v reference signal, the other is to adjust the 1v/oct CV tracking

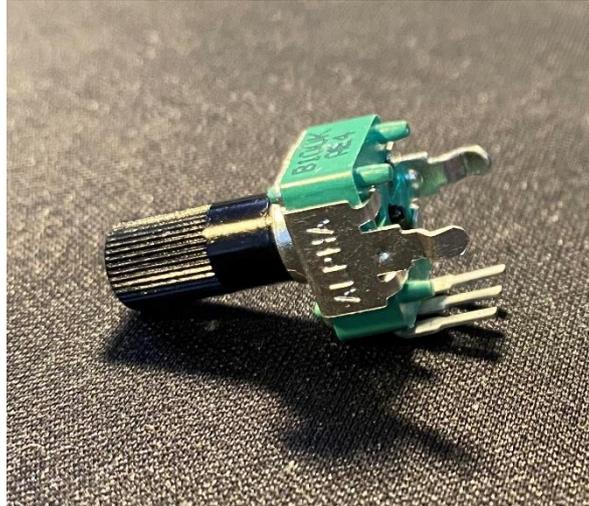


Step 5: Solder in the 2x3 header which will be used to program the board.

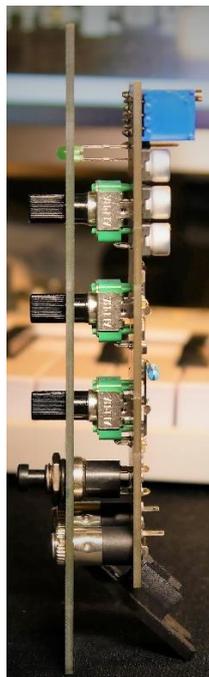
Step 6: Solder in the 2x5 header which will be used to supply power to the module.

Step 7: Now it's time to install the 3 main pots which will be used for the wave-mixer. These should 'click' into place when inserting them onto the PCB.

Don't solder these in yet though! We need to put the other parts loosely in place before so that the panel all lines up nicely.



Step 8: Now you can put in the 2 x 3.5mm sockets. These (along with the potentiometers) need to be flush against the PCB, but the LED & button will need to stand proud so they're the same height. Once you've put all the parts in to line up, put the faceplate on & screw on the nuts for the button and sockets. You can then solder up those parts once you're happy with where they're sitting – see photo below for how they should sit:



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Step 9a: Once all the parts have been soldered, it's time to program the module. For this, you'll need the USB Tiny programmer, along with AVRDUDESS programming app which you can find online. There are many good guides out there for how to download this. To program, set the settings as they are below:

Programmer = USBtiny Simple USB Programmer

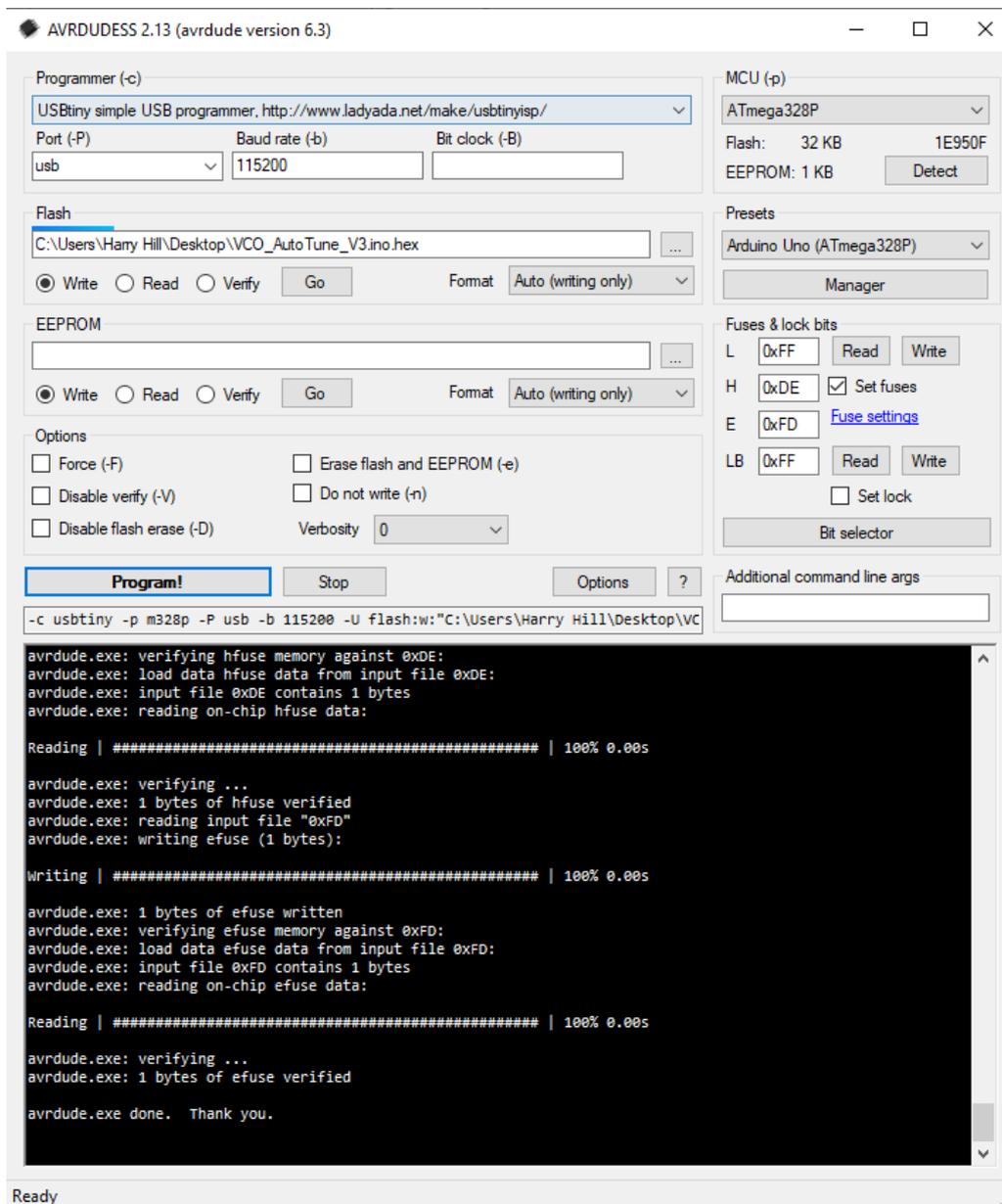
Port: USB

MCU: ATmega328P

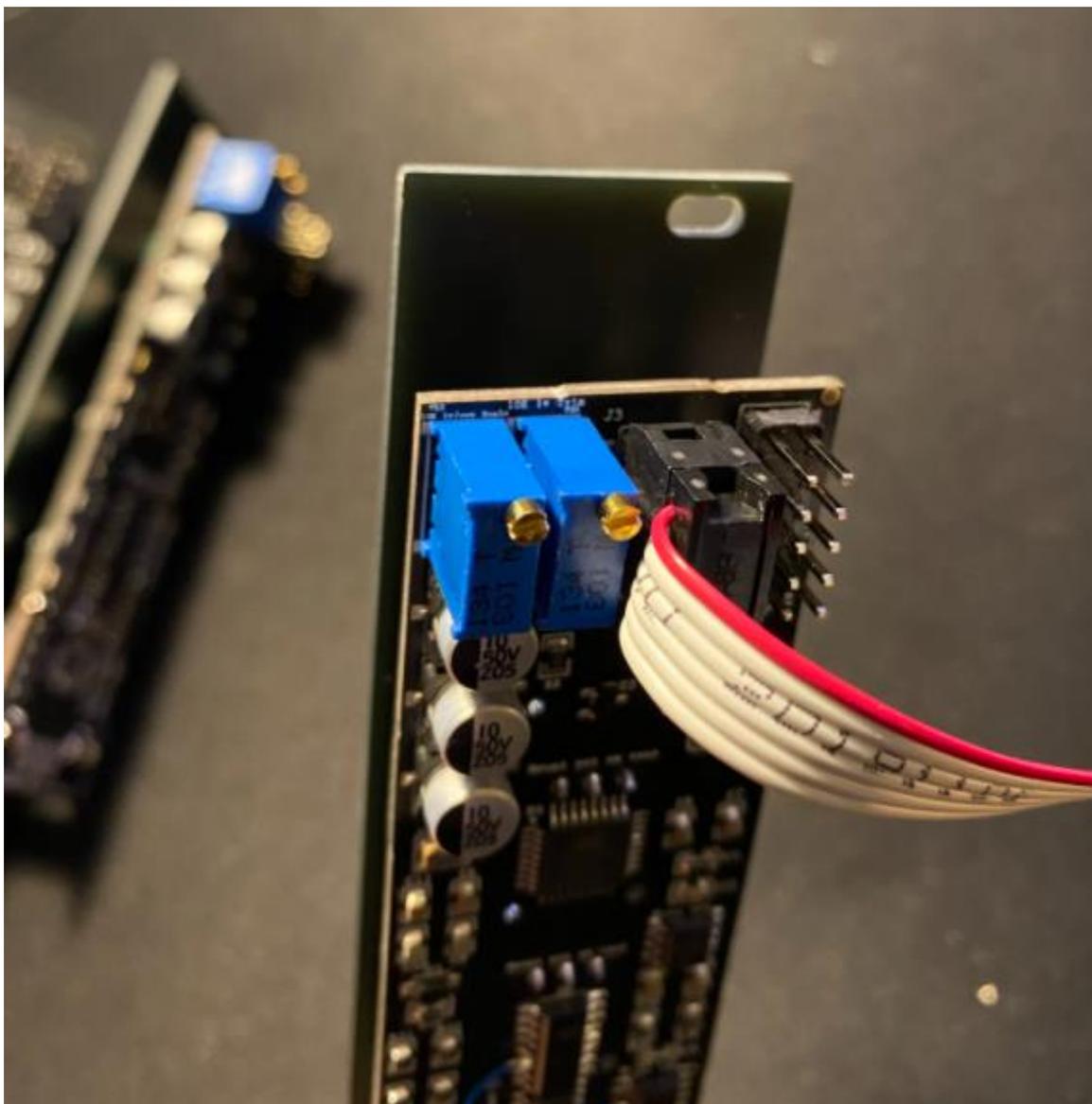
Presets: Arduino Uno

Fuses & Lock Bits: Select 'set fuses'

For the 'Flash' file, you need to download the latest firmware (it's a .hex file) on the product page on Duskwork.net – this is the firmware for the self-tuning part of this module. Without this, the module won't tune itself.



Step 9b: Connect the 6 pin ISP programmer as shown below. Red stripe should be toward the top!



Note: -12v is at the bottom of the socket

Step 10: Time to plug in the VCO, but don't worry about a CV input or output just yet! We need to calibrate the 1v rail by using the top right-hand trim pot. Grab a multimeter and use the "volts" setting to measure across the 1v & GND which are located just beneath the 10 pin power header. Adjust the trim pot until you measure exactly 1v. This is regulated by a precision voltage regulator and this is what feeds the Self-Tuning circuit.

Step 11: Now time to run up the VCO on your system so we can calibrate the 1v/oct setting.

You'll need to use an external tuner for this part – I just use the built in one on Ableton, but a phone app, or hardware tuner should work just the same.

This step is the same on any 3340 VCO build – you need to make sure each 'C' note is exactly one octave apart. Adjust VR5 (top left trim pot) until these are exactly in tune.

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And that's it folks! All that's left now to do is hold C on your CV keyboard and hit tune...
Enjoy!

