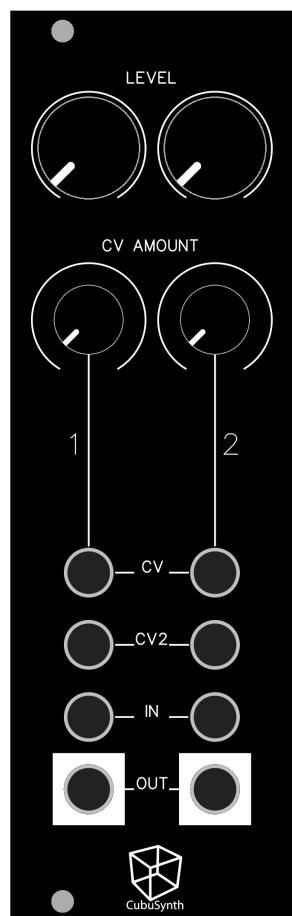


CubuSynth

Dual Vintage VCA Eurorack Dual VCA

Build Guide

PCB V1.1 Dec 2021



Written and Illustrated by Ruben Sponar

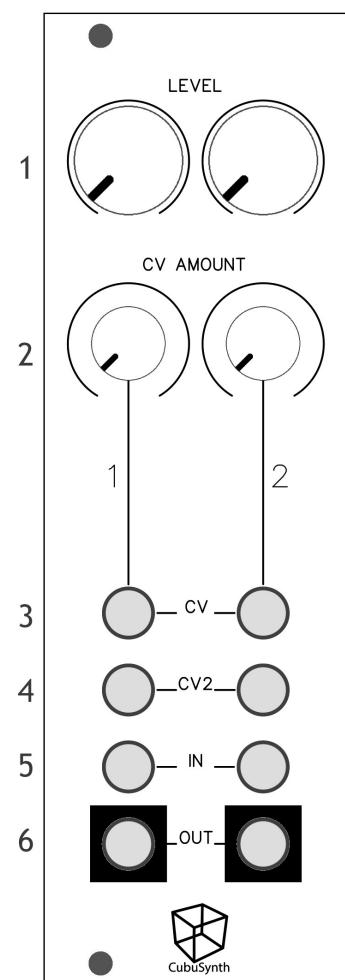
Introduction

The CubuSynth Dual Vintage VCA is a nice sounding, zero bleed, analog Voltage controlled amplifier based on the LM13700 chip. It can work as two independent VCAs or as a stereo unit, and CV input 1 on channel 1 is normalized to the CV input 1 on channel 2. (same signal can control both Channels)

The Original concept is designed by Tom Wiltshire aka "Electric Druid". For more information visit:
<https://electricdruid.net/design-a-eurorack-vintage-vca-with-the-lm13700/>

Please note: The numbers represent the Parts from up to down. Channel 1 (left) and Channel 2 (right) are identical.

- 1 LEVEL
Sets the Amplitude for each channel.
- 2 CV AMOUNT
Attenuates the Control voltage from CV input (3)
- 3 CV
CV input for the amplitude Modulation. The input on channel 2 is normalized from CV on channel 1 when nothing is plugged in.
- 4 CV2
A second CV input for amplitude modulation, without attenuator
- 5 IN
Input for Audio Signal
- 6 OUT
Output for the Audio Signal



There are two Trimmers on the back of the module to set the zero / off point. If your Module has some bleed through with the level knob all the way to the left, adjust the trimmer of the correct channel just to the point where the signal disappears.

The Trimmers act like a volume knob

BUILD GUIDE

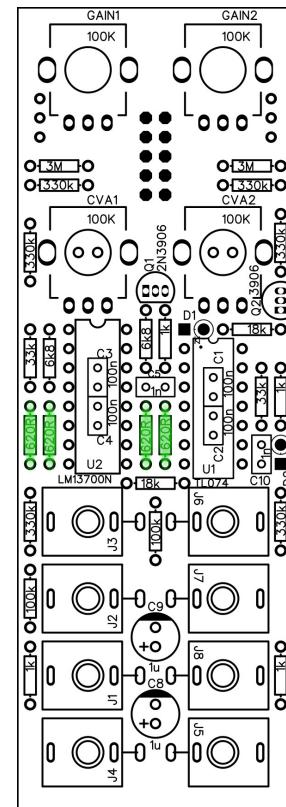
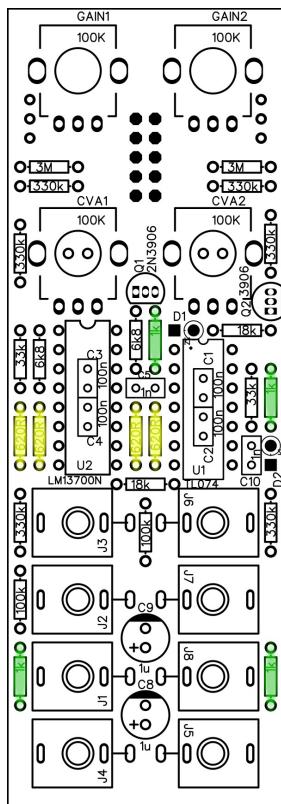
STEP 1 620R resistors x4

As always start with the smallest components. In this module it's the resistors.

The orientation doesn't matter for all resistors.

Look for the 620ohm resistors and put them in place.

Tip: When the components are put in place, bend the solder legs slightly outwards, so they don't fall out when turning the board around.

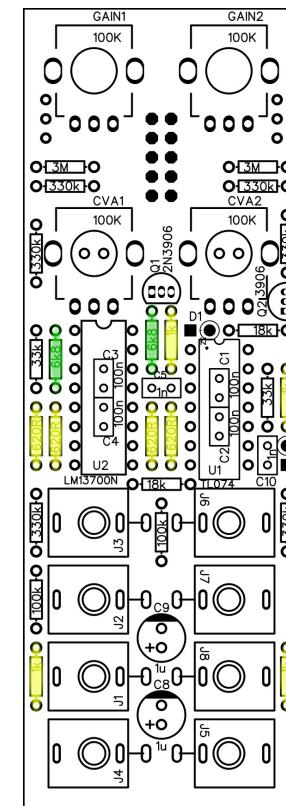


STEP 2 1k resistors x4

Identify the 1k resistors and put them in place.

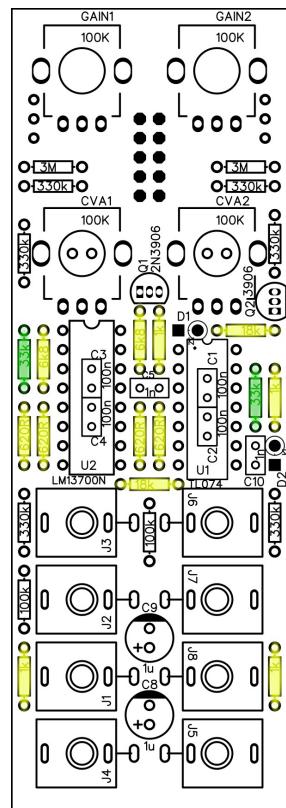
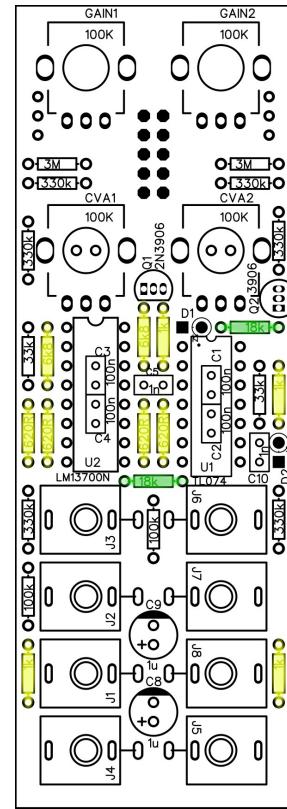
STEP 3 6k8 resistors x2

Look for the 6k8 resistors and put them in place.



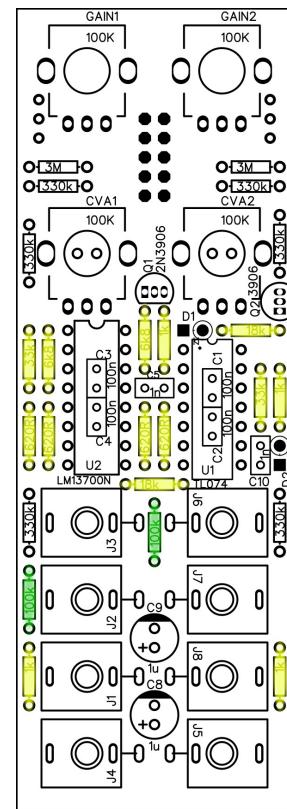
STEP 4
18k resistors x2

Find the 18k resistors and put them in place.



STEP 5
33k resistor x2

Identify the two 33k resistors in the bag and put them in place.

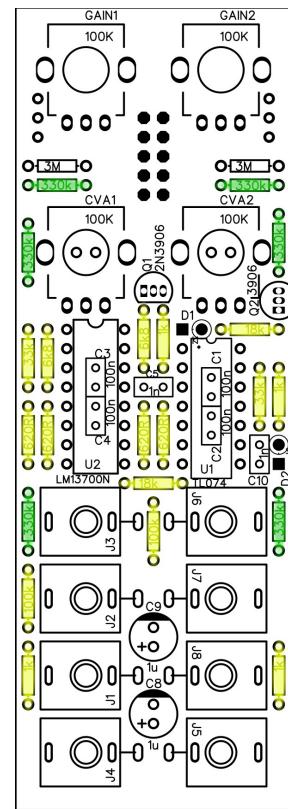
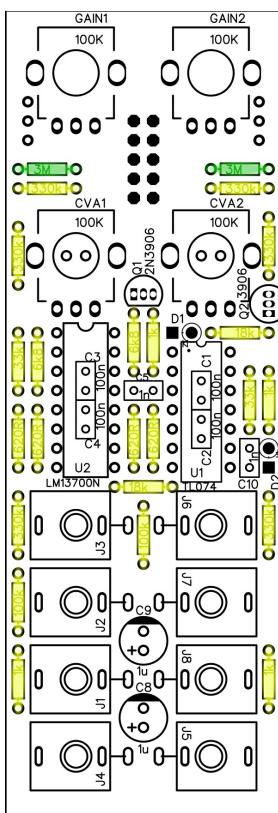


STEP 6
100k resistor x2

Identify the 100k resistors and put them in place.

STEP 7 330k resistors x6

Identify the 330k resistors and put them in in place.

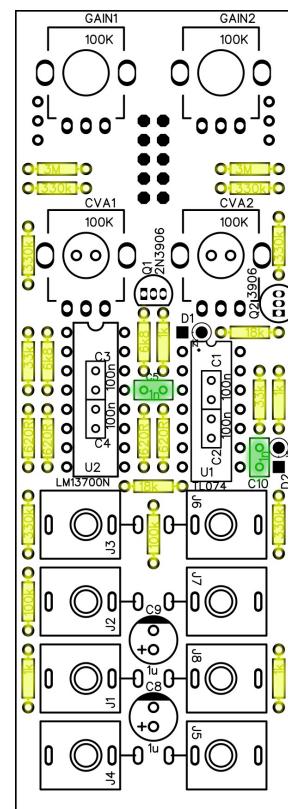


STEP 8 3M resistor x2

Identify the 3M resistors and put them in in place.
Make sure all resistor legs are bent slightly outwards so they don't fall out. Turn the board around and solder all resistors.
Make sure you cut all solder legs flush to the PCB after soldering.

STEP 9 1nf capacitor x2

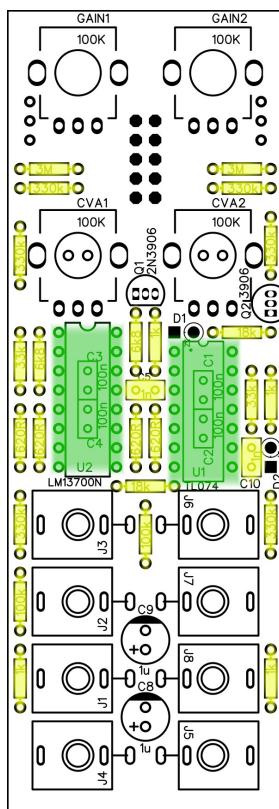
Find the 1nf capacitors marked "102". The orientation doesn't matter. Put them in place and bend the solder legs outwards, so it doesn't fall when turning around the board.



STEP 10

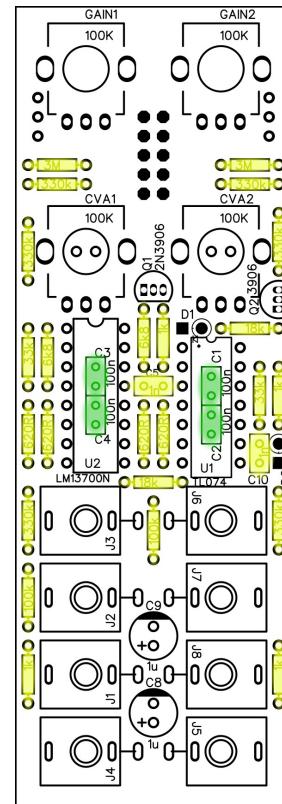
100nf ceramic capacitors x4

Identify the 100nf capacitors marked "104". Orientation doesn't matter. Make sure they stand up straight, so the IC socket fits around. Solder all ceramic capacitors in place.

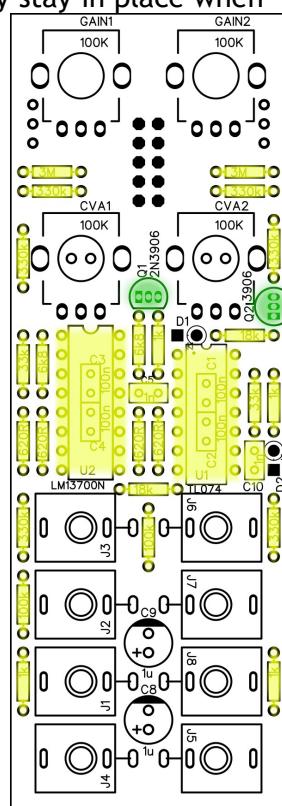
**STEP 11**
IC sockets

Look for the dip-16 and dip-14 sockets. Put the sockets in place, with the notch looking to the top of the PCB. Make sure the 100nf capacitors don't look out too much

Oriantation is important to know how to place the ICs later! You can bend 2 pins of each socket inwards, so they stay in place when turning the board around.

**STEP 12**
2N3906 transistors x2

Find the 2N3906 transistors and put them in place. Make sure the Orientation of the transistor matches the Outline on the PCB. Turn the board around and solder the transistors.

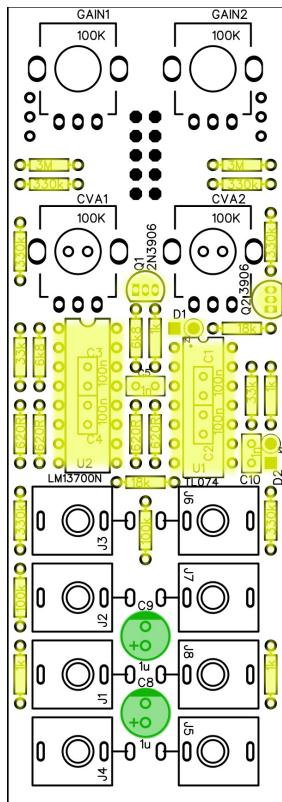


STEP 13 1N4148 diodes x2

Find the two 4148 diodes and bend the positive leg 180degrees around.

Put the diodes in the holes, so the ring on the diode is facing down to the ring on the PCB.

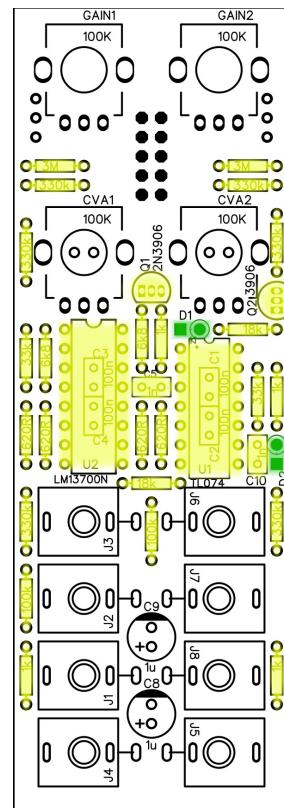
Turn the Board around and solder the diodes.



STEP 14 1uf capacitors x2

Take the 1uf capacitors and put them in place. The orientation is important. The white line on the capacitor must be line up with the white/grey side of the cap. The longer leg goes in the hole marked with "+".

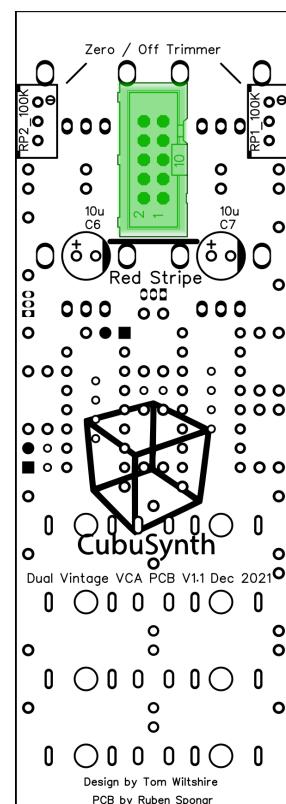
Turn the board around and solder the capacitors.



STEP 15 16 pin Power connector

Now take the shrouded 16 pin connector and put it in place on the back of the PCB. Make sure the cut-out matches the marking in the silkscreen. You can temporarily tape the Power header to the PCB so it doesn't fall out while soldering.

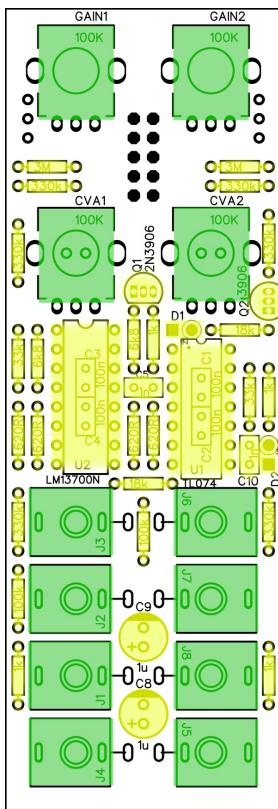
Turn the board around and solder the power pins.



STEP 16

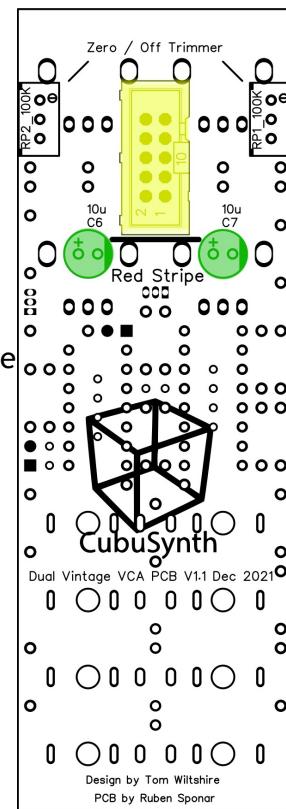
10uf electrolytic capacitor x2

Look for the 10uf capacitors and put them in place on the back of the board. Orientation is important. The white line on the capacitor must be line up with the white/grey side of the cap. The longer leg goes in the hole marked with "+".



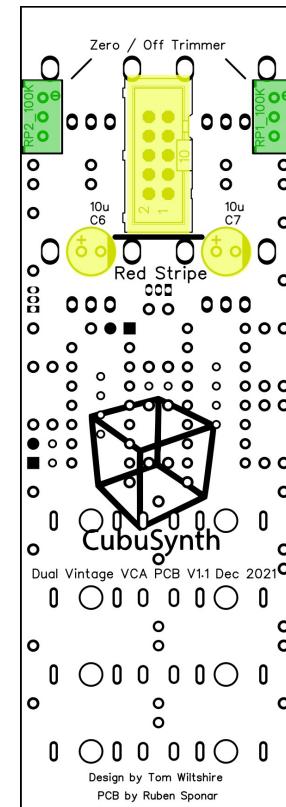
STEP 17 Controls

B100k potentiometer x4;
PJ-301M Jack (Thonkiconn) x8;



After all previous steps are done and all solder legs are cut off, take the Potentiometers, jacks, switches and the LED and put them in place as marked on the PCB but don't solder yet.

When everything is in place, take the front panel and put it on top, so all controls go into each corresponding hole of the panel. Put all the nuts on the Potentiometers and Jacks and tighten with your fingers. Then carefully flip the board around and solder everything.



STEP 18

100k Trimmer x2

Take off the front panel again and put the trimmer in place on the back of the PCB. Bend the 2 outer Pins a bit outwards and solder.

STEP 19 - Installing ICs and final check

The final step is to install the 2 ICs. The LM13700 is on the left and the TL072 on the right. Make sure the orientation is correct, the notch has to match the silkscreen, facing to the top of the PCB!

Bend the legs of the ICs carefully so they form a 90degree angle to the body of the chip. Like this they fit properly in the sockets.

Check your soldering. If you see shorts or bad soldering, fix it up. Then check the power pins for shorts with your multimeter.

When everything looks fine, you can put the front panel back again, tighten all the Nuts and put the knobs on the Potentiometer. For best results, turn all Potentiometers counter-clockwise and push on the knobs, so the marking points towards the left end of the surrounding circle.

Congratulations, now you can power up your module!

STEP 20 - Trim

When building the module yourself, this part is essential for the VCA to work properly.

There are two Trimmers on the back of the module to set the zero / off point.

If your Module has some bleed through with the level knob all the way to the left, adjust the trimmer of the correct channel just to the point where the signal disappears.

<https://linktr.ee/CubuSynth>