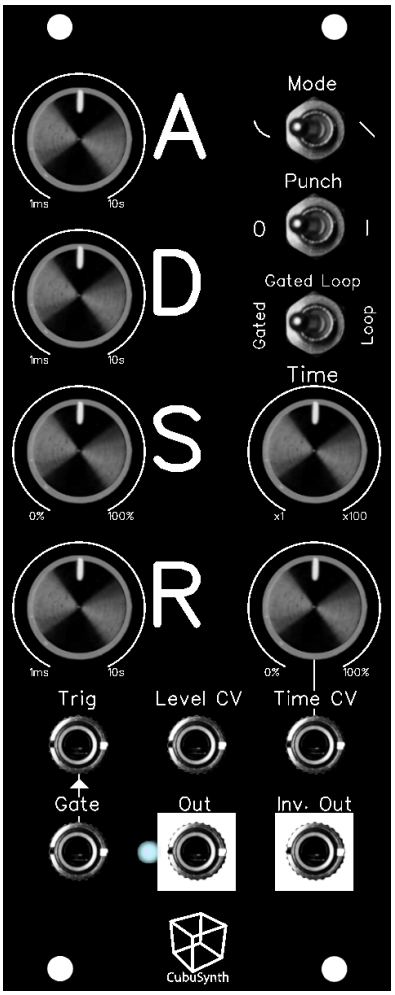
CubuSynth

ADSR

Envelope Generator with Looping Mode, Time and Level control

Build Guide

PCB V2.1 Rev1 Dec2022



Written and Illustrated by Ruben Sponar

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Introduction

The CubuSynth ADSR Module is a VC looping envelope generator based on the Electric Druid EnvGen8, with controls for the Attack, Decay, Sustain and Release stages, for overall Time of the envelope and CV inputs for Time and Level.

The EnvGen8 chip was written/designed by Tom Wiltshire aka "Electric Druid". For more information visit: https://electricdruid.net/product/envgen8/

1 ATTACK (1ms - 10s)
Sets the time, the Envelope takes to reach full level from the moment a gate is detected (Key is pressed)

2 DECAY (1ms - 10s)
Sets the time, after the envelope hits full level, to fade to the level set by the SUSTAIN Knob.

3 SUSTAIN (0% – 100%)
Sets the Volume to stay after the decay, while the GATE input is high.

4 RELEASE (1ms - 10s)
Sets the time for the fade out on falling edge of the GATE input (after the Key is released)

5 MODE switch
Select between exponential and linear curves.

6 PUNCH switch
Adds extra thump to very short percussive envelopes

7 LOOPING MODE switch
Allows selection between three different modes of operation. "Gated" mode acts as a normal envelope. "Gated Loop" will trigger the ATTACK stage when the GATE goes high, then continue looping whilst the GATE remains high, and will RELEASE to zero when the GATE goes low. The LFO Looping mode loops continuously and ignores input from the GATE.

8 TIME (x1 – x100)
Overall Time control which shortens the length of the entire envelope.

9 TIME CV Attenuator
Attenuates incoming CV for Time modulation. Higher voltages will shorten the length of the envelope.

10 TRIG Input
Envelope goes to ATTACK stage on rising edge of Pulse while Gate can still be on. Re-trigger for the envelope, used for Polyphonic patches.

11 GATE Input
Envelope goes to RELEASE stage on the falling edge.

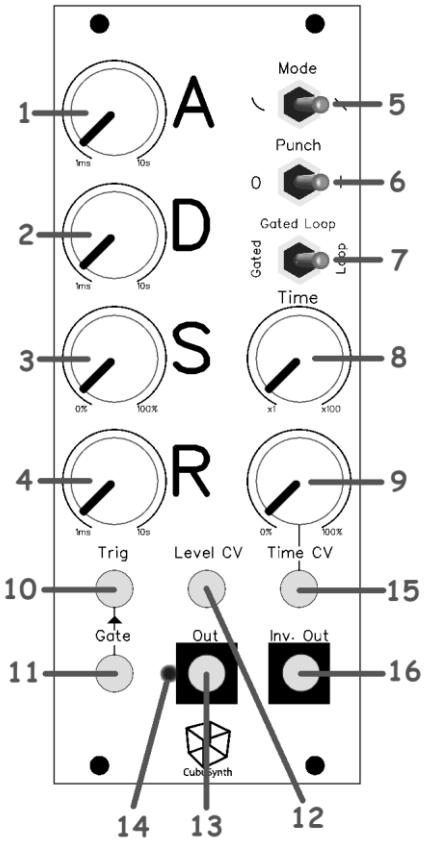
12 Level CV Input
Control the overall Volume of the envelope. Can be used for velocity control. If nothing is plugged in, the Volume stays on max.

13 OUT
CV-output of the envelope (0 to +5V)

14 LED
Indicates the output voltage.

15 TIME CV
CV Input for Time modulation. Higher voltages will shorten the length of the envelope.

16 INV. OUT
Inverted voltage of the output CV (0 to -5V)



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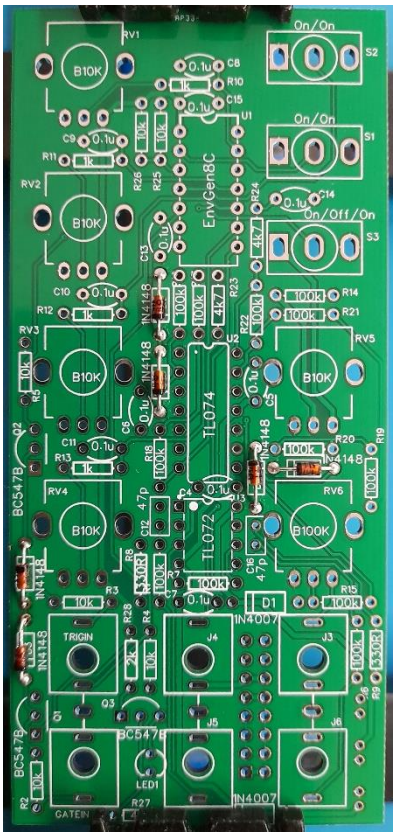
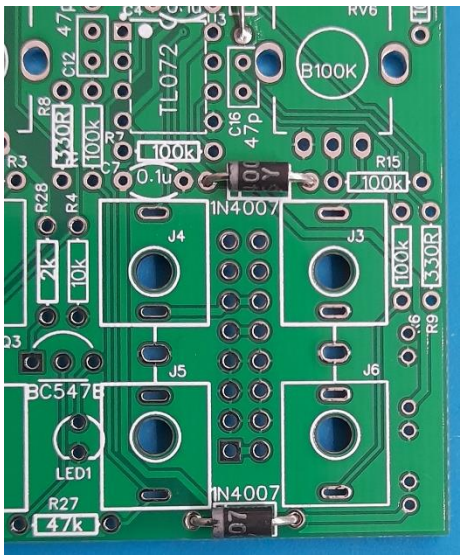


STEP 1
1N4148 x6

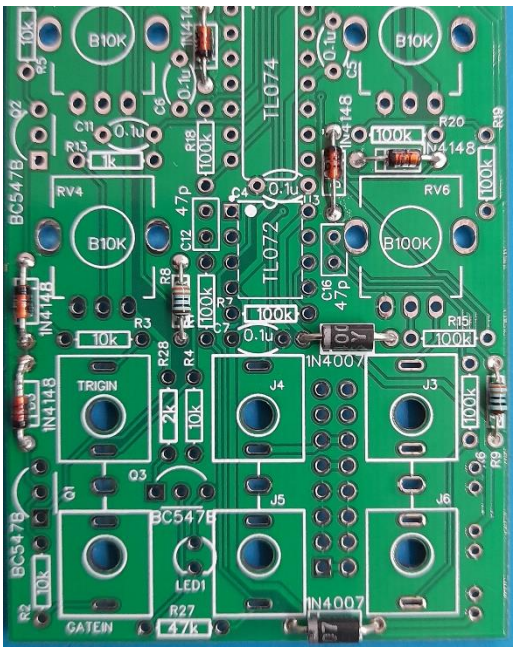
As always start with the smallest components. In this case it's the 1N4148 Diodes. Make sure the black line on the diode is lined up with the white stripe on the PCB.
Bend the solder legs outwards, so it doesn't fall when turning around the board. (same for STEP 2-10)



STEP 2
1N400X* x2

identify the 1N400X* diodes and put them in place. Again orientation is Important.
These are the reverse voltage protection diodes. The white line on the diode has to line up with the stripe on the PCB silkscreen.
Turn board around and solder everything in place.

*can be any from 1N4001 to 4007 or 1N5819 (marked as 1N4007 on the PCB)



STEP 3
330R resistors x2

When all diodes are soldered, look for the 330ohm resistors and put them in place.
Orientation on all resistors doesn't matter.

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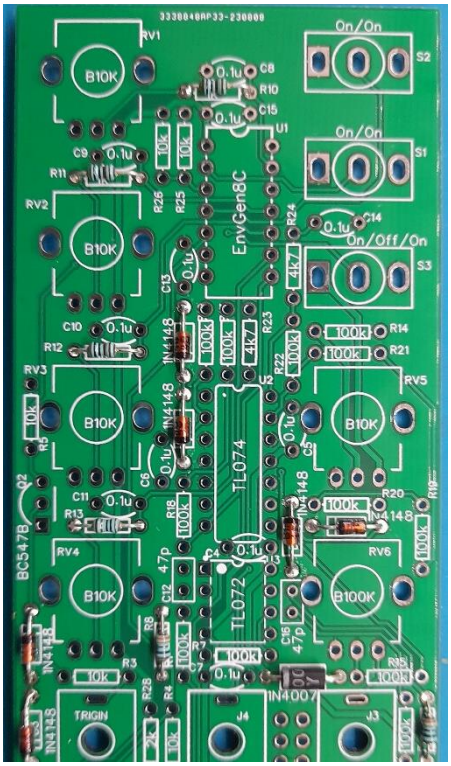
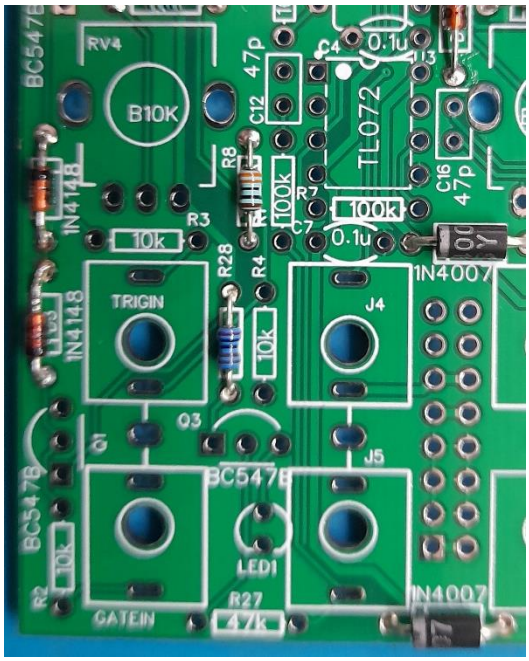


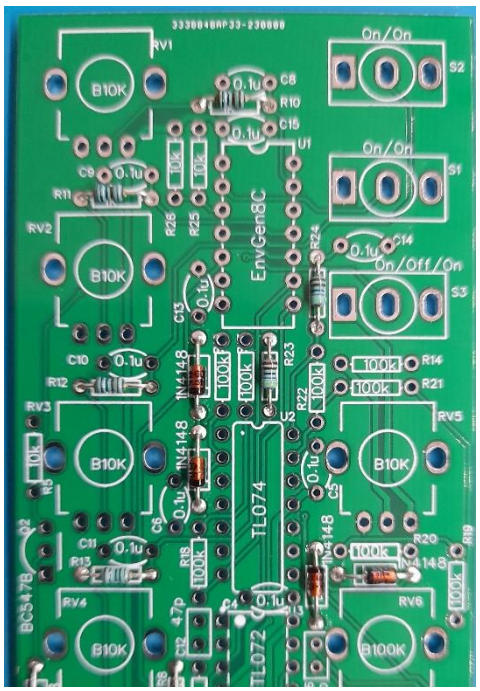
STEP 4
1k resistors x4

Find the 1k resistors and put them in place.



STEP 5
2k resistor x1

Identify the 2k resistor in the bag and put it in in place.



STEP 6
4.7k resistor x2

Identify the 4.7k resistors and put them in in place.

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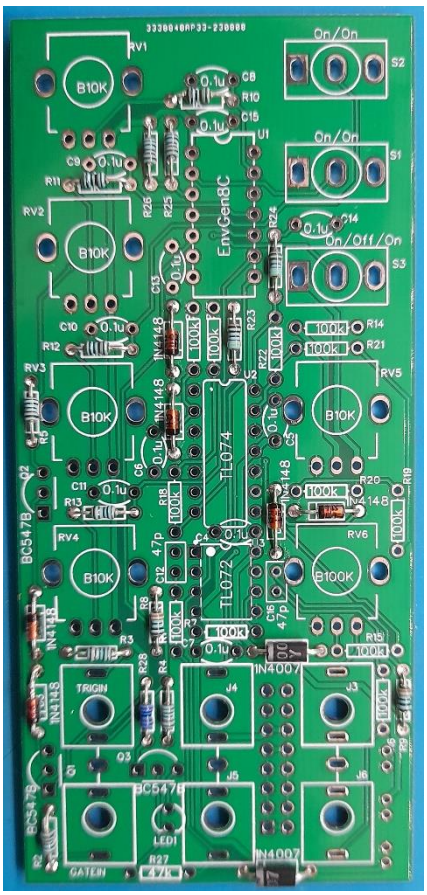
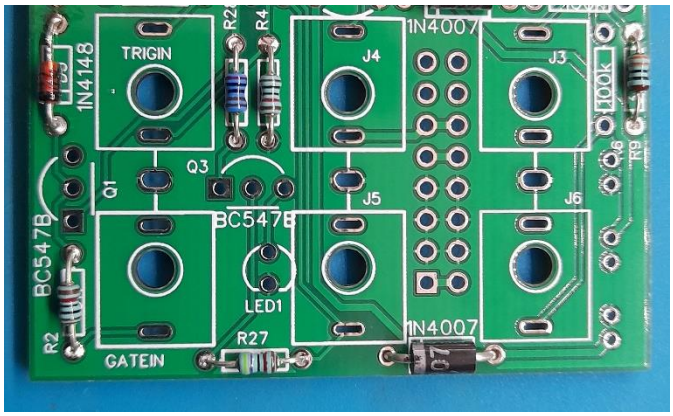
STEP 7
10k resistors x6

Identify the 10k resistors and put them in in place.



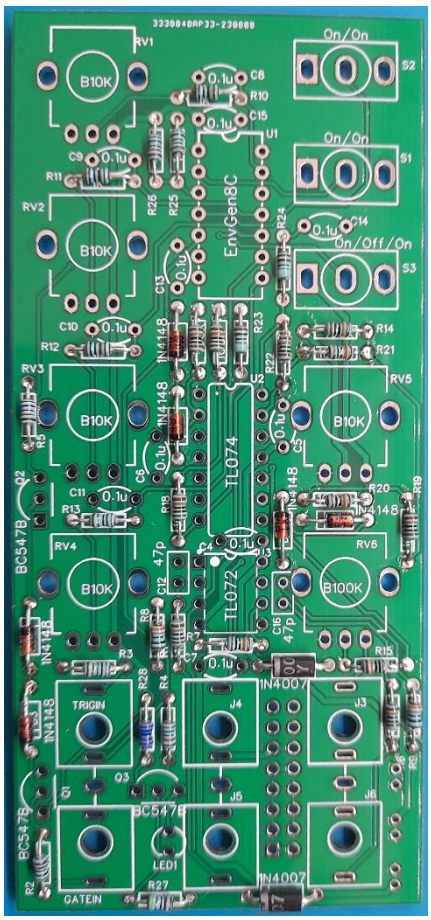
STEP 8
47k resistor x1

Identify the 47k resistor and put it in in place.



STEP 9
100k resistors x11

Identify the 100k resistors and put them in in place.



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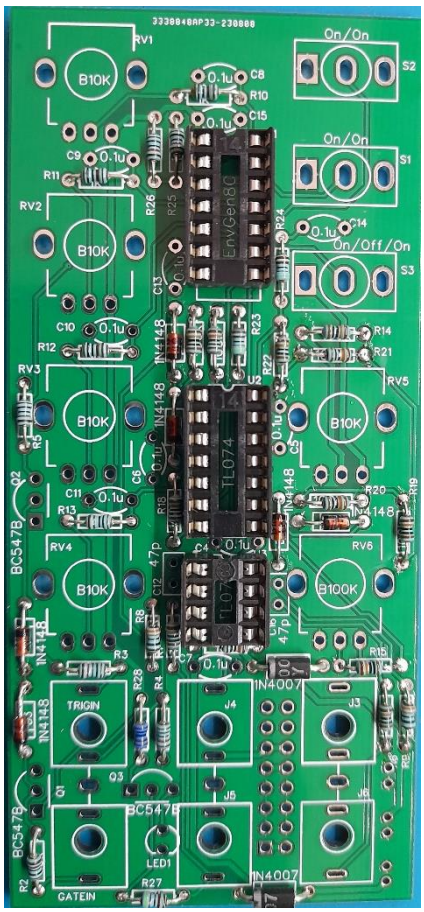
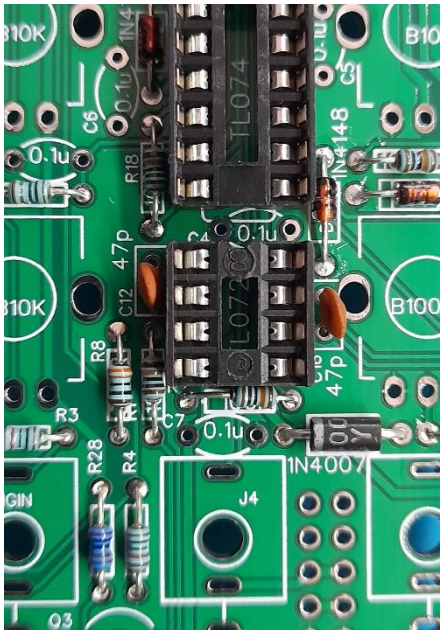


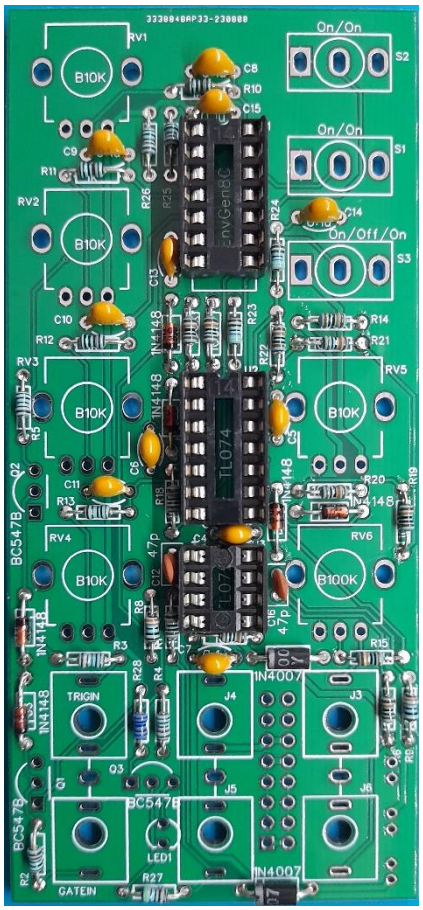
STEP 10
IC sockets

Look for the dip-8 and dip-14 sockets. Put the 14 pin sockets in place, with the notch looking to the top of the PCB.
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 11
47pf ceramic capacitors x2

Find the 47pf capacitors marked "47". 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 12
100nf ceramic capacitors x11

Identify all 100nf capacitors marked "104". Orientation doesn't matter. Put them in place and bend the solder legs outwards, so it doesn't fall when turning around the board.
Solder all ceramic capacitors in place.

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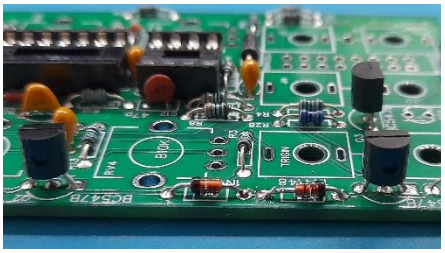
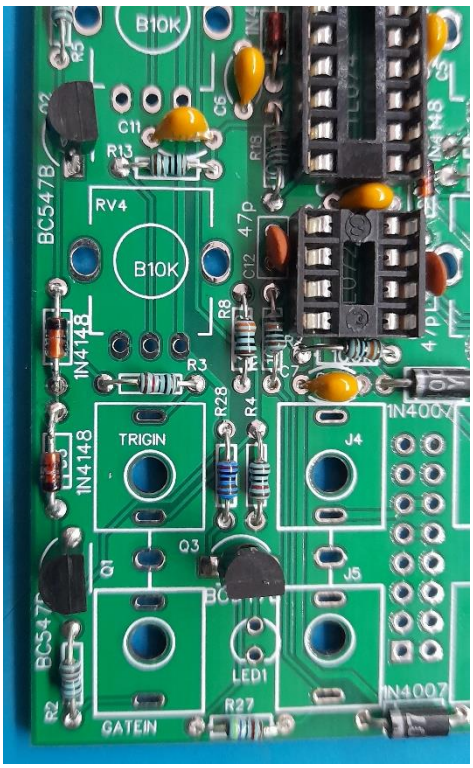
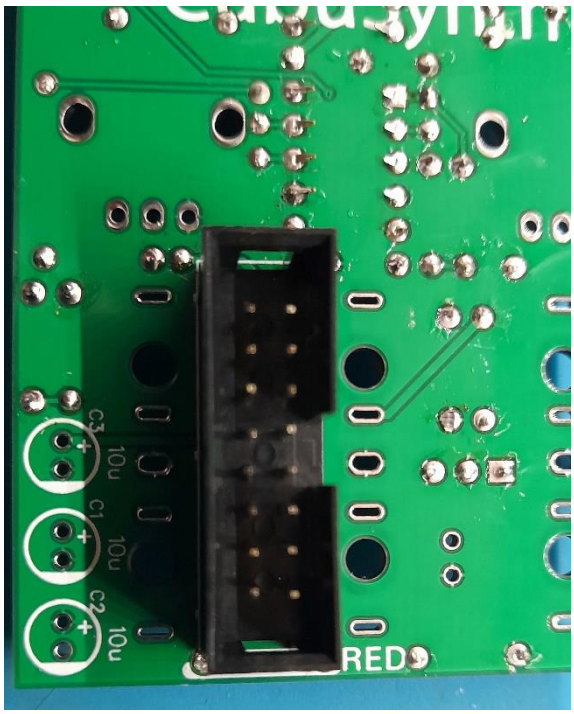
STEP 13
BC547 transistors x3

Take the three BC547 transistors and bend its legs slightly outwards, so they fit in the holes. Make sure the Orientation of the transistor matches the marking on the PCB. The flat side of the transistor has to line up with the straight line on the PCB.
Turn the board around and solder the transistors.







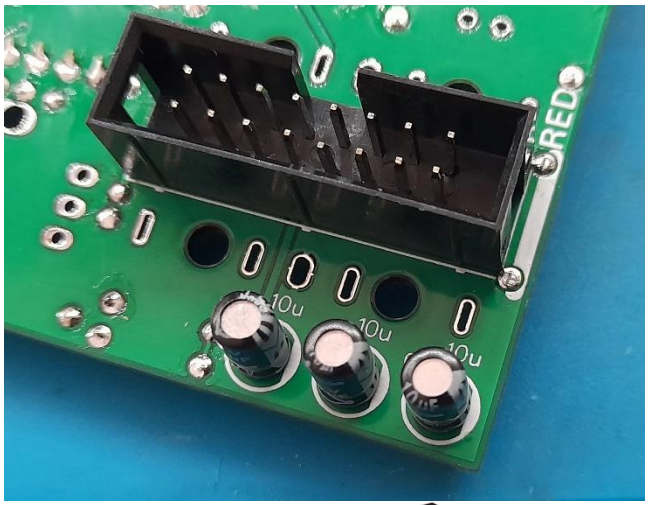
STEP 14
16 pin Power connector

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 temporarely 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 15
10uf electrolytic capacitor x3

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 facing downwards, towards the thicker part of the circle.

Turn the board around and solder capacitors.



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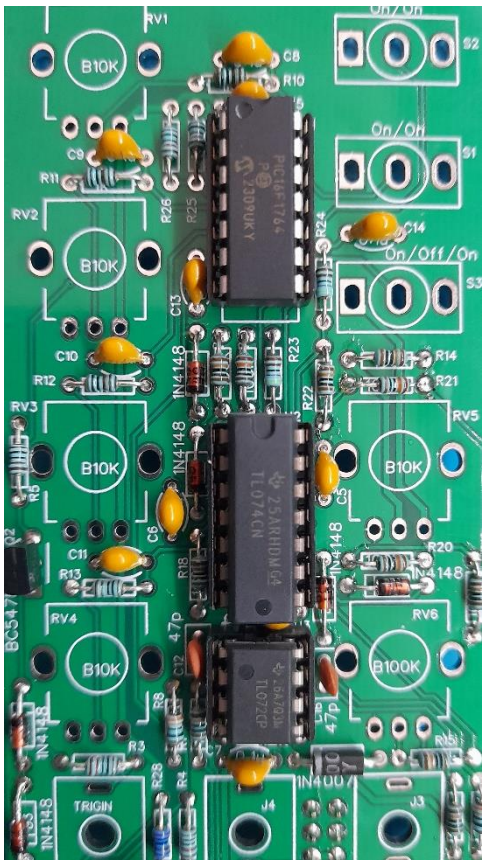
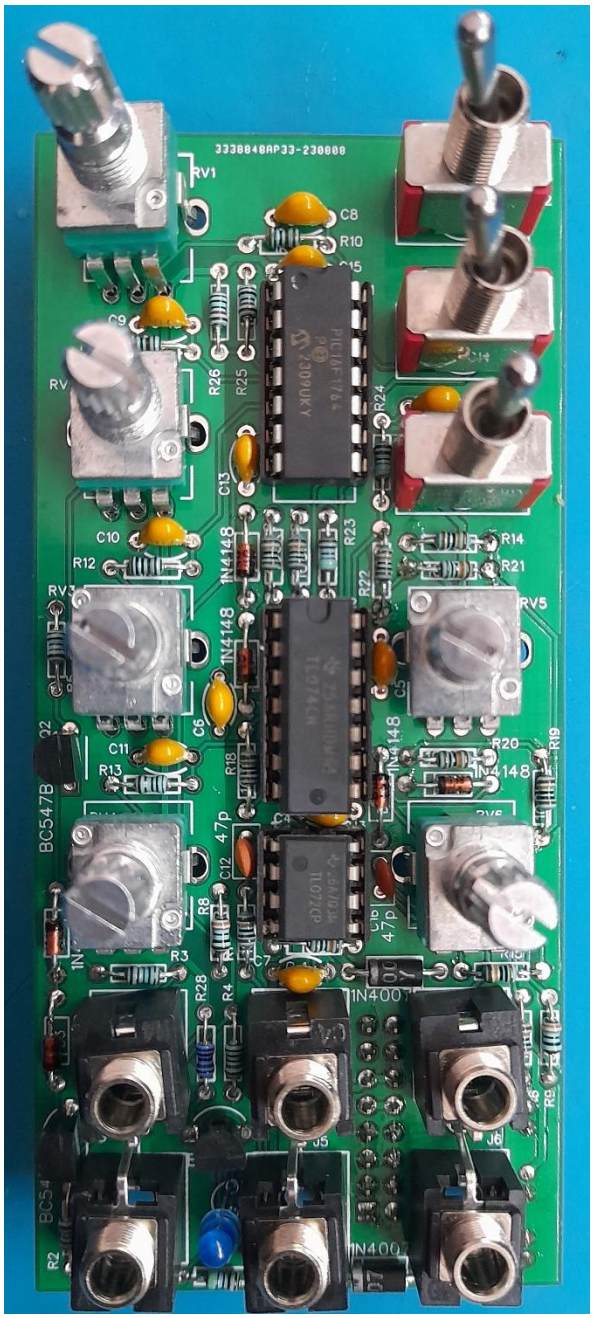
STEP 16 (ICs)
EnvGen8C x1
TL074 x1
TL072 x1

Now you can install the ICs. EnvGen8 chip on top, TL074 in the middle and TL072 down. Make sure the orientation is correct, the notch has to match the silkscreen, facing to the top of the PCB!





STEP 17 (Controls)
B10k potentiometer x5; B100k potentiometer x1;
ON-ON switch (SPDT) x2; ON-OFF-ON switch (SPDT) x1;
PJ-301M Jack (Thonkiconn) x6; LED x1

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

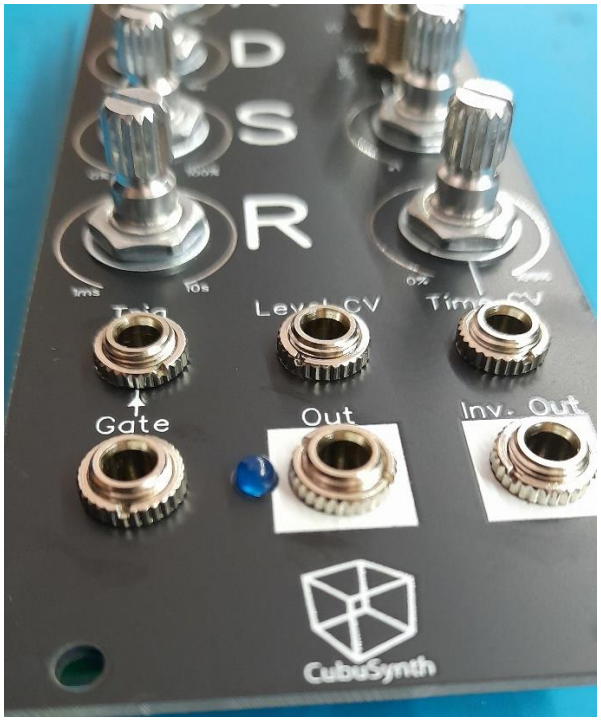
The upper and lower jacks each share a hole for the ground pins.
For the LED, the orientation is important!
The flat side of the LED should be facing down, longer leg is closer to the BC547.

STEP 18
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, switches and Jacks and tighten with your hands.

Make sure the LED shows through the Front Panel before soldering.

Then carefully flip the board around and solder everything.



STEP 19 – final check / Knobs

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 knobs on the Potentiometers.
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 and have fun patching!

If you have trouble with your build, or missing parts in your DIY Kit, you can contact us at:

cubusynth@gmail.com

For better support, please include pictures of your soldered board, front+back.

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