VCLFO^{V2}

Low frequency oscillator with 16 different waveforms, Sample&Hold, Sync, Multiplier, Frequency and Level CV

Build Guide
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Written and illustrated by Ruben Sponar

Introduction

The CubuSynth VCLFO v2 is a Voltage controlled Low frequency oscillator, with 16 Waveforms, Step control (Sample&Hold style), LFO Sync / Reset, CV control over Frequency, Amplitude, Waveform, Frequency multiplier, Skew and Step Rate.

It is based on the Electric Druid VCLFO10 chip which was written/designed by Tom Wiltshire aka "Electric Druid".
For more information visit:
https://electricdruid.net/product/vclfo-10/

The PCB has all SMD Parts pre-soldered, which lowers Part count and makes it easy to DIY.

Tools Required

Soldering iron (+wire)
side-cutter
flat head screwdriver (Trimmer driver)
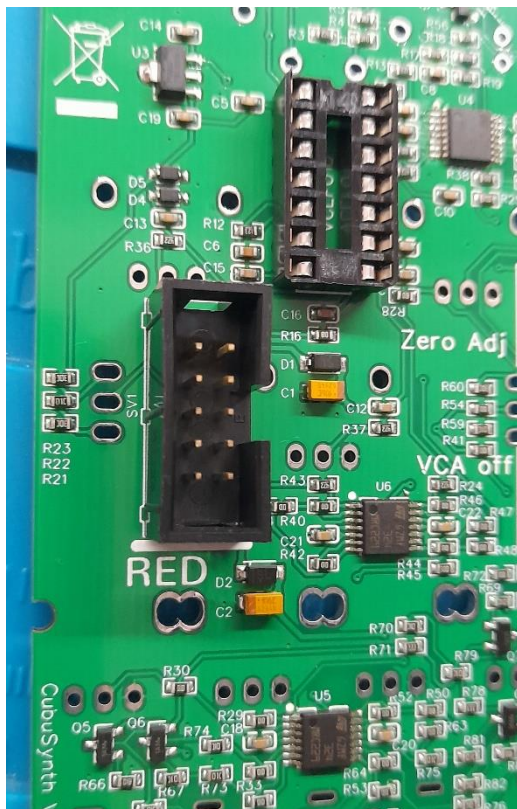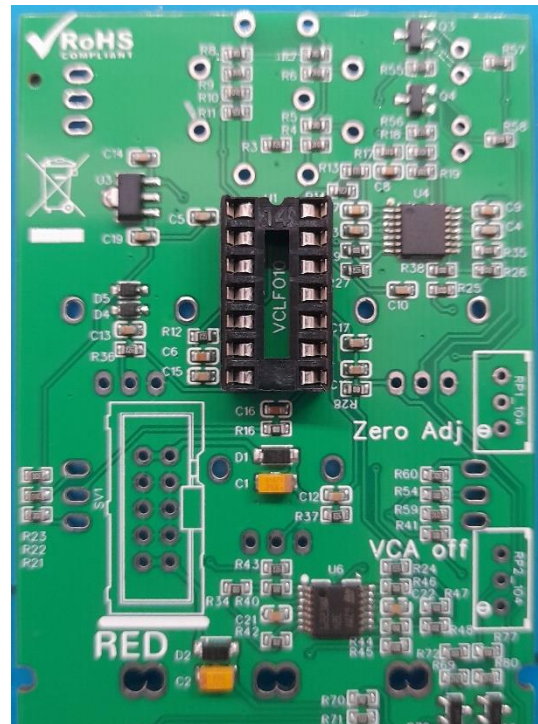Digital Multimeter

Useful but not necessary:
Nut wrench / driver M5, M8, M9
Helping (third) hand / PCB holder
Oscilloscope

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BUILD GUIDE

STEP 1
IC Socket x1

Place the 14 pin DIP socket, with the notch facing upwards, matching the white marking on the PCB.

You can bend the Pins on the other side of the PCB to hold it in place while soldering.

STEP 2
Power Header

Place the 10-Pin Power Header on the PCB, with the cutout facing to the Right.

Solder only one pin first and check placement.
If needed, heat the solder pad again while pushing the Power header against the PCB.

Then solder the remaining Pins.

The ground pins (6 middle Pins) might need a bit more Heat or time to achieve a proper solder connection.

STEP 3
Trimmer

Place the two blue Trimmers as shown in the picture.

Bend the two outer legs outwards to hold them in place. Solder only one pin first and make sure the Trimmer sits nicely on the PCB. Then solder the remaining Pins and cut them flush to the Board.
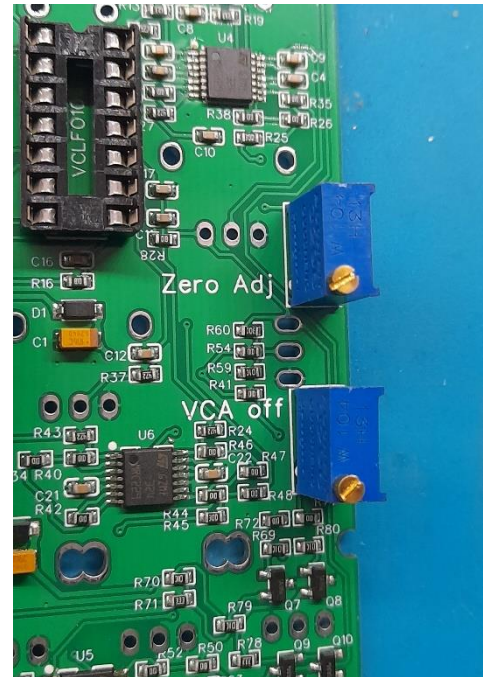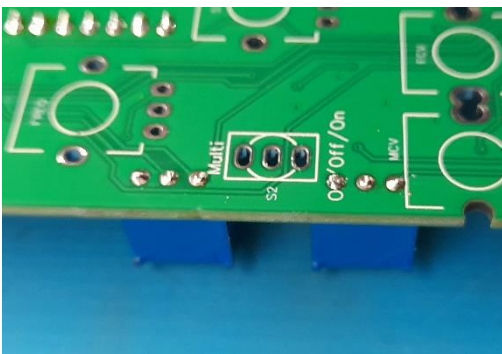

STEP 4
LEDs

Place the LEDs in their spot, Orientation must match the Marking on the PCB.
The longer leg goes in the pad next to the LED number / Flat side of the LED towards the Flat side of the circle on the Silkscreen.

You can use LED spacers like shown in the picture. Make sure they don't stand off the PCB more than 10mm!

You can start by only solder one leg and adjust alignment before soldering the second one.

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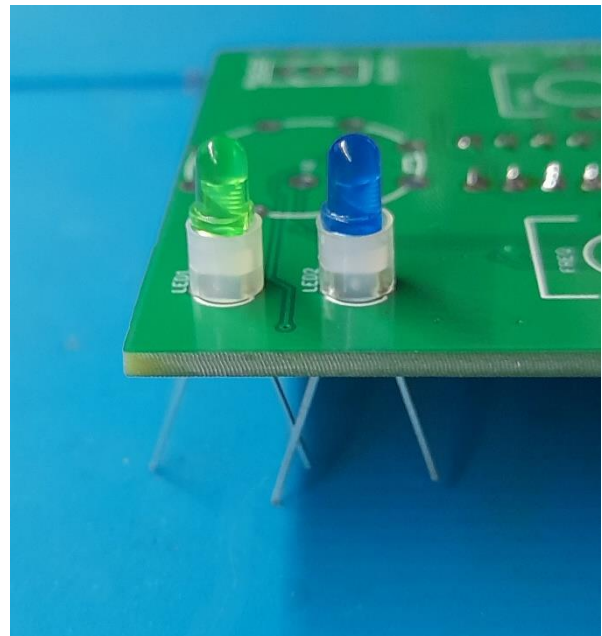
STEP 5
Rotary switch

Now it is time to prepare the Control components.

Take the 8-position Rotary switch and cut off the small Anti-rotation pin, like shown in the picture.

STEP 6
Toggle Switch

Take the three Toggle switches and take off the nuts and washers.

Leave only one nut screwed on to the Shaft of the switch, like in the picture.

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STEP 7
(Controls)
B100k potentiometer x3
B100k Tall Trimmer x4
SR-16 8-position rotary switch x1
ON-ON sub-mini toggle switch (SPDT) x2
ON-OFF-ON sub-mini toggle switch (SPDT) x1
PJ-301M Jack (Thonkiconn) x10

After all previos steps are done, take the
Potentiometers, jacks and switches 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, switches and
Jacks and tighten with your hands. Then carefully
flip the board around and solder everything.

Make sure the Tall Trimmer Potentiometers are Properly
placed while soldering.

STEP 8
Knobs

put the knobs on the Potentiometers. For best results, turn all Potentiometers counter-clockwise (to 0%) and push on the knobs, so the marking points towards the left end of the surrounding circle.

For the Rotary switch, turn it all the way counter-clockwise and place the knob facing towards the Ramp Waveform.

STEP 9
final check and Installing IC

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 Power on the module without the VCLFO chip installed.
Check with your multimeter, if you get 5V between Pins 1 and 14 on the IC Socket.

If that is the case, install the VCLFO chip on the socket, make sure the orientation is correct, the notch has to match the silkscreen / IC Socket, facing to the top of the PCB!
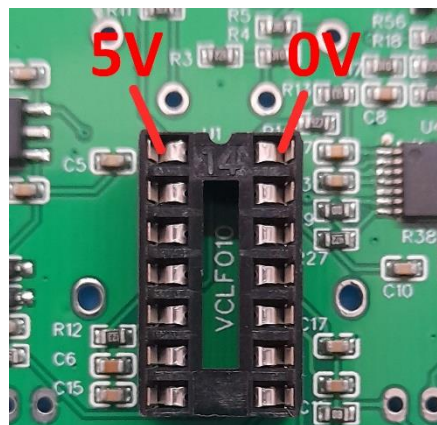
STEP 10
Calibration

The trimmers on the back are for the offset of the LFO wave and the Output Level.

Zero Adj:

1. Connect the Main Output (Rightmost Jack) to an oscilloscope.

2. Set Level to 100%, Step Rate to 0%, the Skew to 50% and the Waveform to Spike (Set 1, Waveform 7)

3. Adjust the frequency (or Scale on the Scope) until you see at least a full wave cycle.

4. Turn The Trimmer until the Waveform is centered around 0V. Clockwise shifts the voltage up, towards Positive Voltages.

VCA off:

1. Connect the Main Output (Rightmost Jack) to an oscilloscope.

2. Turn the Level Potentiometer on the front to 0%

3. Check on the Oscilloscope if there is any Signal present.

4. The VCA off Trim acts like a volume knob. If there is some signal visible with Level on 0%, adjust the Trimmer Counter-Clockwise until the Voltage stays at 0V.

If you don't have an oscilloscope, you can still (roughly) calibrate it.

Zero Adj:
Set the waveform to sine or triangle and the distort knob to 0% (middle position). Then turn the trimmer until the two LED colors light up for the same time (e.g. 2 sec green and 2 sec blue).

VCA off:
Send the Output to a Pitch CV input on an Oscillator. With the Level on 0% the Pitch should stay constant. Adjust the Trimmer if there is some fluctuation in Pitch.

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If you have trouble with your build, you can contact us at:

cubusynth@gmail.com

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

https://www.cubusynth.com

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