



CubuSynth

VCLFO^{v2}

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

User Manual

PCB V1.3 Jan 2024



Written and illustrated by Ruben Sponar
Illustrations on page 4 by Tom Wiltshire

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Limited Warranty:

CubuSynth guarantees this product to be without defects in materials and workmanship for a period of one year from the date of purchase (proof of purchase/invoice needed).

Malfunctions due to improper supply voltages, incorrect or reversed Eurorack power cable connection, misuse of the product, removal of knobs, changing faceplates, or other causes determined by CubuSynth are the user's responsibility and are not covered by this warranty.

During the warranty period, all defective products will be repaired or replaced in the CubuSynth workshop, with the customer paying the shipping costs to us.

CubuSynth takes no responsibility for any damage to persons or equipment caused by the operation of this product.

Please contact cubusynth@gmail.com with any questions, authorization for return to manufacturer or any needs and comments.

1. 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/>

2. Specifications

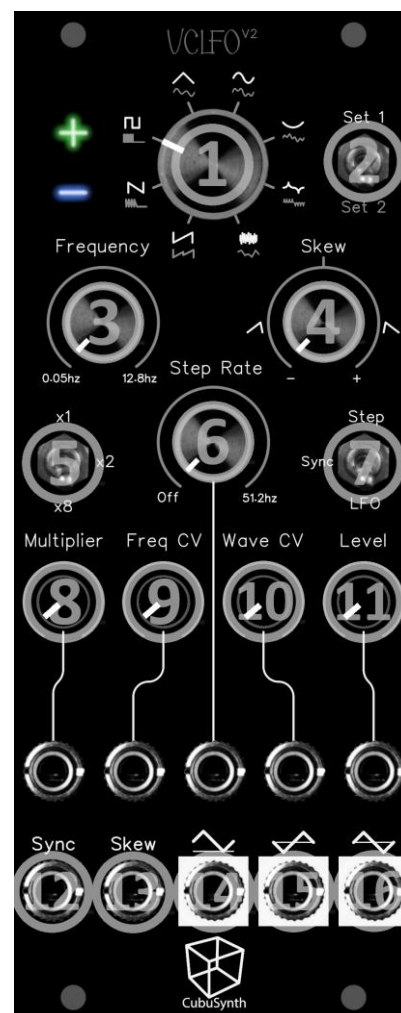
- Size: 10 HP / 50 mm
- Depth: 24 mm (measured from the front panel)
- Current Draw:
 - +12V: +40 mA
 - 12V: -30 mA

3. Key Features

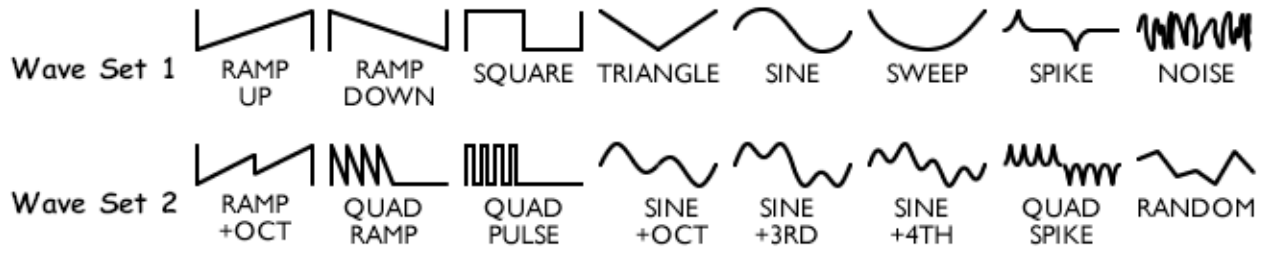
- 16 Waveforms selectable in two Banks of 8
- Frequency range: 0.05Hz to 12.8Hz (102.4Hz with multiplier x8)
- 6 CV inputs for Multiplier, Frequency, Step Rate, Skew, Waveform and Level
- "Sync" Input for LFO reset, or Step Sync
- 3 outputs:
 - Uni-Polar (0 to +5V),
 - Bi-Polar inverted (+5V to -5V / 10Vpp) and
 - Bi-Polar normal (-5V to +5V / 10Vpp)

4. Detailed Overview

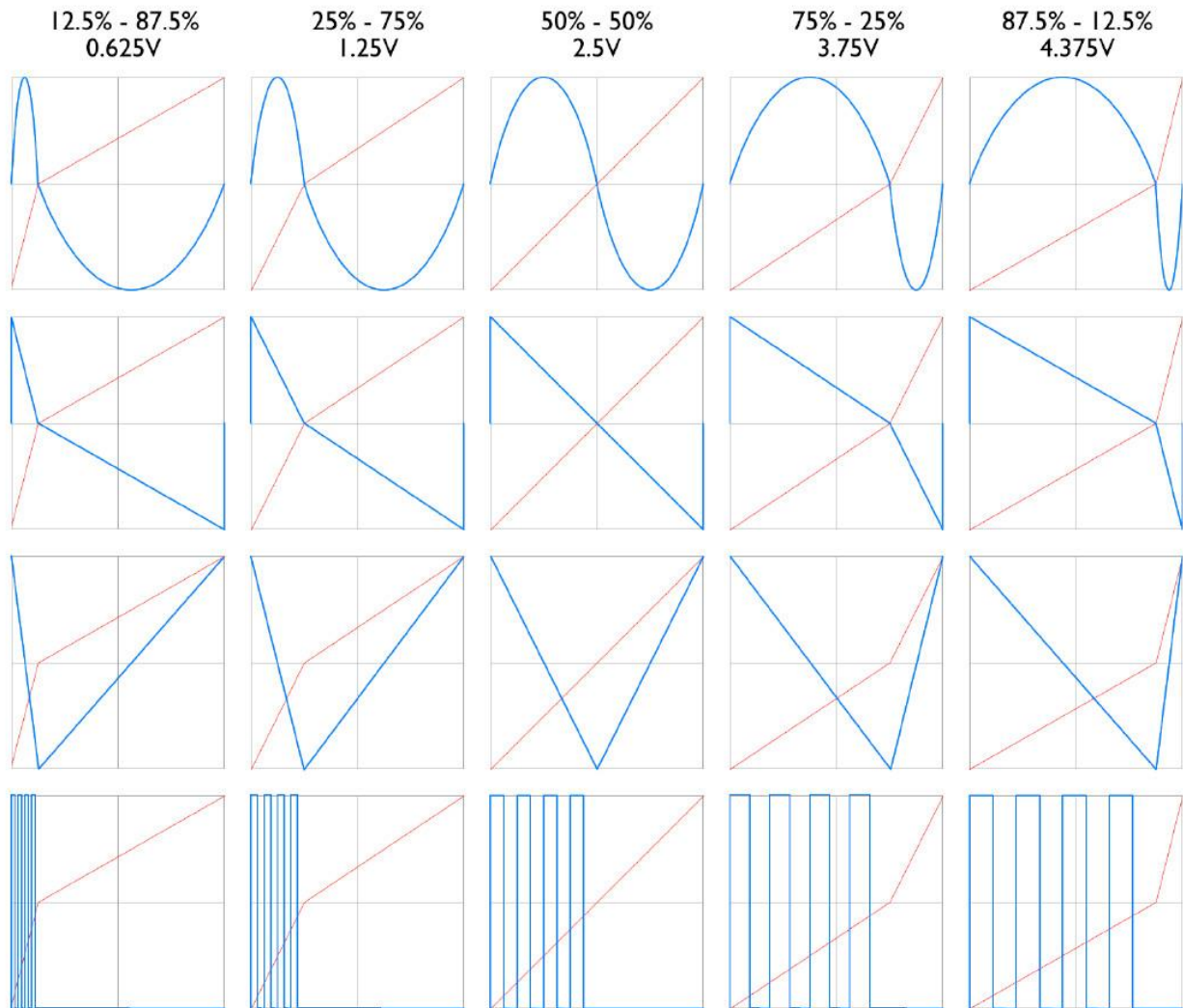
- 1 **WAVEFORM**
Select the 8 different waveforms of the selected Wave Set. The LED display on the left shows the positive part of the wave on the green "+" and the negative part on the blue "-".
- 2 **WAVE SET**
Select between the 2 banks of 8 waveforms. More info on Page 4.
- 3 **FREQUENCY (0.05Hz - 12.8Hz)**
Set the frequency for the LFO
- 4 **SKEW**
Shift the 180° phase towards left or right of the waveform. More details on Page 4.
- 5 **MULTIPLICATION (x1 / x2 / x8)**
Sets the multiplication of the frequency by 1, 2 or 8
- 6 **STEP RATE (Off - 51.2Hz)**
Sets the Rate of the Sample&Hold function. All the way Counter Clockwise will deactivate steps. The frequency of the Sample & Hold ranges from 0.2Hz to 51.2Hz
With a cable plugged into the CV input below, the Knob will act as an attenuator.
- 7 **SYNC MODE (LFO / Step)**
Resets the LFO back to phase zero or synchronizes the Step Rate
- 8 **Multiplier CV (x1 / x2 / x4 / x8)**
Set the amount of the incoming CV for Multiplication of the frequency. Mixes with the setting of the Switch above. For full modulation range, set the switch to middle position.
- 9 **FREQ CV**
Set the amount of the incoming signal on the Frequency CV input. Mixes in with the Frequency knob
- 10 **Wave CV**
CV input for the Waveform within selected Set. Mixes in with the Waveform selector switch.
- 11 **LEVEL**
Sets the overall Amplitude of the 3 Outputs.
If CV is plugged in, it acts as attenuator.
With CV Voltages over +5V, the output can be up to 20Vpp.
- 12 **SYNC Input**
Resets the LFO to phase 0° or triggers the Step mode, depending on the setting of the Sync mode switch.
- 13 **Skew CV Input**
CV input for the Skew function. Creates an offset around the Skew knob.
- 14 **Unipolar output**
CV-output of the LFO (0 to +5V)
- 15 **Inverted output**
CV-output of the LFO (+5V to -5V / 10Vpp).
- 16 **Normal output**
CV-output of the LFO (-5V to +5V / 10Vpp).



5.1 Waveforms:



5.2 Skew Mode:



6. Calibration

The trimmers on the back set 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:

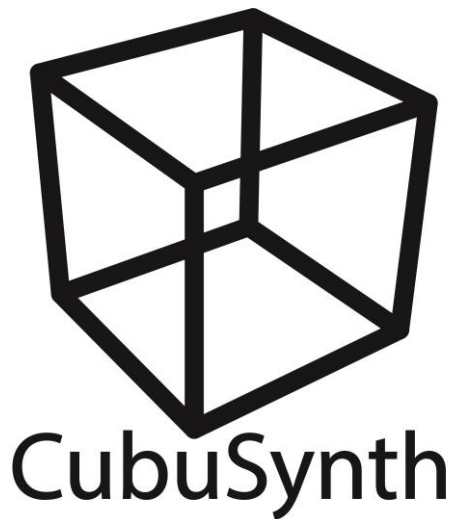
Send the Output to a Pitch CV input on an Oscillator. With the Level on 0% the Pitch should stay constant. Adjust the Trimmer if there is some fluctuation in Pitch.

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The CubuSynth VCLFO module was designed by Ruben Sponar, from the first prototype in July 2021 to the finished module in May 2022. Due to chip shortages, the Module was discontinued and only available as DIY PCB+Panel Set. Since some stabilization came back, the VCLFOv2 as our take at making the most out of a digital LFO with all the features you could ask for.
The VCLFO10 chip was designed by electric druid aka. Tom Wiltshire.