THONK SYNTH t01 VCO

4HP VOLTAGE CONTROLLED OSCILLATOR

FINE TUNE

VCO RANGE
0.5Hz to 8KHz

LFO RANGE
200s (0.0047Hz) to 12ms (80Hz)

COARSE TUNE

1V/OCT INPUT

PWM CV INPUT
-5V to +5V.
0V = 50% duty cycle.
Note: at 0% or 100% duty cycle, you may hear nothing!

FREQUENCY LED
Shows the current voltage level at the output.
Orange = positive voltage
White = negative voltage

3 WAY OCTAVE SWITCH

LFO SWITCH
LED will light when in LFO mode.

LINEAR FM CV INPUT
AC Coupled.
Linear FM varies the frequency of oscillation in a linear scale without changing the average pitch.

HARD SYNC CV INPUT
Hard sync occurs at any point in the oscillating cycle - a rising edge on the sync input will force the oscillator to GND and to begin rising.

WAVE OUTPUTS
Square, Saw, Triangle & Sine.
All outputs are 10Vpp.

MODULE SPECS

Width: 4HP
Depth: 37mm (inc power header)
+12V: 30mA
-12V: 26mA
+5V: 0mA

MODULE INSTALLATION

1. Ensure your eurorack system is powered off.
2. Double check your power cable is plugged into your busboard correctly.
3. Locate the red stripe on your power cable.
4. Plug in the power connector onto the 10-pin header on the back of the module, ensuring that the red stripe on the power cable is matched with the "RED" text on the module.
5. Turn on the power to your eurorack case.

CALIBRATION

Volt per octave calibration

Method 1. 'Quick n dirty'

For this method you will need:
- A way to listen to the output of the VCO; an output module or mixer connected to speakers/headphones.
- A small flathead screwdriver
- Your ears!

1. Plug any of the VCO outputs into your headphones/speakers so you can hear it.
2. Start with the OCTAVE switch on '-' and tune set the coarse tune to a reasonable frequency you can hear well.
3. Flip the octave switch all the way up to the '+' setting and listen to the note - it should be 2 octaves above the first note.

4. If the note is HIGHER than what it should be:
   Turn the V/Oct trimmer COUNTER CLOCKWISE half a turn.

   If the note is LOWER than what it should be:
   Turn the v/Oct trimmer CLOCKWISE half a turn.

5. Now quickly flip between the three octave settings, listening and comparing the notes. Repeat step 4, making small adjustments to the v/oct trimmer each time until you are happy with how in tune the octaves are sounding - it's completely up to your taste how precise you want to be!

Method 2. 'Precise'

For this method you will need:
- A way of plugging the output into a tuner e.g. Eurorack/pedal tuner, oscilloscope, audio interface & computer.
- A precise & reliable voltage source e.g. a keyboard with CV output, a MIDI to CV interface, a voltage source Eurorack module such as the Befaco Voltio.
- A small flathead screwdriver.

1. Plug your voltage source into the V/Oct input of the VCO.
2. Play a low C note on your keyboard, or set your voltage source to 0V.
3. Tune your VCO (using the coarse and fine tune knobs) to the lowest C note that your tuner reliably picks up, usually C1.
4. Once that is perfectly tuned, play a note one octave up on your keyboard, or set your voltage source to +1V.
5. Now check your tuner - this note should be 1 octave higher than the first note.

6. If the note is HIGHER than what it should be:
   Turn the v/oct trimmer COUNTER CLOCKWISE half a turn.

   If the note is LOWER than what it should be:
   Turn the v/oct trimmer CLOCKWISE half a turn.

7. Now go back and play the original low C note on your keyboard, or set your voltage source back to 0V.
8. Any adjustment of the V/Oct trimmer will have changed the original tuning, so now go back and repeat steps 3 - 7, making small adjustments each time until your two octaves are perfectly in tune.
9. When you are happy with the tuning, you can now move through some higher octaves. Repeat the same steps as before, making small adjustments to the V/Oct trimmer at a time, until you have solid tracking over a wide range of octaves.

Method 3. 'AtoV Project Calibration tool'

The great folks over at AtoV Project have released a fantastic calculator tool to help with VCO calibration, and is fully combatible with the t01 VCO. Head over to https://atovproject.de/resources/calculator for details on how to use it.

Sine calibration

The sine output of the VCO is achieved using a discrete transistor based sine shaper, turning the triangle wave into a sine wave. It should be pretty close out of the box, but may require some simple adjustment to get a purer sine wave.

The easiest way to do this is just by listening to the sine wave output and adjusting the sine trimmer until the harmonics disappear.

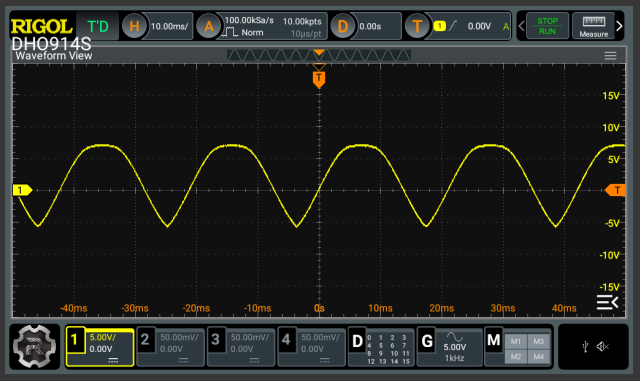
If you go too far either way, more harmonics will start appearing and it will start to sound more like a triangle wave.

Keep adjusting the trimmer until you have a nice sounding sine wave that is as pure (or not!) as you like it.

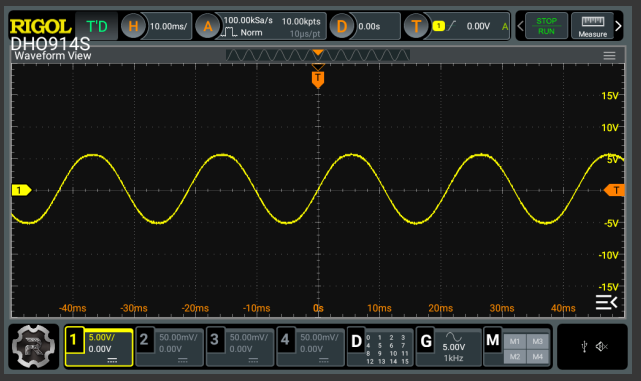
Alternatively, you can hook up the sine output to an oscilloscope so you can see the wave. By adjusting the trimmer, you will see the sine wave morph into a weird asymmetric triangle wave.

The goal here is to find the perfect middle point where the waveform looks as close to a pure sine wave as possible.

We recommend listening to the output while doing this, and trusting your ears. What looks ideal may not always sound the best



Uncalibrated sine wave



Calibrated sine wave