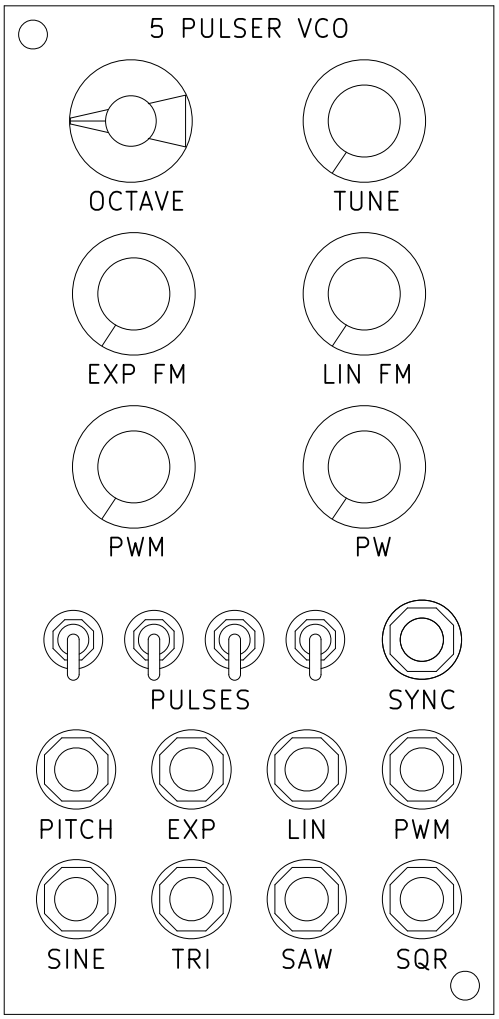
.: Five Pulser VCO User Manual :.

Brief:

Voltage Controlled Oscillator with Sine, Triangle, Sawtooth, and special 5-Pulse waveforms. The special 5-pulse waveform is a train of one to five variable width pulses, which creates a unique harmonically rich sound. 1 volt per octave control, exponential and linear Frequency Modulation are available, as well as Sync and Pulse Width Modulation. All waveform outputs have a range of +/- 5 volts.

Panel layout:



Description of the controls:

- OCTAVE: rotary octave switch.
- TUNE: fine tune control.
- EXP FM: attenuator for the EXP (exponential FM) input.
- LIN FM: attenuator for the LIN (linear FM) input.
- PWM: attenuator for the PWM (pulse width modulation) input.
- PW: manual Pulse Width control.
- PULSES switches: turns pulses 2 through 5 on or off (pulse 1 is always on).

Description of the jacks:

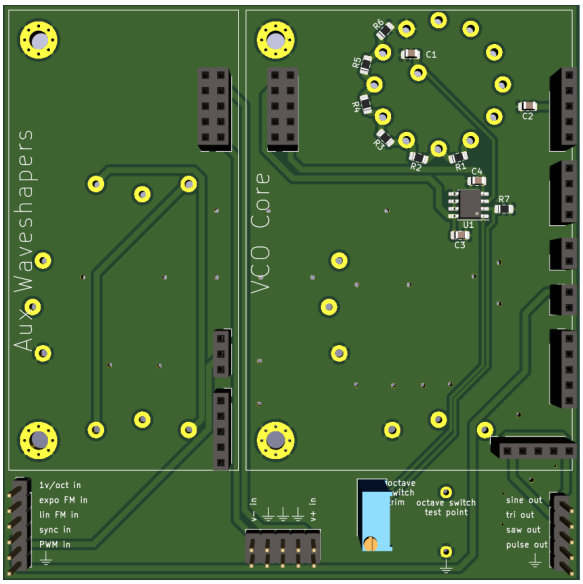
- SYNC: synchronization input. Plug the output of a different VCO into this jack for sync effects. For typical sync sounds, the “master” VCO (the one plugged into the sync jack) should be tuned to a lower frequency than the “slave” VCO.
- PITCH: 1 volt per octave input jack.
- EXP: attenuated exponential frequency modulation input.
- LIN: attenuated linear frequency modulation input.
- PWM: attenuated pulse width modulation input.
- SINE: sine wave output jack.
- TRI: triangle wave output jack.
- SAW: sawtooth wave output jack.
- SQR: special 5-pulser output jack.

Mechanical structure:

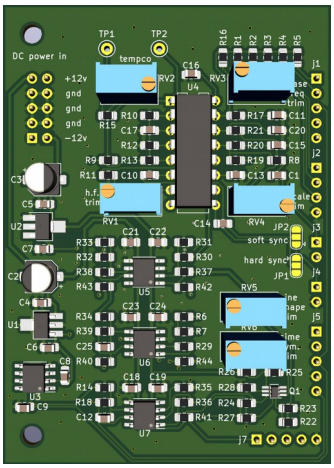
The VCO is constructed with a “motherboard” which houses the potentiometers and octave switch, and a “VCO core” pcb that plugs into a port on the motherboard. The motherboard also has a port for an auxiliary waveshaper pcb, but the dual-range VCO does not use this feature.

Below is an illustration of the boards and how the VCO core plugs into the motherboard:

The motherboard pcb:



The VCO core pcb:



The five-pulser auxiliary waveshaper board:

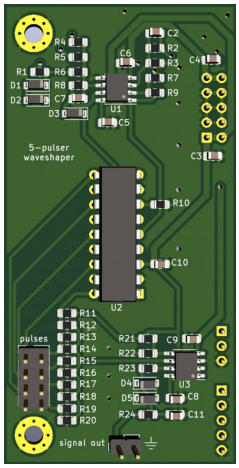
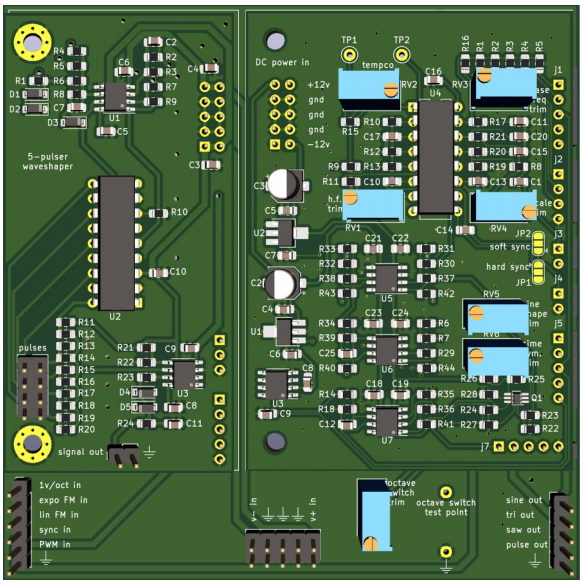


Illustration of mating the pcbs together:



Calibration:

Sine wave calibration:

- Monitor the sine wave output with an oscilloscope.
- Adjust the “sine shape trim” and “sine sym trim” for the best sine shape.
- This can also be done by ear by adjusting the trimmers while listening to the sine wave.

VCO tuning calibration:

- First turn down the high-frequency compensation circuit by turning the “h.f. trim” clockwise ten turns, or until you hear a small click.
- Next calibrate the temperature compensation by adjusting the “tempco trim” until the difference between test points TP1 and TP2 is as close to zero volts DC as you can get.
- To calibrate the octave scaling, connect the 1volt per octave signal you intend to use to the PITCH jack. Play octaves while adjusting the “scale trim” trimpot until the octaves between about 30Hz and 500Hz are in tune with each other. Use either a frequency counter or a guitar tuner, or even your ears to do this.
- The VCO may go flat a bit at higher frequencies. To compensate for this, adjust the “h.f. trim” trimpot to cause higher frequencies to become more sharp.
- You may need to go back and forth with the “scale trim” and “h.f. trim” adjustments to get the VCO to be as in-tune as possible over the widest frequency range.
- Finally, set the octave switch to the lowest octave and rotate the TUNE potentiometer to 12 o’clock. Now adjust the “base freq trim” so that the VCO plays C1, or 32.7 Hz.

Octave switch calibration:

- After the VCO tuning is well calibrated, simply rotate the octave switch through its positions and adjust the “octave switch trim” trimpot until the octaves are in tune.
- You can also monitor the octave switch voltage at the “octave switch test point” and ensure that the switch creates 1 volt steps.

Current draw:

+12 volts: 50mA

-12 volts: 50mA