OSC3

1. Introduction
2. Controls and I/O
3. Parameters
    1. SHAPE
    2. QUANT
    3. BEAT
    4. OCT
    5. LVL S+H

1. Introduction

OSC3 is a trio of oscillators with one master VCO (oscillator 1) and two oscillators (oscillators 2 and 3) that spread up and down from the master oscillator (center) frequency. It is a nod to the oscillator sections on classic monosynths, but with a focus on unconventional musical control and patching opportunities.

2. Controls and IO

If you haven't yet, take a glance at this introduction of Via's controls, IO, and user interface.

Knobs

COARSE sets the base pitch of the oscillator cluster over a 4 octave range.

FINE adjusts the pitch up to a fifth above the base pitch.

spreads oscillators 2 and 3 up and down from the center frequency respectively. See BEAT for more detail on the spread pattern.

CV

V/OCT provides volt per octave control over a 10 octave range from -5V to 5V.

PHASE modulates the phase of oscillators 2 and 3. Audio-rate inputs are particularly rewarding.

 controls the spread amount. Note that this CV is disabled when the corresponding knob is fully counterclockwise. See BEAT for more detail on the spread pattern.

Logic Inputs

OCT ⊓ transposes the oscillators down by an octave jump when the input is high. See OCT for more info on the size of the jump.

UNITY pulls oscillators 2 and 3 to the center frequency when the input is high. The behavior is altered when the BEAT mode is set to clocked, see BEAT for more details.

Outputs

The center oscillator is output directly from the OSC1 output with a range of -5V to 5V.

The two detunable oscillators (2 and 3) are sent to the control inputs of the VCAs in the core Via circuit. As such, the level knobs and CV act as attenuverters for each oscillator, with the oscillator always unipolar. By mixing a fully on and fully inverted pair of oscillators, you can achieve a -5 - 5V output at OSC 2+3 output. You can control the levels with CV, but note that your CV may bleed into the output. To achieve VCA-like control, patch the same envelope into both inputs and turn the 3 scale knob fully counterclockwise. Bleed will be minimized.

The BEAT output is a square wave at the difference (heterodyne, beating) frequency of the detuned oscillators. Its frequency increases as the frequencies of oscillators 2 and 3 diverge.

Δ PITCH outputs a 1ms trigger whenever the pitch at the v/oct input changes.

LED Display

The current setting for the QUANT parameter is displayed as a color on the RGB LED.

The top left LED indicates a note change at the V/OCT input.

The top right LED indicates the state of the BEAT output.

The bottom left LED indicates the state of the sample and holds at the oscillator 2 and 3 level inputs. When the LED is on, the input is being held.

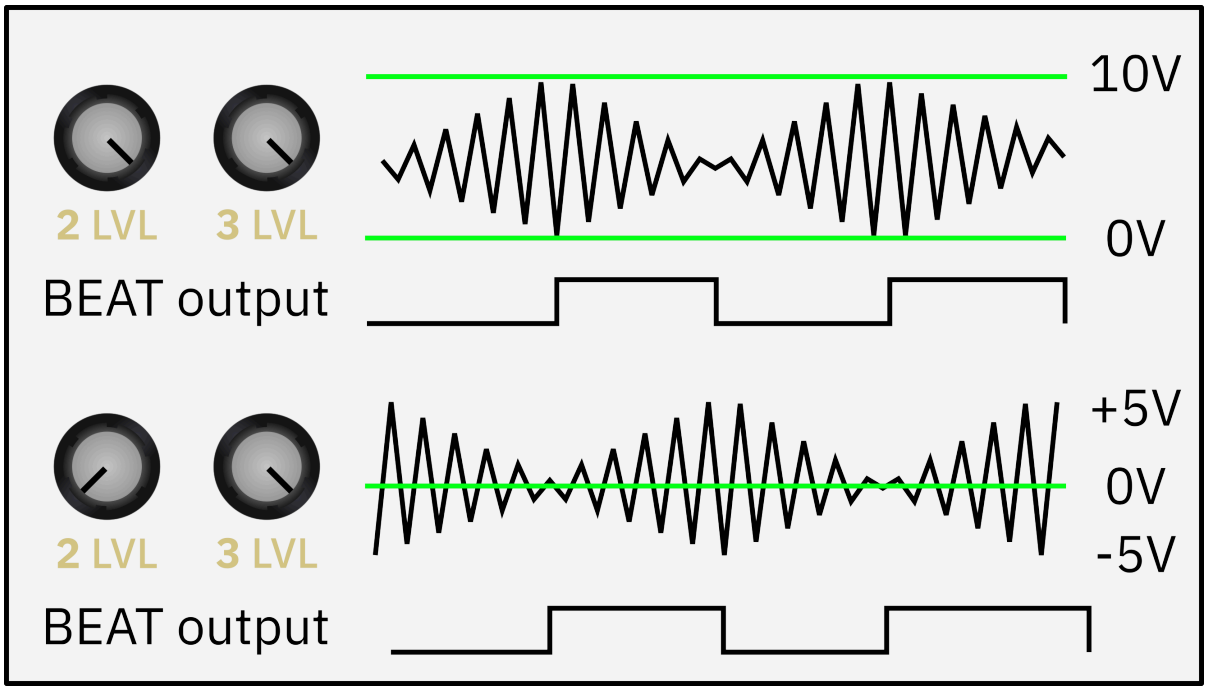
The bottom right LED is illumated when the BEAT parameter is set to "chord mode".

3. Parameters

SHAPE

The oscillators all share a wave shape. The options are: *(1) saw*, *(2) square*, *(3) trapezoid*, and *(4) triangle*.

Oscillators 2 and 3 are each unipolar, with a 5V peak to peak level at each extreme of the LVL control knobs. Due to the beating effect of two detuned oscillators, the output 2 + 3 output amplitude ranges from 10V peak to peak when the waveforms are perfectly in phase to 0V when the waveforms are perfectly inverted relative to one another. When both knobs are clockwise, the output is positive and unipolar, when both are clockwise, the output is negative and unipolar, and when they are at opposite extremes, the output is bipolar and centered about ground as shown below.



QUANT

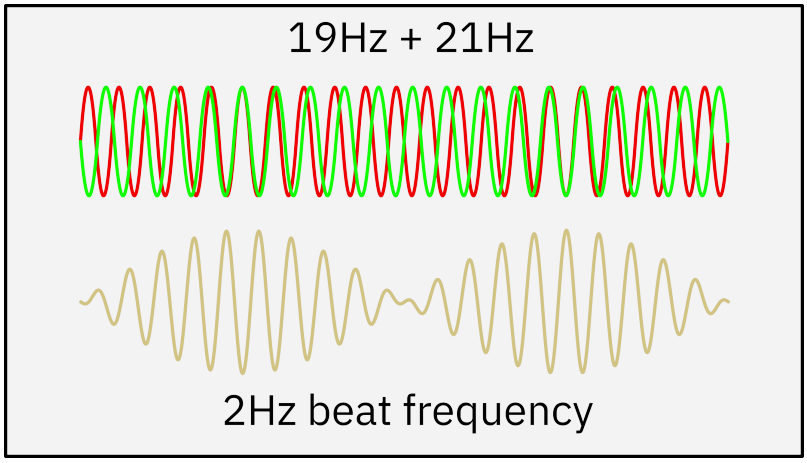
The V/OCT input can be optionally quanitized to an equal tempered scale. The triangle shows the current quantization setting. The options are as follows:

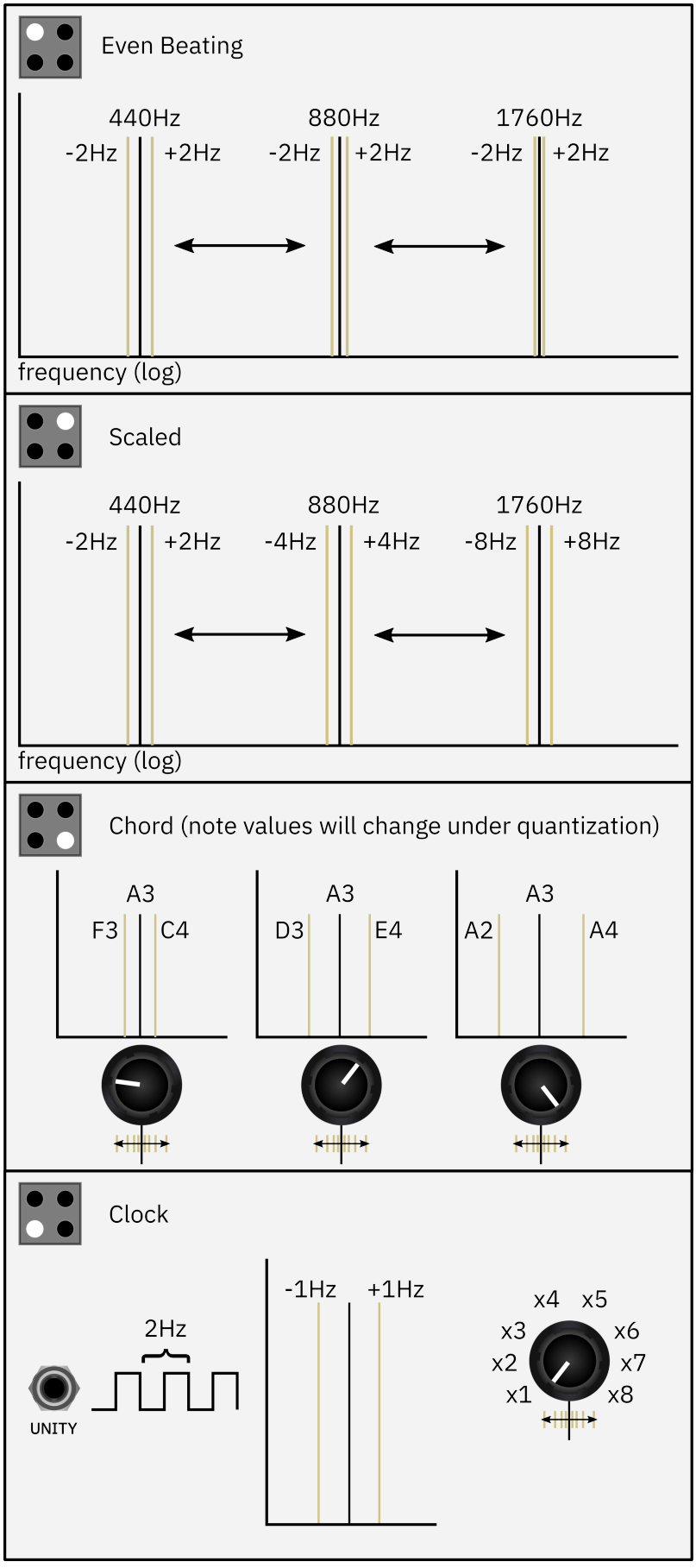
1. *off (red)*
2. *semitone (yellow)*
3. *major (teal)*
4. *minor (purple)*

When quantization is enabled (when the parameter is not set to mode 1), the COARSE knob steps in semitone increments. With the FINE tune all the way counterclockwise, the pitches are tuned to A440. In Chord mode the quantization also applies to which pitches are selected from the chord bank.

BEAT

"Beating" or "heterodyning" refers to amplitude modulation when two signals at different frequencies are mixed. Interferance between the waveforms alternates from constructive (in phase) to destructive (out of phase). You can liken the result to a tremolo with the modulation LFO frequency equal to the difference in frequency between oscillators 2 and 3. OSC3 is built around this effect.




Even Beating
440Hz
-2Hz
+2Hz
880Hz
-2Hz
+2Hz
1760Hz
-2Hz
+2Hz
frequency (log)
Scaled
440Hz
-2Hz
+2Hz
880Hz
-4Hz
+4Hz
1760Hz
-8Hz
+8Hz
frequency (log)
Chord (note values will change under quantization)
A3
F3
C4
A3
D3
E4
A3
A2
A4
Clock
UNITY
2Hz
-1Hz
+1Hz
x4
x5
x3
x6
x2
x7
x1
x8

The manner in which oscillators 2 and 3 and spread from oscillator 1 can be set to one of 4 modes: *(1) even*, *(2) scaled*, *(3) chord*, and *(4) clock*. The maximum frequency spread increases through the modes.

1. The beating frequency does not change with pitch, which to the ear sounds like a larger spread with lower frequencies. The beat output can be used as a steady clock.
2. The beating frequency scales with pitch, making the percieved detune amount even across all pitches and giving a sound reminiscent to classic detuned oscillators.
3. The oscillators are spread out into chords, scaling to the root note and also staying constrained to the chosen quantization. Note that when the root pitch as set by COARSE is below C3, the chordal voices (oscillators 2 and 3) transpose into a higher register while the center pitch (oscillator 1) is allowed to stay in the lower register. If the chord is pulled to the center pitch with the UNITY input, the transposition is preserved. This is implemented to combat muddy chord voicings and provide the opportunity explore bi-timbral patching.
4. The beating frequency is controlled by an external clock at the UNITY input. The spread control acts as a clock multiplier for the input.

OCT

The up and down arrows can be used to offset the coarse knob some number of octaves, much as you would find on a traditional keyboard synthesizer. The maximum octave offset is 4 octaves up from the lowest register.

This affects the range of the octave drop with when the OCT ⊓ input is high. In the lowest octave, the drop is a single octave. Press the up arrow, and the drop will be two octaves, again and the drop will be 3 octaves, etc.. This allows you to rhythmically toggle between a bass tone and a higher pitched lead with a gate sequence.

LVL S+H

When SH functionality is enabled, the 2 LVL and 3 LVL inputs are sampled and held synchronously with oscillator 1. This will only have an effect when audio-rate signals are patched into one or both of the level inputs.