NEON FLUX Plug-In Manual

Multi-Cycle Wavetable Synthesizer

version 1.0

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Overview

NEON FLUX is a polyphonic wavetable synthesizer designed to deliver customizable and evolving timbres. The core feature multi-cycle wavetable allows user to put different waveforms in their desired sequence and produce unique evolving textures.

Unlike traditional static wavetable synthesis, NEON FLUX morphs in two dimensions – between samples in the same wavetable and between different wavetables. By dragging and dropping basic waveforms onto the main display, a "Wavetable Sequence" is created. The built in LFO proceeds to scan through the sequence to create evolving sound, while constantly stays updated to the newest wavetable sequence.

Other synth features involve addable layers of sub-oscillator, Frequency Modulation (FM), ADSR envelop, detune, and reverb.

System Requirements

- **Operating systems:** macOS 10.13 or newer / Windows 10 or newer
- **Format:** VST3, AU.
- **Host platform:** Any VST3/AU compatible DAW.

Signal Flow
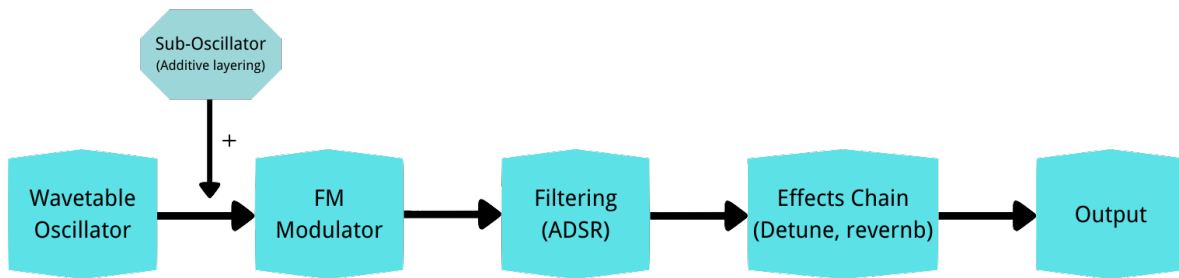
1. **Wavetable Oscillator:** Source of sound. Linear interpolation is implemented between the wavetable samples and between user-selected waveforms.
2. **Sub-Oscillator:** An additive layer that generates frequency one octave lower than the pitch played to produce fuller timbre.
3. **FM Modulator:** Add phase modulation to samples using input frequencies as carrier frequencies.
4. **Filtering/Envelope:** Amplitude modulation through ADSR envelope.
5. **Effects Chain**: Effects include the reverb effect and detune effect that's applied to the right channel to create fake stereo width.
6. **Output:** Main output for the final processed signal.

MIDI Input

NEON FLUX is designed to be played using both computer keyboard and external MIDI device.

- **Computer Keyboard:** You can trigger the on-screen piano using computer keys. NEON FLUX retains keyboard focus while you are adjusting parameters, ensuring uninterrupted performance.
- **External MIDI in DAW:** Simply route your MIDI controller to the track with NEON FLUX loaded. No internal routing is required.

The Wavetable Interface

The interactive wave sequence display locates at the center of NEON FLUX.

Wave Sequence Display

The large window at the center will show you current wavetable sequence, which starts empty with a message "Drag Waveforms Here". The synthesizer will cycle through every wave displayed in this window.
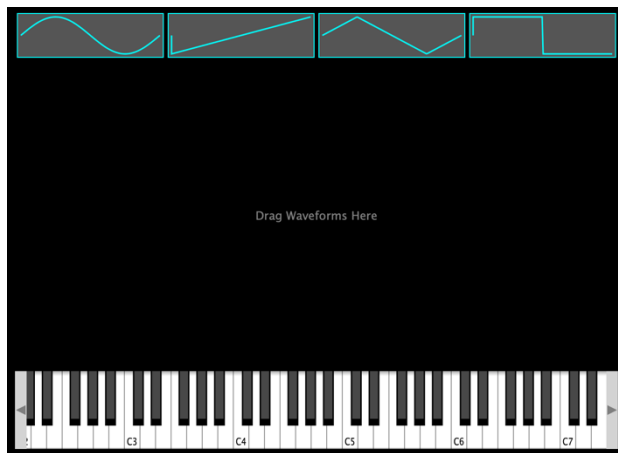

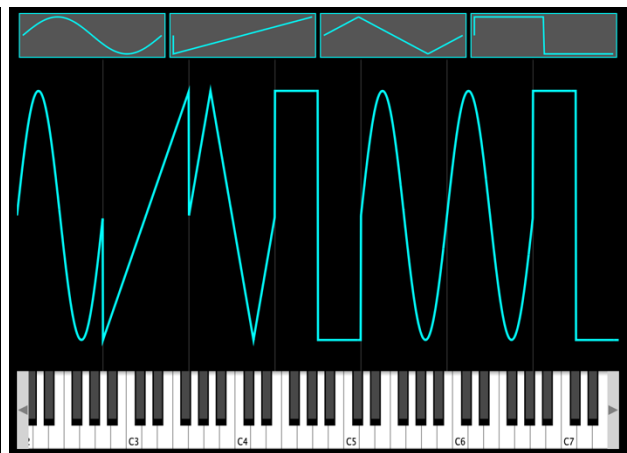*Figure 2 Empty main wave sequence display window*   *Figure 1 Main display window with customized wave sequence*

- **Drag & Drop:** To build sound, click and drag the **<u>Wave Icons</u>** located at the **top of the interface** into the window display.
- **Wave Sequencing:** You may arrange more complex patterns by creating different permutations of the waveforms provided. There is no limitation on the total length of waveform sequence and the time each waveform can appear.
- **Reset:** To reset the wavetable sequence, **<u>right-click</u>** anywhere on the display window.

Parameter Controls

ADSR Envelope

The envelope controls how a sound's volume change over time using four stages: Attack, Decay, Sustain, and Release.

- **Attack:** The time it takes for the sound to **reach full volume** from total silence after a note is triggered.
- **Decay:** The time it takes for the sound to drop from its peak volume to the sustain level.
- **Sustain:** The volume level the sound is held at while a key is pressed down.
- **Release:** The time it takes for the sound to fade out completely after the key is released.
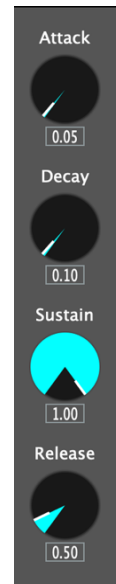

Figure 3 ADSR Envelop

Sub-Oscillator

A bass layer that adds in parallel to the main wavetable output. The sub-oscillator wave is one octave lower than the current pitch. It's useful for keeping the low-end sounds fuller while the main window waveforms cycle and changes.
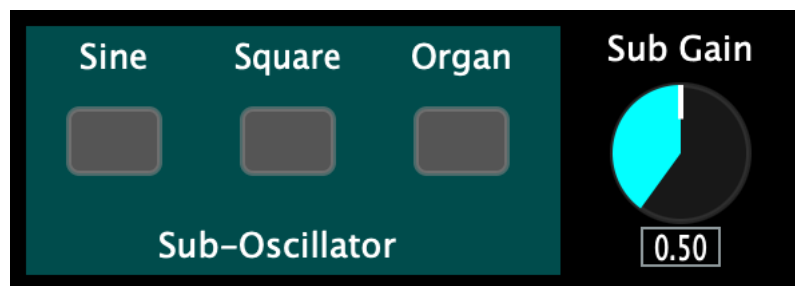

Figure 4 The Sub-Oscillator parameter section

- **Sub-Oscillator Type Buttons:**
  - **Sine:** Sine wave bass. Clean texture.
  - **Square:** Square wave bass. Punchy texture.
  - **Organ:** A complex tone mixing sine and square waves. Rich texture.
- **Sub Gain:** Controls the **volume** of the Sub-Oscillator independently.

LFO Modulation

LFO Rate knob controls the speed at which the wavetable sequence is scanned through.

- **Low LFO Rate:** Slow, evolving pads.
- **High LFO Rate:** Fast wobbles.

Figure 5 LFO Rate control knob

Frequency Modulation (FM)

FM synthesis section adds rich harmonics and dynamic timbres to the signal.

- **Mod Phase:** Controls the "**Depth**" or intensity of the modulation. Turning this up adds metallic, bell-like or aggressive textures to the signal.
- **FM Amt:** Controls the **ratio** of the modulator. Changing FM Amt changes the "flavor" of sound that FM affects.
  - o **0 value:** The modulator is **silent**. The output signal is unaffected.
  - o **Low value:** The modulator slightly moves the carrier's phase. You may hear little movement or **vibrato**.
  - o **High value:** The modulator aggressively moves the carrier's phase back and forth, **creating new harmonics** that makes the sound brighter and harsher.
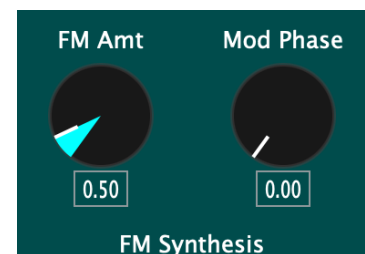

Figure 6 FM modulator control section

Width (Detune)

Create a sense of stereo field by slightly tuning off the pitch of the right channel.

- **0%:** Mono, center focused.
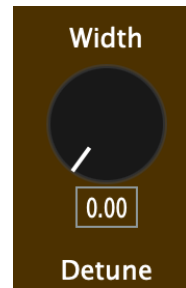- **100%:** Wide stereo image with pitch drifting slightly.

Figure 7 Width control knob

Reverb

- **Room Size:** Simulates different size of acoustic space, from small room to massive hall.
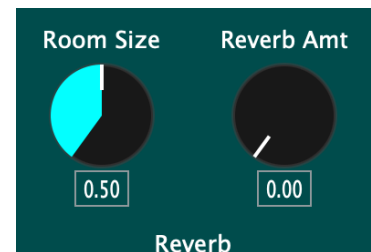- **Reverb Amt:** The Dry/Wet mix. 0% is dry. 100% is full reverb wash.

Figure 8 Reverb control section

Global Controls

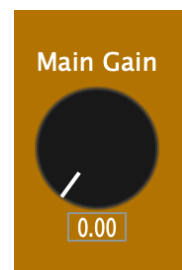- **Main Gain:** Master output volume.

Figure 9 Main Gain control

Credits

NEON FLUX

- **Concept & Design:** Emma Wang
- **DSP Programming:** Emma Wang
- **GUI Design:** Emma Wang
- **Development Framework:** JUCE

Special thanks to the Audio & Music Engineering Department at the University of Rochester.