The Höller Synthesizing Manual v2 ANSI COMPLIANT

The Höller Synthesizer is a state-of-the-art frequency modulation instrument intended for use by the general public. It was born out of a group of young men's collective yearning for a higher purpose. The kind of calling that sends sailors over the stearn, or possesses scientists to pursue the secrets of nature that might beget eternal life. Allow us to begin:

Overview

The Höller is a 12-voice polyphonic FM synthesizer with support for two modulating voices and a single signal voice. Each signal has a set of parameters that can be fine-tuned via the GUI, allowing users to meticulously craft the texture and timbre of their notes.

Fig. 1: Take note of the intuitive layout of the synthesizer. On the left hand side, we see the parameters and knobs showing the current state of the first modulator. This wave will be applied to the second modulating signal, which will finally be applied to the carrier signal. This "chain" of signals allows the user to create complex sounds.

Using the Höller

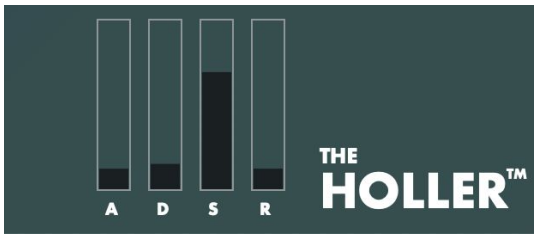
If you have not already installed the prerequisites for our project, go to our GitHub page, install the necessary software, and then follow the installation steps. If everything goes well, you now only need to get the Höller open in your DAW of choice. If you do not have a DAW, Reaper is freely available for non-commercial use, and has been tested with our synth.

If you are on MacOS or Unix, you should be already set to open the synth as a plugin instrument in your DAW. On Windows, however, you will need to manually copy the make-generated .vst file into "$DISK$/Program Files/Common Files/VST3", where $DISK$ refers to the name of your main disk drive.
Finally, open your DAW. The specifics of opening the plugin will depend on the DAW that you are using, but you should be able to insert a new instrument. Now simply select the Höller from the list of available plugins, and start synthesizing. You can use either a hardware MIDI instrument or use a virtualized keyboard roll within your DAW to provide input to the synth.

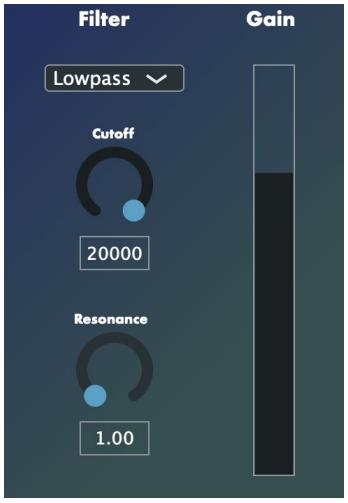
Signal Flow

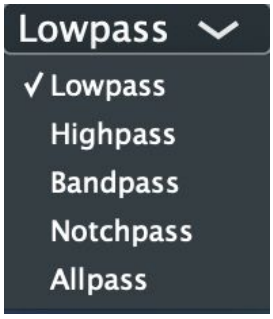
The signal flow follows from left to right. The leftmost modulator signal is used to modulate the frequency of the second modulator. This signal is then said to the right most carrier signal.This signal is then modulated by the ADSR envelope and then finally passed through the filter and gain.

Global Parameters



1. ADSR - manipulates the volume of the signal over time.
   - Attack: The time it takes for the signal to rise to its highest volume.
   - Decay: The time it takes for the signal to reach its sustain volume.
   - Sustain: The volume of the sustain portion of the signal.
   - Release: The time it takes for the signals volume to hit zero after a key has been released.





2. FILTER and GAIN - Used to remove user-specified frequencies from the synthesiser.
   - Filter Type: A dropdown menu with various types of filters
     - See https://en.wikipedia.org/wiki/Audio_filter for more information.
   - Cutoff: The starting frequency in which the filter will start to take effect.
   - Resonance: Additional amplitude control at the cutoff frequency.
   - Gain: Controls the overall volume of the signal outputted to your speakers.

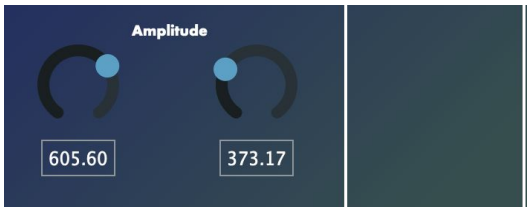
FM Parameters

1.Wave Types: Sine, Square,Triangle, Sample-and-Hold Noise, and Saw. These are standard waves with very disparate textures, so experimentation is encouraged.

- Known Issue: Triangle Wave is Broken

2. Octave Change - changes the octave of each voice.
   - Carrier Octave Change - simply a multiple of the note being pressed down on the keyboard.
   - Modulator Octave Change (First 2): Some multiple of the carrier's frequency. If 0, signal is bypassed, if negative, multiplied by the negated reciprocal.

3. Detune - Fine grain control on changing the current frequency of the modulator signal. Measured in Hz. Note: no detune for the carrier signal (yet!).



4. Amplitude (of Modulator Signals) - Increases the amplitude of modulation signals. Perceptually, this increases the harmonics of the final output signal.