

# Helm Manual



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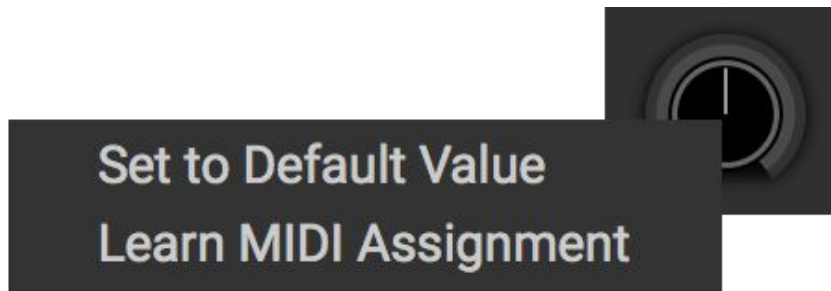
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# General Usage

## Default Values

Double click on a knob or slider to return to its default value.

## Midi Learn



1. Right click on a knob or slider.
2. Click "Learn MIDI Assignment"
3. Change a value on your MIDI device. That MIDI control is now mapped to that knob/slider.

## Turn a Module On and Off

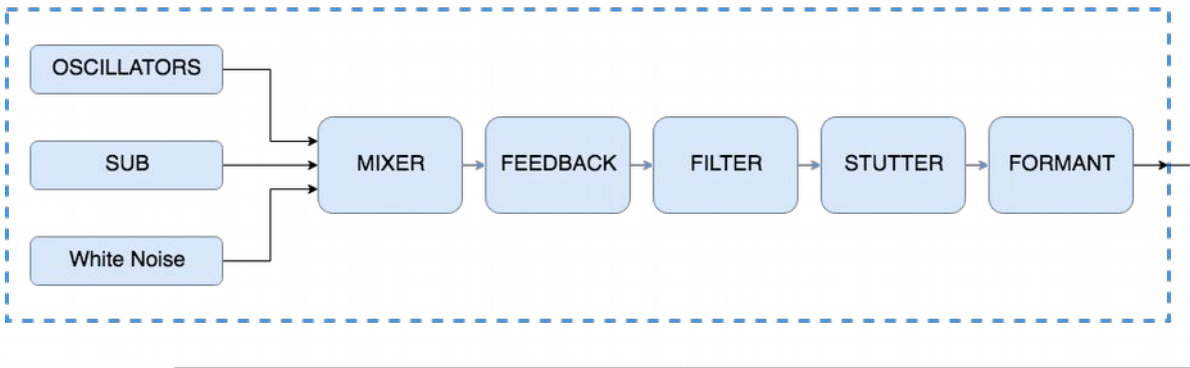
You can turn some modules on and off. They have little power buttons in the top left that you can click to turn them on or off. *Below: Off(left) On(right)*



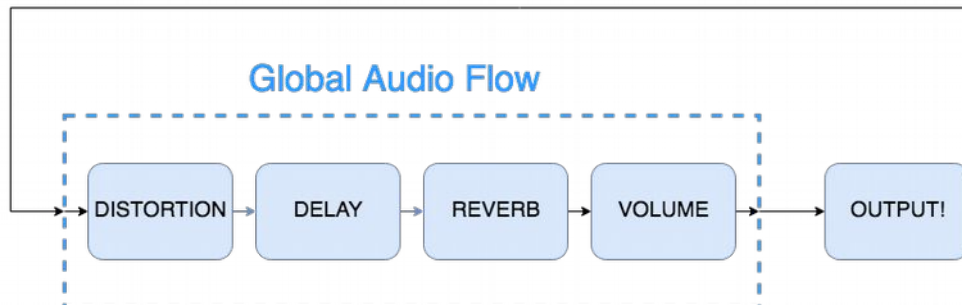
# Audio Modules



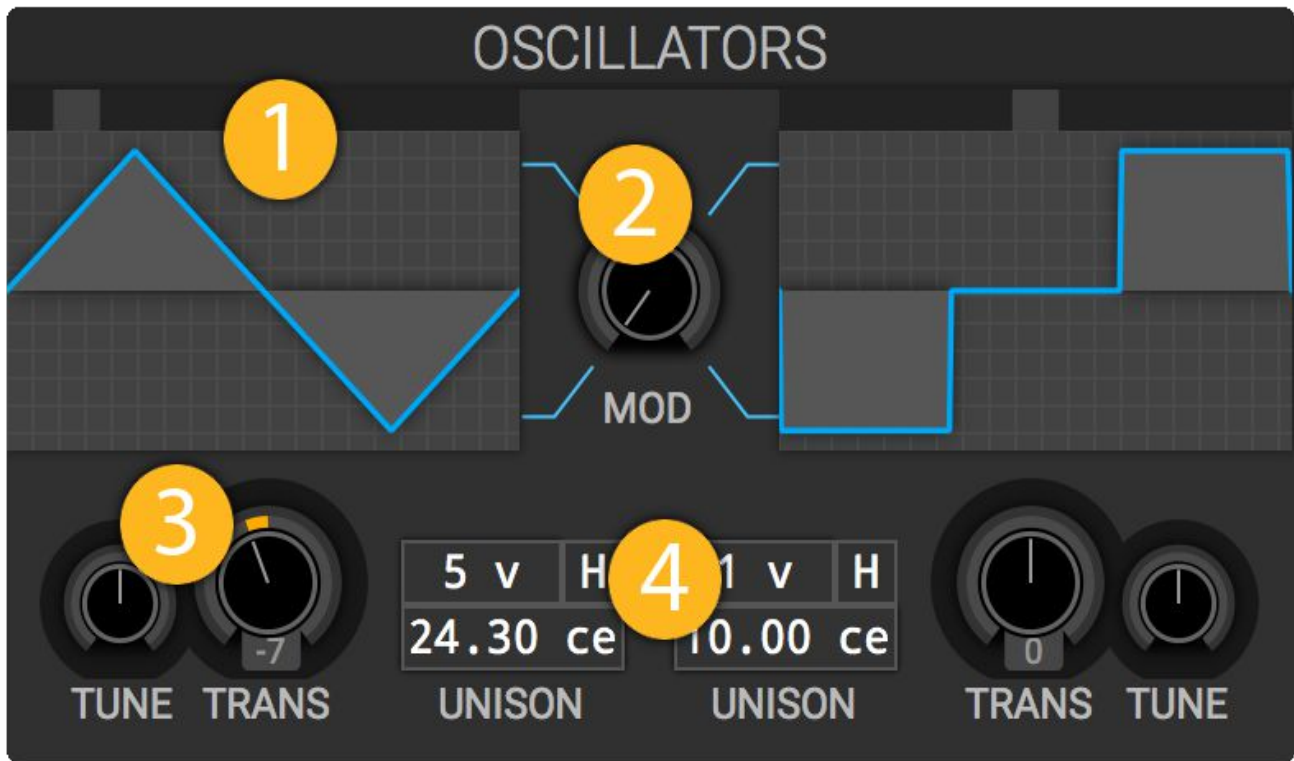
## Voice Audio Flow



## Global Audio Flow



# OSCILLATORS



The OSCILLATORS module is one of the three sound producers in Helm. There are two oscillators in this module with duplicate controls.

## 1. Waveform selector

The waveform selector sets the timbre of the oscillator. The available waveforms in order are: *sine, triangle, square, saw up, saw down, 3 step, 4 step, 8 step, 3 pyramid, 5 pyramid, 9 pyramid.*

Usage: left mouse click will advance waveform, right mouse click will go to the previous waveform.

## 2. Cross Modulation

Cross modulation is a way to change the timbre of the oscillators. The left oscillator modulates the phase of the right oscillator and the right oscillator modulates the tone of the left oscillator. The oscillators are simplified to a sine wave before the modulation is applied.

## 3. Tune/Transpose

TUNE and TRANS set the pitch of each oscillator relative to the note played. The TRANS sets how many semitones to change pitch and TUNE sets how many additional cents (1/100 of a semitone) to change the pitch.

Example: If you play a C3 and the right oscillator TRANS is set to 7 semitones, it will play a G3.

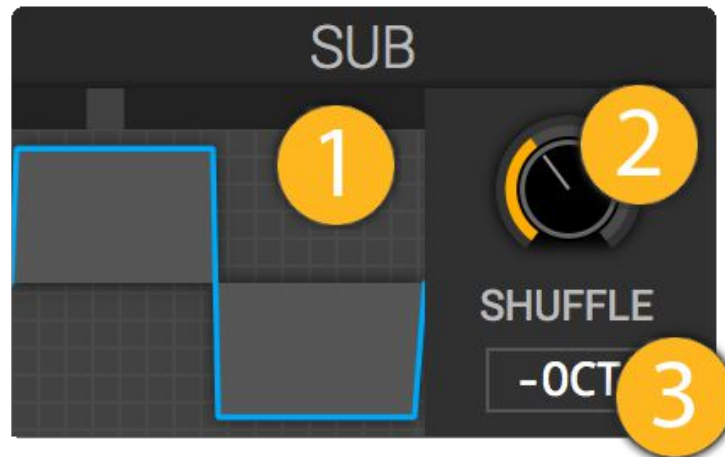
## 4. Unison

Unison creates multiple instances of the left and right oscillator. The top left controls the number of voices or oscillator instances. The bottom controls the span of frequencies the oscillators get.

For example: if you have 5 voices and a detune of 10 cents, the first oscillator is detuned -10 cents, the second: -5 cents, the third isn't detuned at all, the fourth: 5 cents and the fifth: 10 cents.

The 'H' control stands for harmonize. If selected, each voice of the oscillator will play a harmonic of the played note. This creates a very harmonically rich tone.

## SUB



The SUB module is one of the three sound producers in Helm. It controls a single oscillator that by default plays one octave below the currently played note.

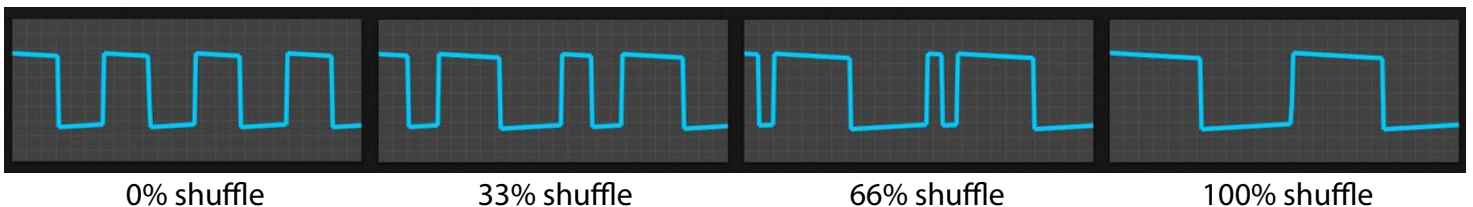
### 1. Waveform selector

The waveform selector sets the timbre of the oscillator. The available waveforms in order are: *sine, triangle, square, saw up, saw down, 3 step, 4 step, 8 step, 3 pyramid, 5 pyramid, 9 pyramid.*

Usage: left mouse click will advance waveform, right mouse click will go to the previous.

### 2. Shuffle

The sub oscillator has a wave shaper called SHUFFLE that is similar to a pulse width control. When shuffle is 0%, the oscillator plays normally. As you increase shuffle, the sub oscillator lengthens and shortens every other waveform.

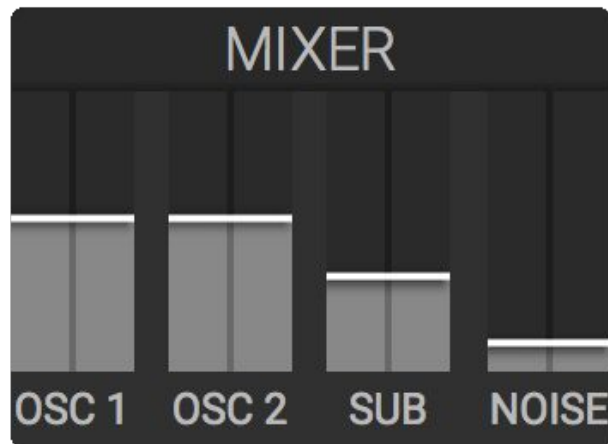


### 3. Octave Down

The -OCT button will shift the sub oscillator down an extra octave (total of two octaves below the note played).



## MIXER



The MIXER module controls the gain of each oscillator sound source and a white noise source. OSC 1 and OSC 2 control the gain of the left and right oscillator in the OSCILLATORS module. The SUB controls the gain of the oscillator in the SUB module. The NOISE controls the gain of a white noise oscillator. These signals are then combined in the MIXER and passed into the FEEDBACK module.

# FEEDBACK



The FEEDBACK module is a very quick delay line/comb filter inserted into each voice. It harmonizes with the note currently played so it is useful for modifying the harmonics and timbre of a given note.

## 1. Transpose

The transpose changes the delay period by an amount of semitones. This will make the feedback effect modify different sets of harmonics.

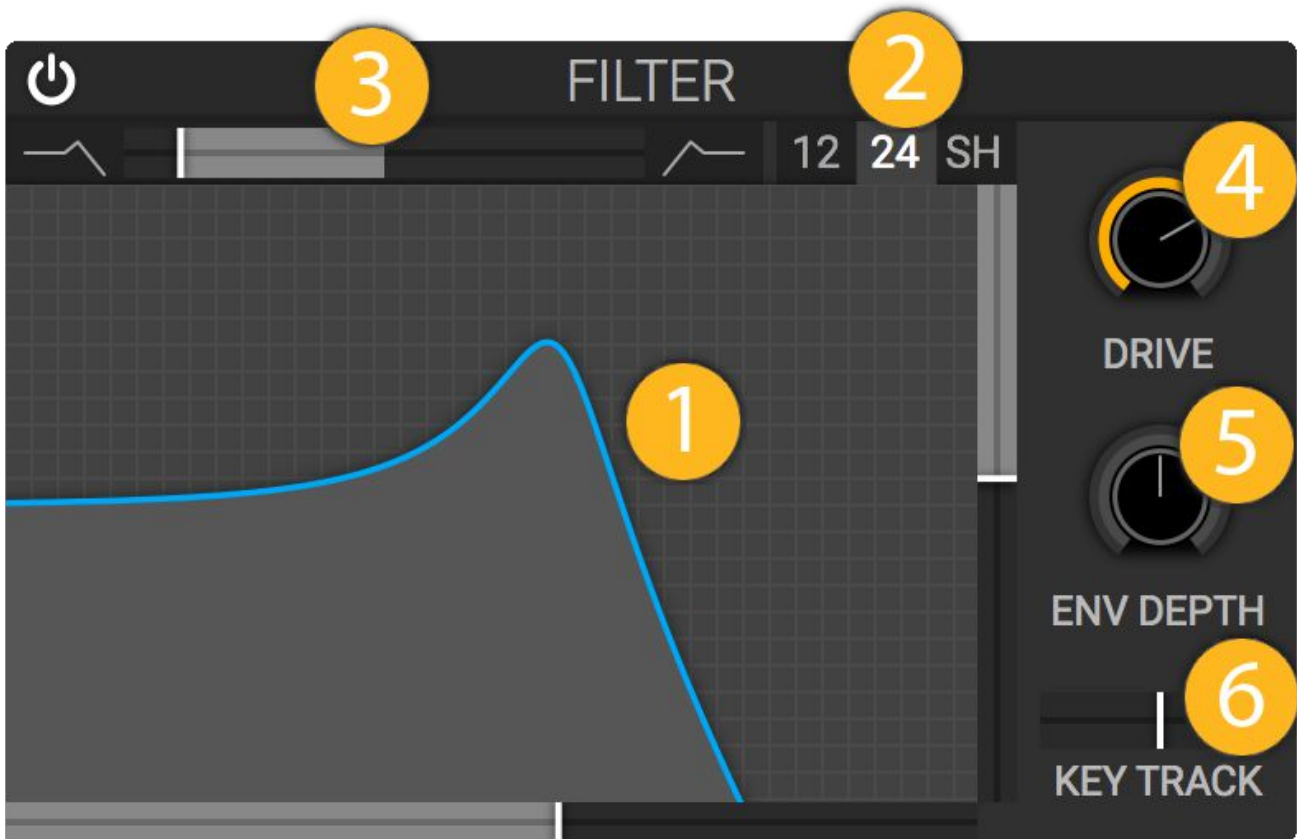
## 2. Tune

The tune changes the delay period by an amount of cents (1/100 of a semitone). This slightly modifies the effect on each harmonic.

## 3. Amount

The amount sets the delay line feedback. Positive and negative feedback amounts will emphasize and reduce different harmonics. At zero, the effect is off. The farther from zero the amount is, the stronger the feedback effect.

## FILTER



The Filter module reduces or boosts different frequencies in each playing voice. Each type of filter has different characteristics.

### 1. Filter Response

The **Filter Response** section graphs which frequencies are boosted and which are reduced. The x-axis displays the frequency and the y-axis displays changes in the loudness of that frequency.

The slider on the bottom controls the **Cutoff Frequency** measured by semitones. You can shift the filter response up and down the frequency spectrum with the **Cutoff Frequency** slider.

The slider on the right controls the **Resonance** or **Gain** depending on the **Filter Type**. The resonance will set how much the frequencies are boosted *around* the **Cutoff Frequency** and the **Gain** will set how much the frequencies are boosted *past* the **Cutoff Frequency**.

### 2. Filter Type

At the top right of the filter you can select the **Filter Type**. The available types are: *12db low/band/high pass filters, 24db low/band/high pass filters, low/band/high shelf filters.*

### 3. Filter Blend

At the top left of the filter you can choose between low/band/high versions of the filters. If the **Filter Type** is set at 12db or 24db, you can smoothly blend between low, band and high versions of the filters. If the **Filter Type** is set to shelf, you can discretely set the low, band and high shelf.

The *low pass* filters allow low frequencies through but remove high frequencies. The *band pass* removes low and high frequencies but keeps a section. The *high pass* filters allow high frequencies through but remove low ones. The 24db versions of these filters have a sharper cutoff than the 12db versions, so they have a different sound. The low/band/high *shelf* filters boost or reduce the low/band/high frequencies depending on the **Gain**.

### 4. Filter Drive

The **Filter Drive** sets the initial gain of the input to the filter. The more drive there is, the more distortion the filter adds to your signal in the filtering process.

### 5. Envelope Depth

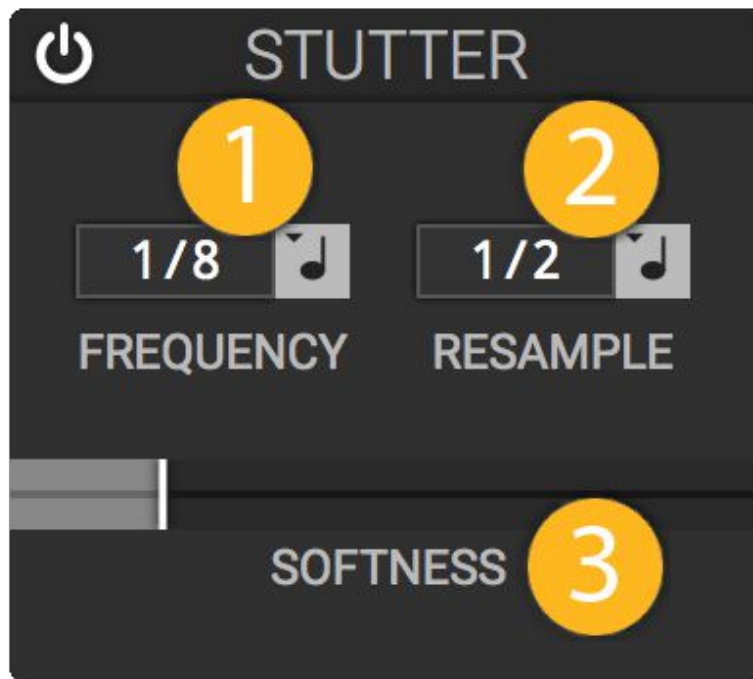
The **Envelope Depth** sets how much the **Filter Envelope** changes the cutoff frequency (x-axis of filter). If positive, the **Filter Envelope** will increase the cutoff, if negative, it will decrease the cutoff.

### 6. Key Track

The **Key Track** makes the filter cutoff of a voice follow the currently played note. If 0, the cutoff remains unchanged. If 100%, every octave up you play the filter cutoff frequency will double. If -100%, every octave up you play the filter cutoff will half.

To make the filter affect the timbre of each note in the same way, set the **Key Track** to 100%.

# STUTTER



The Stutter module samples a section of input audio and repeats it.

## 1. Stutter Frequency

This sets how fast the stutter is, which sets the length of the stutter sample.

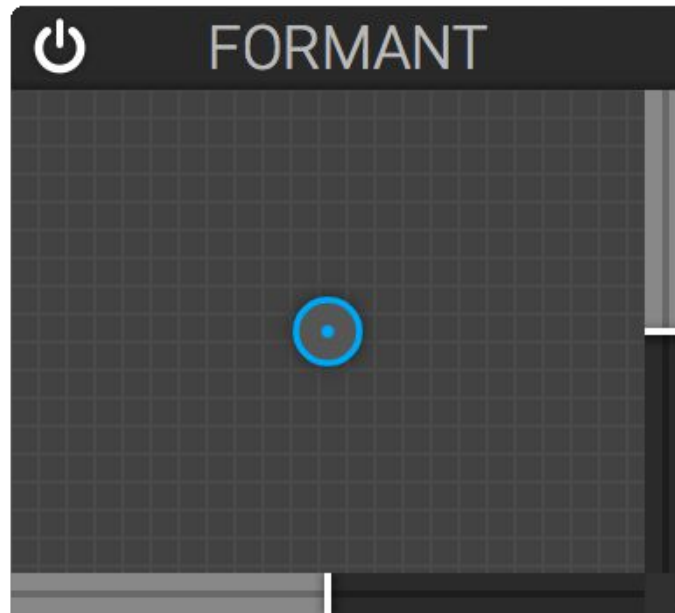
## 2. Resample Frequency

The resample frequency sets how often a new buffer is sampled from the input for a new stutter.

## 3. Softness

The **Softness** sets the fade transition between stutters. At 0%, there is no fade and will immediately jump to the next stutter which may cause a discontinuity click. At 100%, each stutter is windowed by a sine wave and will fade in and out reaching maximum volume at the middle of the stutter.

## FORMANT



The Formant module is a type of filter that sounds like a person's mouth. You can create different vowel sounds by picking different spots in the X/Y pad. The corners of the x/y pad correspond to these vowels:

- Top Left: *ee*
- Bottom Left: *ah*
- Top Right: *eh*
- Bottom Right: *oh*

# DISTORTION



## 1. Distortion Type

This sets the style of the distortion. The types are:

- *Soft Clip* – As the audio reaches clipping, round off to the limit values.
- *Hard Clip* – Clip the audio at the limit values.
- *Linear Fold* – When the audio exceeds the limit values, fold the waveform back into the limits.
- *Sine Fold* – When the audio exceeds the limit values, fold the waveform back into the limits but with a sine function. This adds fewer high harmonics than the *Linear Fold*.

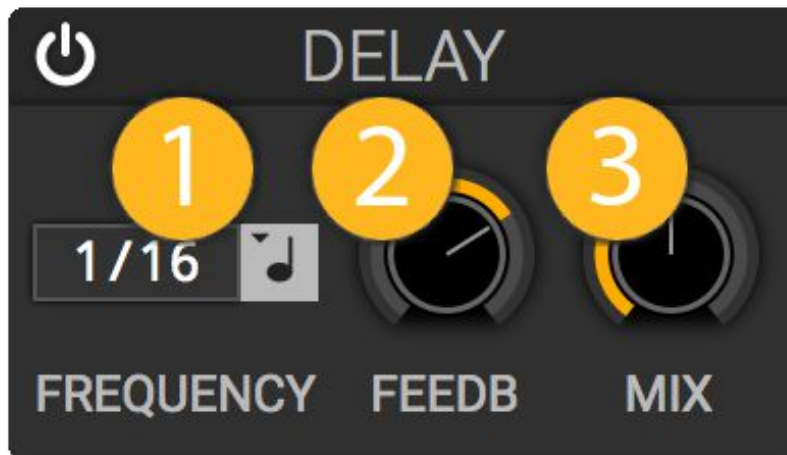
## 2. Drive

The **Drive** is the gain added to the input signal. The more **Drive**, the more distortion.

## 3. Mix

This mixes the original input signal with the distorted signal to create the output. 100% is only the distorted signal, 0% is only the input signal. 50% is half and half.

# DELAY



Delay is essentially an “echo” effect. It will take the input audio and repeat it while reducing the gain of each consecutive repeat.

## 1. Delay Frequency

How fast the delay line is. Faster frequency makes the echo occur more often.

## 2. Feedback

The feedback of the delay line sets the gain change of each echo. If the feedback is near 100% or -100% each echo will only diminish a little bit, so it will create a long effect. If the feedback is near 0% the echoes will diminish very quickly.

## 3. Mix

This mixes the original input signal with the delayed signal to create the output. 100% is only the delayed echo signal, 0% is only the input signal. 50% is half and half.



# REVERB



If you clap inside a large church, the sound will bounce around and you'll hear the remnants of the clap fading away. The Reverb module simulates these audio reflections of a room or space by having many delay lines overlaid upon each other.

## 1. Feedback

The feedback of the reverb line sets the gain change of each echo. If the feedback is near 100%, each echo will only diminish a little bit so it will create a long tail effect. If the feedback is near 80%, the reverb will diminish very quickly.

## 2. Damping

There is a simple low pass filter inside the reverb line. The higher the damping is, the more low pass filter is applied to each echo. This creates a muffled reverb sound.

## 3. Mix

This mixes the original input signal with the reverberated signal to create the output. 100% is only the reverberated signal, 0% is only the input signal. 50% is half and half.

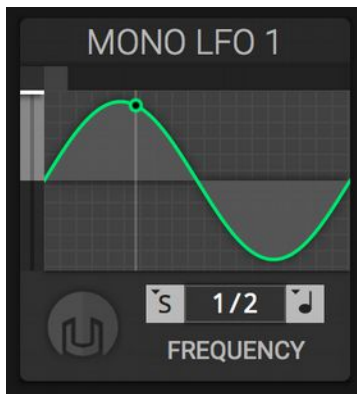
# Modulation



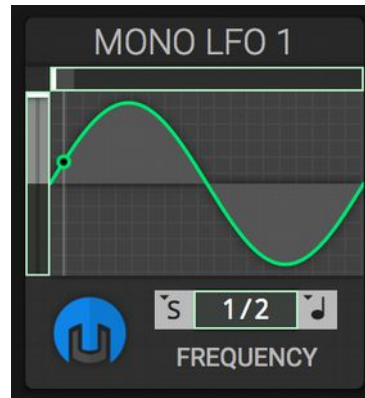
The Modulation modules can change an audio or performance control over time to make dynamic/morphing patches.

## How to Map Modulation

1. Click on the grey Helm logo on a modulation source. The helmet becomes blue to communicate that it is currently selected and ready to modulate.

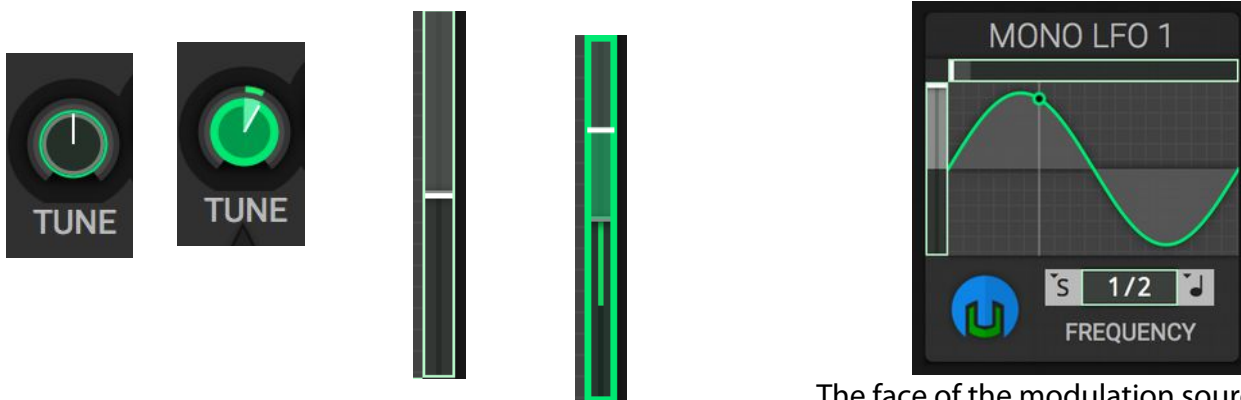


*Before Click*



*Clicked*

2. A green overlay appears on the controls you can modulate. Pick a control and click and drag on it to begin modulating. You can see the current value of the control with the little moving green bar around the outside of knobs or the moving green bar on the inside of sliders. Double click on the slider to remove modulation.



The face of the modulation source turns green to say it is modulating a control.

3. When done, click on the now blue and green Helm logo on the modulation source again. Right click on either the control or the source logo button to bring up a menu to remove the modulation.



*The face stays green to say it is still modulating a control.*

# ENVELOPE



The envelopes in Helm are *ADSR* (*attack*→*decay*→*sustain*→*release*) envelopes. They are polyphonic (one instance per voice) and are useful for bringing in and fading out a value like the amplitude or filter cutoff of a voice.

The **Amplitude Envelope** is automatically hooked up to the amplitude (or loudness) of the voice.

The **Filter Envelope** is automatically hooked up to the filter cutoff and the amount of the effect is controlled by the **Env Depth** control in the **Filter**.

The **Mod Envelope** is an extra envelope you can use for modulation.

## 1. Modulation Button

The modulation button allows you to modify a synth control with the LFO. See **How to Map Modulation**.

## 2. Graphical Envelope

The envelope is drawn in this section and you can see the envelope progress through the stages as you press, hold and release a key. You can also modify the attack, decay sustain and release by clicking and dragging in this section.

## 3. ADSR Sliders

This is where you set the envelope values. A – attack, D – decay, S – sustain, R – release. The graphical envelope to the left will change to match the slider settings.

## How to Use the Envelope:

The different stages of the envelope are set based on the current key press that corresponds to the voice.

As an example we'll look at how the **Amplitude Envelope** affects the loudness of a voice over time.

### **A**    **Attack**

The envelope start is triggered when a key is pressed which brings it into the *attack* phase. The *attack* slider determines how long the envelope takes to reach full value. If you have a short attack on your amplitude envelope, the volume of the voice will start loud. If you have a long attack, the voice will fade in over a period of time.

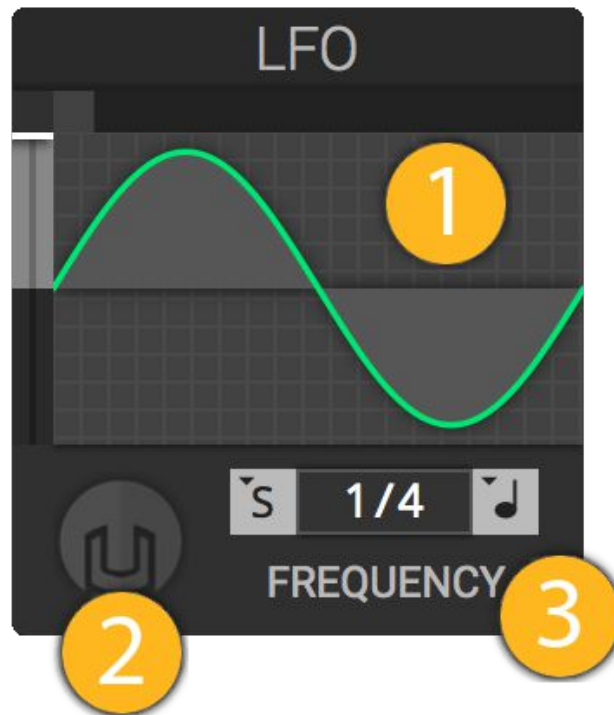
### **D/S**    **Decay / Sustain**

Once the envelope reaches full value, if the key is still held down, the value will fade to the **Sustain** value. How long this takes is specified by the **Decay**. Once the value reaches the sustain value, it stays there until the performer releases the key.

### **R**    **Release**

Any time the key for a voice is released, the state will jump to the **Release**, which fades the value to 0 over time. A short value will kill the voice quickly. A long value will fade the voice out slowly.

# LFO



LFO stands for low frequency oscillator. The value of an LFO pulses back and forth in a pattern determined by the Waveform. You can use an LFO to create vibrato by modulating Oscillator Tune controls, tremolo by modulating sliders in the Mixer or global Volume, or wub-wubs by modulating the Filter Cutoff.

## 1. Waveform Selector

The **waveform selector** sets the timbre of the oscillator. The available waveforms in order are: *sine, triangle, square, saw up, saw down, 3 step, 4 step, 8 step, 3 pyramid, 5 pyramid, 9 pyramid.*

Usage: left mouse click will advance waveform, right mouse click will go to the previous. The current position is shown on top of the waveform.

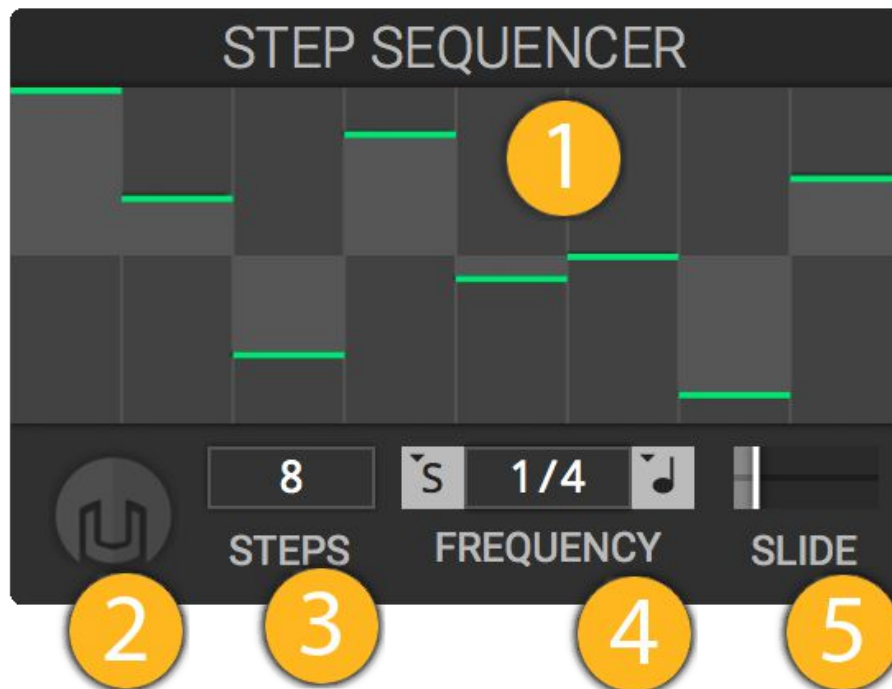
## 2. Modulation Button

The **modulation button** allows you to modify a synth control with the LFO. See **How to Map Modulation.**

## 3. Frequency

The frequency controls how fast the LFO pulses. On the right is the frequency control type where you can select *Seconds, Tempo, Tempo Dotted, Tempo Triplets.*

## STEP SEQUENCER



The Step Sequencer is a modulation source that cycles through a series of steps.

### 1. Step Sequence

You can set each step in the sequence here.

### 2. Modulation Button

The **modulation button** allows you to modify a synth control with the LFO. See **How to Map Modulation**.

### 3. Number of Steps

This determines the step sequencer length. Sets how many discrete steps you can set and cycle through.

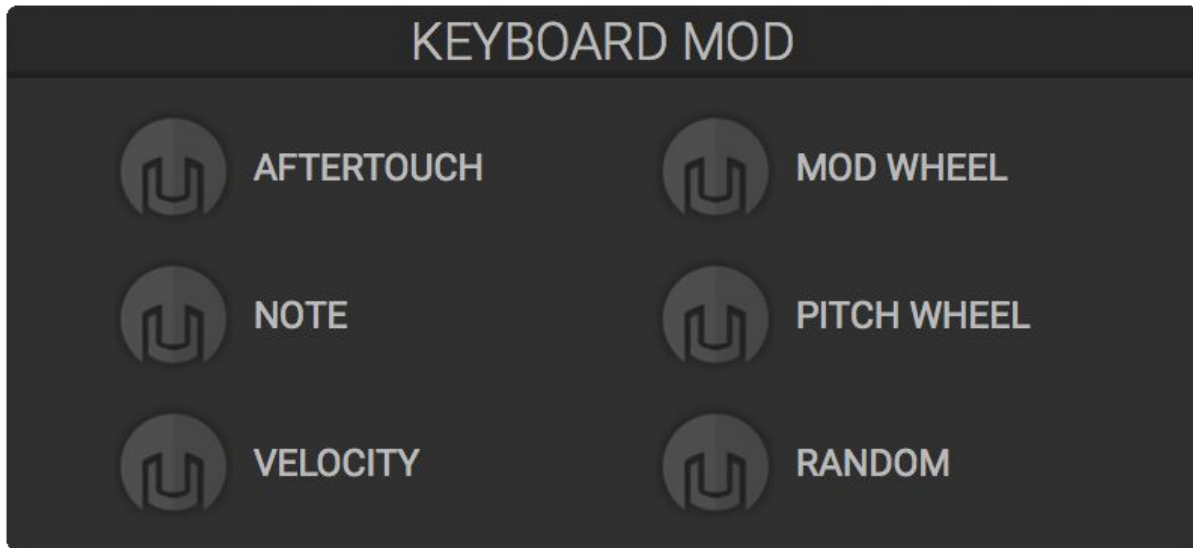
### 4. Frequency

Controls how fast the Step Sequencer advances. On the right is the frequency control type where you can select *Seconds*, *Tempo*, *Tempo Dotted*, *Tempo Triplets*.

### 5. Slide

Smooths out the value the step sequencer gives. At 0, there is no smoothing and the value jumps each step. With positive values, the value decays toward the current step smoothly.

# KEYBOARD



## Aftertouch

With aftertouch enabled keyboards you can map the pressure of the key to modulate a value. If using a non-aftertouch keyboard, the velocity pressed is used instead.

## Note

How far up or down the keyboard the note is. MIDI note 0 gives a value of 0 and MIDI note 127 gives a value of 1.

## Velocity

How fast you hit the key. This only works on velocity enabled keyboards.

## Modulation Wheel

The current value of the modulation wheel on a MIDI keyboard.

## Pitch Wheel

The current value of the pitch wheel on a MIDI keyboard.

## Random

Every time a key is pressed, this will generate a random value that you can map.



# Performance and Other Usage

The image displays the 'Formant X' synthesizer interface, organized into several functional sections:

- Header:** Includes a logo, a name field 'Formant X' with a value of '0.500', and buttons for 'SAVE', 'EXPORT', and 'BROWSE'. A 'VOLUME' meter and a waveform display are also present.
- OSCILLATORS:** Features a modulation graph and a 'MOD' knob. Below are two oscillator sections, each with 'TUNE' and 'TRANS' knobs, and 'UNISON' settings (5 v H, 24.30 ce and 1 v H, 10.00 ce).
- FEEDBACK:** Contains 'TRANPOSE', 'TUNE', and 'AMOUNT' knobs.
- FILTER:** Includes a filter curve graph, 'DRIVE' and 'ENV DEPTH' knobs, and a 'KEY TRACK' button.
- STUTTER:** Features 'FREQUENCY' (1/8) and 'RESAMPLE' (1/2) settings, and a 'SOFTNESS' knob.
- DISTORTION:** Includes a 'sft clip' knob and 'TYPE', 'DRIVE', and 'MIX' settings.
- DELAY:** Features a 'FREQUENCY' (1/16) knob and 'FEEDB' and 'MIX' settings.
- FORMANT:** Includes a 'FORMANT' knob and 'FREQUENCY', 'FEEDB', and 'MIX' settings.
- REVERB:** Features 'FEEDB', 'DAMP', and 'MIX' knobs.
- MIXER:** Includes a 'SHUFFLE' knob and a '-OCT' button. Below are 'OSC 1', 'OSC 2', 'SUB', and 'NOISE' level meters.
- AMPLITUDE ENVELOPE:** A graph with 'A', 'D', 'S', and 'R' stages.
- FILTER ENVELOPE:** A graph with 'A', 'D', 'S', and 'R' stages.
- MOD ENVELOPE:** A graph with 'A', 'D', 'S', and 'R' stages.
- MONO LFO 1 & 2:** Each has a frequency knob (1/2 and 1/4) and a 'FREQUENCY' label.
- POLY LFO:** Has a frequency knob (1/4) and a 'FREQUENCY' label.
- STEP SEQUENCER:** Includes 'STEPS' (8) and 'FREQUENCY' (1/4) settings, and a 'SLIDE' button.
- KEYBOARD MOD:** Includes buttons for 'AFTERTOUCH', 'MOD WHEEL', 'NOTE', 'PITCH WHEEL', 'VELOCITY', and 'RANDOM'.
- Bottom Row:** Features 'VOICES' (4), 'PITCH BEND' (2), and 'VEL TRACK' knobs. A piano roll shows notes on C2, C3, C4, and C5. On the right, there are 'PORTA' (OFF), 'PORTA TYPE' (AUT), and 'LEGATO' (ON) settings.

## Info and Mini Patch Browser



The Info and Patch Browser section give you info and global settings and ways to save, export and browse patches.

### Info Button

Clicking the Helm logo will bring up the **Info Panel** that will give you some global settings and share information about Helm including the version and developer.

### Mini Patch Browser

You can advance or go back a patch in the currently browsed folder by clicking the left and right arrows.

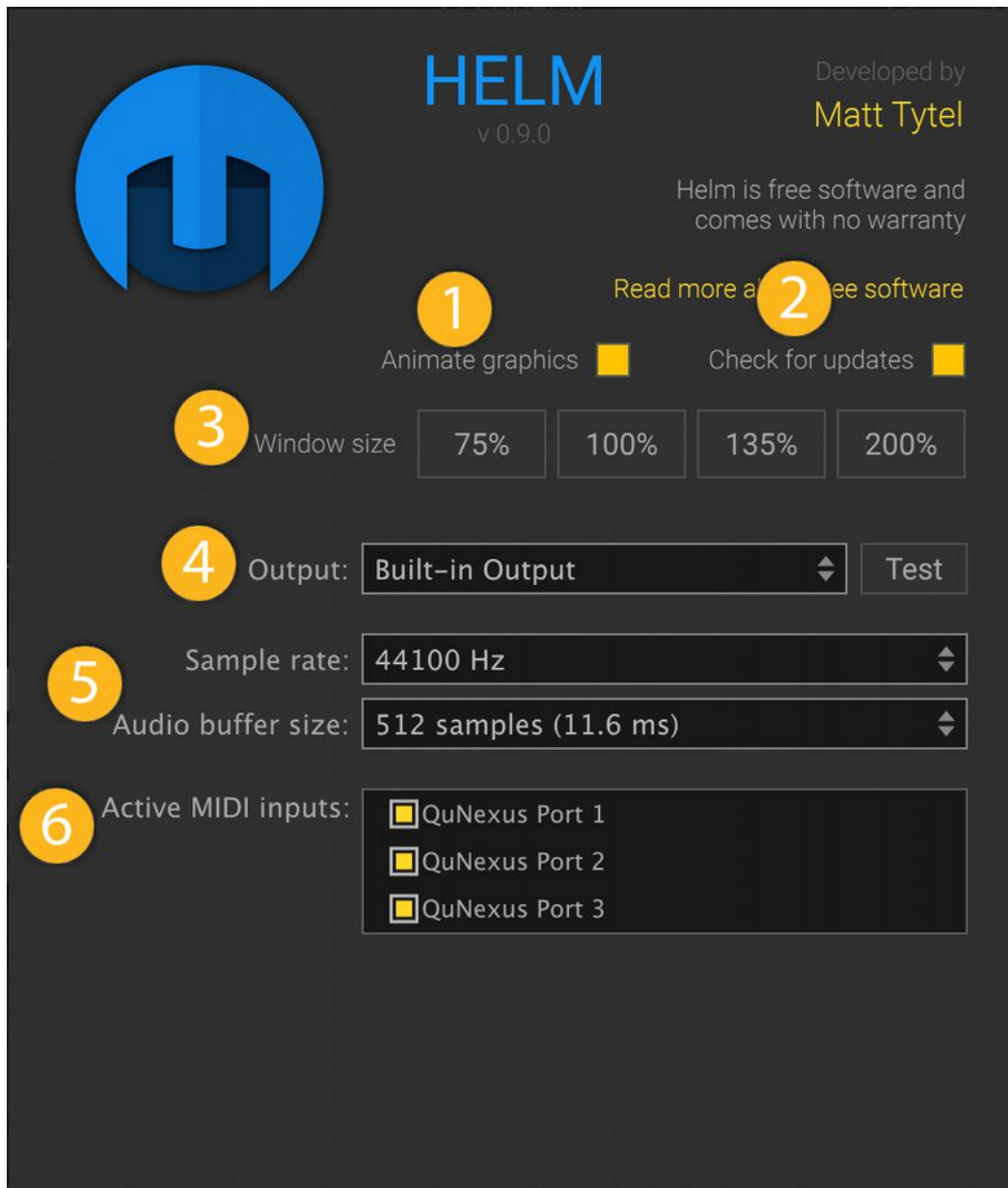
The **Save** button will bring up the Save Panel so you can save your patch for later use.

The **Export** button will save the current patch to a ".helm" file that you can save anywhere you want.

The **Browse** button will bring up the **Patch Browser Panel** for full window browsing.

You can right click on the patch information and click for a menu to load the Init Patch (the default settings).

## Info Panel



### 1. Animate Graphics

If enabled, **Animate Graphics** will animate the oscilloscope, envelopes, lfos, and modulation meters to give you real-time feedback.

### 2. Check for Updates

If enabled, **Check for Updates** will see if a new version of Helm is released and will ask you if you want to update.

### 3. Window Size

Sets how large the Helm window is by a percentage of the default size.

### 4. Audio Output

*Standalone only.* Select the audio device where you want to output audio.

### 5. Sample Rate / Buffer Size

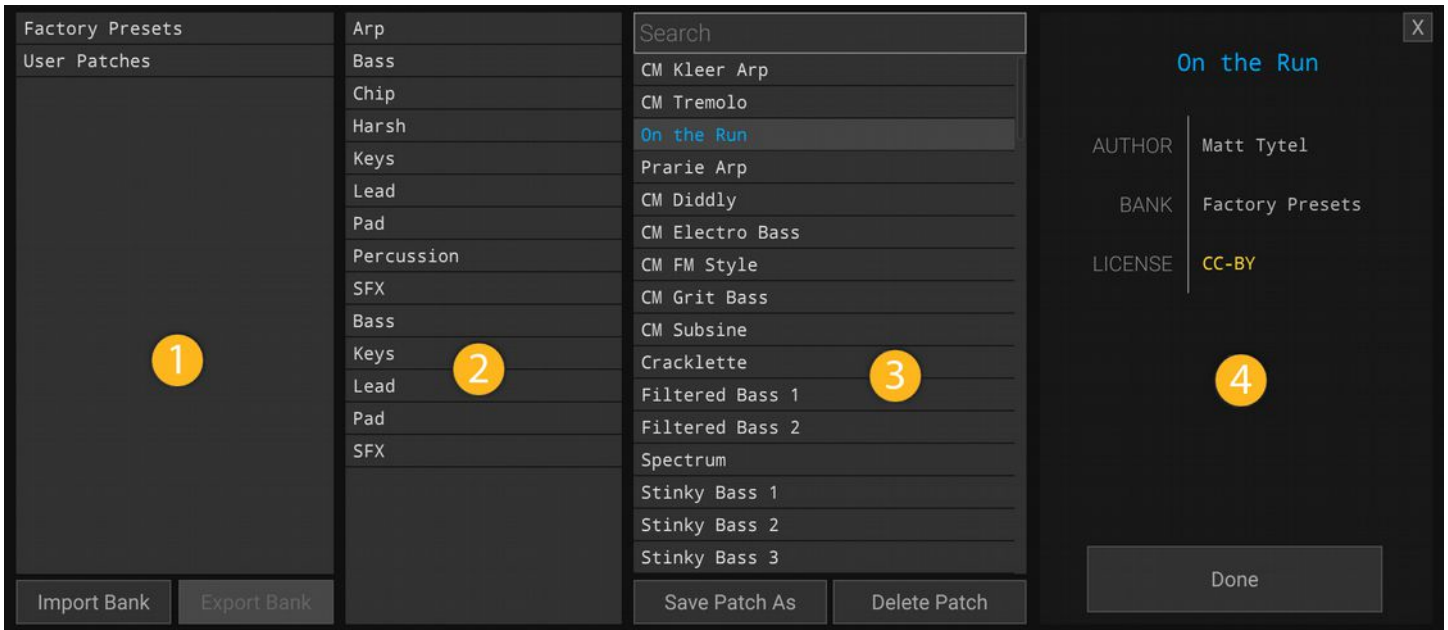
The **Sample Rate** defines how many audio samples are processed per second. The higher this is, the more CPU processing Helm will use.

The **Buffer Size** defines how large each chunk of data Helm should process at one time. The smaller this is, the less delay Helm has. At very small buffer sizes, Helm's CPU usage will increase.

### 6. Active MIDI Inputs

Select what MIDI inputs you want Helm to receive data from.

# Patch Browser Panel



The patch browser lets you browse all available patches/presets. Click **Done** in the bottom right or click outside the patch browser to close it.

## 1. Banks

The top level folders for all the patches are the **Banks**. You can import banks that have the extension “.helmbank”. You can export banks and share them with other people. To browse a bank, click on it.

## 2. Folders

The next level deep are the **Folders**. All patches are contained within a folder here. You can select multiple Folders to browse in this section.

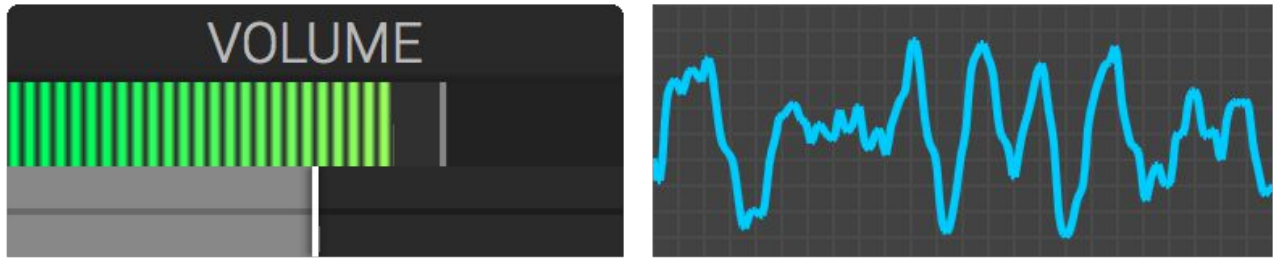
## 3. Patches

The third column contains all the **Patches**. Select a patch here to load the settings. You can delete the patch by clicking “Delete Patch” and save the patch into another file by clicking “Save Patch As”.

## 4. Patch Info

The **Patch Info** shows you data about the patch like the author, what bank it was from, and the license.

# Volume and Oscilloscope



## 1. Volume and Peak Meter

The green bars show the current peak value. If your patch reaches past 0dBFS, the meter turns orange/red and in some DAWs your audio will clip. You can reduce the volume slider below the meter to stop the clipping.

## 2. Oscilloscope

The oscilloscope shows the wave data output. You can gather some information by the shape of the wave but it's mostly there for flash. :P

# Keyboard Response



The performance section has various settings that define how Helm reacts to keyboard presses.

## 1. Voices (Polyphony)

How many concurrent voices can Helm play at one time.

## 2. Pitch Bend

How many semitones the pitch bend wheel affects the pitch.

## 3. Velocity Tracking

How much the loudness of the voice changes with how hard a key is pressed. At 0% there is no effect. At positive percent the harder you hit the key the louder the note. At negative percent the softer you hit the key the louder the note.

## 4. Virtual Keyboard

You can play this virtual keyboard with the mouse. The left and right arrows will shift the virtual keyboard.

## 5. Portamento

If the portamento is enabled, this sets how long the pitch slide is from the last note played to the current note. The lower the portamento, the faster the slide.

## 6. Portamento Type

The Portamento Type enables a pitch slide between notes. If *off*, there is no pitch slide. If *on*, there is always pitch slide between the last note and the current one. If *auto*, there is only pitch slide when the last note is still held down, so if the last note was released there is no pitch slide.

## 7. Legato

In the event you play a note and run out of voices, legato defines what happens when you steal a currently playing voice. If enabled, only the pitch changes and the voices envelopes/LFOs remain where they are. If disabled, the envelopes/LFOs are retriggered so they start from the beginning.

## ARPEGGIATOR



The arpeggiator module will take currently pressed keys and play a repeating pattern based on them.

### 1. Frequency

How often a note plays in the pattern.

### 2. Gate

How long each note in the pattern is held down. If **Gate** is low, the pattern plays like tapping keys and if Gate is high, the current key is held down until the next note in the pattern plays.

### 3. Octaves

How many octaves the pattern spreads.

### 4. Pattern

The Pattern specifies the order of the notes played. Options are:

- *up* – notes ascending
- *down* – notes descending
- *up-down* – notes ascending then descending
- *as-played* – play the notes in the order they are played
- *random* – play random notes from the keys pressed