



# **OPERATOR'S MANUAL**

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# Glossary

## DAW

Multipass is not a standalone program, it needs to be used in conjunction with a host application where it is loaded as a plugin. These programs are usually called "DAWs" (Digital Audio Workstations) or simply "hosts". There are many different DAWs available on the market, and Multipass works with those that support either the VST 2, AAX or the Audio Unit plugin architecture.

## Patch

A patch is a configuration of Multipass that gives it a certain sound. Whenever you pull a slider or turn a knob you modify the current patch.

## Preset

Presets are ready-made patches which ship with Multipass. In Multipass you will find hundreds of different presets ready to be used in any song. Presets also make good starting points for your own patches. Presets are grouped into banks. More preset banks may be available to download using the Kilohearts installer.

## Snapin

Similarly to how a DAW will load Multipass as a plugin, Multipass itself can also load small audio effect modules called **snapins**. Snapins can be used either directly in your DAW as a VST or Audio Unit, or used as building blocks in a Multipass patch.

# System requirements

These are the minimum recommended system requirements for running Multipass.

## **CPU**

2 GHz or faster

## **Memory**

1 GB or more

## **Operating System**

Windows (7 or newer) or Mac OS X (10.7 or newer)

## **Software**

A DAW supporting VST 2, AAX, or Audio Unit plugin standards.

If you have many instances of Multipass running, or use a lot of snapins at the same time in your patch the CPU usage will increase accordingly. Thus, we cannot guarantee that Multipass will work flawlessly in all use cases even if your system does meet the minimum recommended system requirements.

The versions of the plugins installed via the Slate Digital installers, like other Slate Digital products, uses the iLok licensing scheme. If you are using these versions, an iLok (USB dongle or iLok cloud) with a valid license from Slate Digital is required to use the plugins.

# Overview

Multipass is a multiband effect plugin with many uses. At the heart of the plugin is a band splitter which splits the audio into several different frequency bands which can be processed independently. Multipass delegates the actual processing of the bands to other single-purpose effect plugins known as **snapins**. Snapins come in many different flavors, and implements many classic effects like distortion or chorus as well as more unusual ones like formant filtering and frequency shifting.

In addition to being loaded into Multipass, snapins can also be loaded as plugins directly in your DAW. Multipass is bundled with a few different snapins, and more can be bought from the Kilohearts website.

## User interface



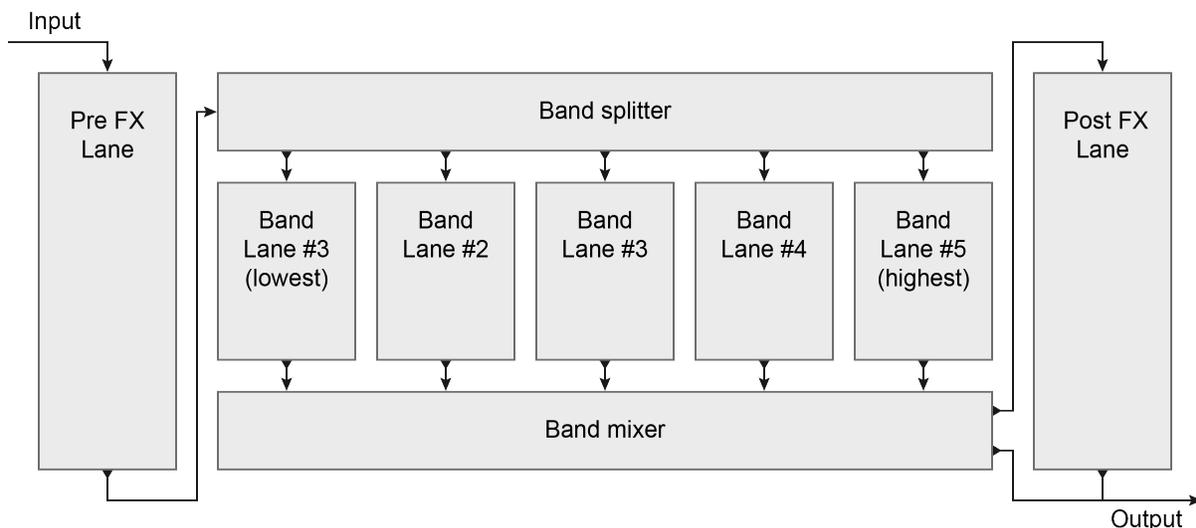
This is an overview of the plugin UI. It may look a bit overwhelming at first, but let's try to break it down a bit.

1. In the top bar the name, author and description of the **current patch** is shown. By clicking the 'Browse' button you toggle the **preset browser**. To the right you will find 'Undo' and 'Redo' buttons, allowing you to undo or redo all actions in Multipass.

2. The eight large knobs under the patch name are known as the **macro knobs**. These knobs can be routed by the sound designer to any other parameters in the patch in order to provide a few easy-to-reach knobs for tuning the sound of the patch. A single macro knob can even be routed to several parameters.
3. To the right of the macro knobs sits the **modulation area**. From here you can modulate parameters of your patch using **LFOs** (low frequency oscillators), **Envelopes** or **MIDI** input. The different modulation options are described in detail below.
4. The large spectrum displayed in the middle of the plugin is the **band splitter**. It splits the audio signal into up to five different frequency bands which can be processed independently.
5. The big space below the band splitter holds the **snopin lanes**. Each lane can hold several snapins. Adding new snapins is as easy as clicking the empty space at the bottom of a lane.
6. Under each lane, at the very bottom of the window, sits the **lane mixing** controls. Here you can adjust the gain and pan of each lane independently, among other things.

## Signal path

Now that we have some intuition on what parts make up Multipass and where to find them on the screen, let's take a peek under the hood to see how Multipass processes the audio you send into it.



The figure above is a schematic of the signal path through Multipass. The audio signal enters the plugin in the top left corner, and passes through a few stages of processing before leaving at the bottom right. Let's take a look at each of the stages in turn.

### **Pre FX Lane**

Before reaching the band splitter the signal will pass through the pre FX lane where snapins can be added which will affect the signal as a whole before band splitting.

### **Band splitter**

Next up is the band splitter, which splits the signal into up to five bands and sends each band into its own band lane. The band splitter uses Linkwitz–Riley crossover filters, which ensure that a flat frequency response is achieved when the bands are mixed back together.

### **Band lanes**

Each audio band is processed separately by the snapins in its band lane.

### **Band mixer**

After the audio bands have been processed by the snapins in the band lanes they are mixed back together. The band mixer also allows blending between the dry unprocessed signal coming out of the band splitter, and the wet signal which has been processed by the snapins in the band lane.

### **Post FX Lane**

Before the audio signal leaves Multipass the post FX lane provides one last chance to process the audio signal as a whole, after the bands have been mixed down. This can, for example, be a good place to place a compressor or limiter snapin to keep the signal level in check. The band mixer also controls how much of each band is sent to the post FX lane, and how much is passed straight to the output without post FX processing.

## **Operating the controls**

Most parameters of Multipass are controlled by the knobs and the sliders seen in the UI. To move a knob or slider simply click on it, and while holding the mouse button down move the mouse up or down.

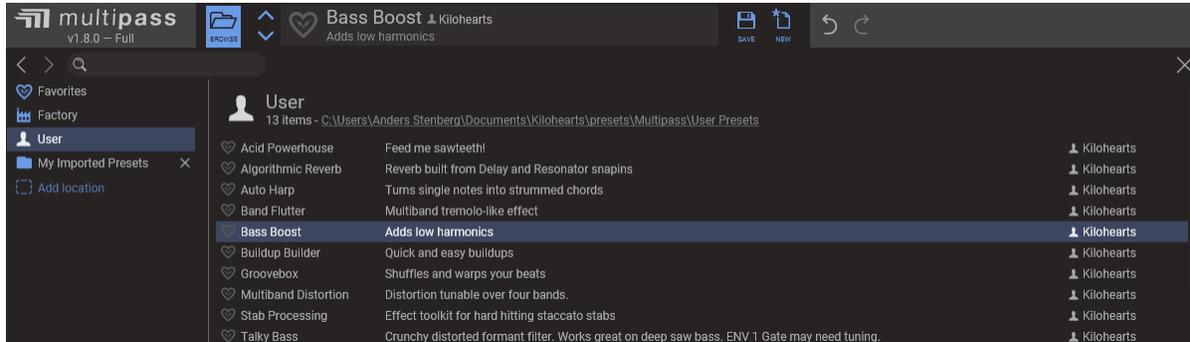
Sometimes you might want more precise control when tuning a parameter. Hold the **shift** key while moving a knob or slider to enter **fine tuning** mode, where the knob or slider will move more slowly.

You can reset a knob to its default position by double clicking it.

Finally, most controls support entering the value using your keyboard by right-clicking on them.

# Working with patches

The first thing you want to do after installing Multipass is probably to try out some of the presets it comes with. To reveal the preset browser, click on the 'Browse' button next to the Multipass logo.



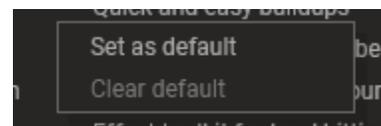
Loading a preset in the preset browser is as easy as clicking on it. Double clicking will load the preset and also close the browser. You can also step through all the presets in the current folder by using the arrow keys, or the arrow buttons in the top bar.

Presets are divided into a number of folders, visible on the left hand side. 'Favorites' starts out empty but will be filled with any presets you favorite by clicking their heart icon. 'Factory' contains the presets shipped with Multipass, categorized in subfolders. The 'User' folder is the default location for saving your own presets, but you are free to add any number of additional folders by clicking the 'Add Location' button at the bottom of the list. Hovering a location you've previously added will show an 'x' button, which allows you to remove it from the list again.

The search field has free text search of all preset information: name, description and author. All words in your search will be matched in any order. To do exact matches of multiple words, put your search terms in quotes. You can also quickly search for all presets by a certain author by clicking the author name in the rightmost column, or searching for "by:Author Name"

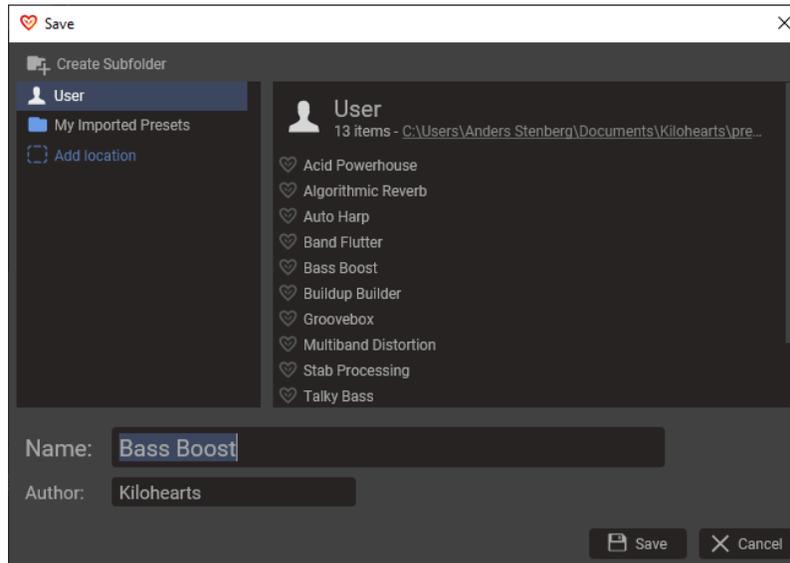
Left of the search field you will find back and forward arrows, which work much like in a web browser by taking to to the previous folder or search results.

Right-clicking a preset in the browser list shows a small context menu with controls for setting the default preset for Multipass. This will make all new instances start with the specified preset opened automatically.



You can close the preset browser by clicking the 'Browse' button again, clicking the 'X' button on the top right, pressing the escape key, or double clicking a preset

Your currently selected preset is also shown in the top bar, where you can edit the name, author and description by clicking them. Saving your changes is done with the 'Save' button, and the 'New' button clears the current patch.



The **save dialog** lets you choose where to save your preset. Note that write protected folders like 'Factory' and 'Favorites' are not included. The 'Name' and 'Author' fields reflect the preset info fields in the top bar, but gives you an opportunity to edit it again before saving.

At the top of the dialog, the 'Create Subfolder' button lets you create subfolders to categorize presets in any way you like.

# Building your sound

Once you have checked out some of the presets you are probably eager to get your hands dirty and create your own patches. We designed Multipass to be easy and fast to work with, and we hope you will enjoy experimenting and discovering the possibilities. Still, knowledge is power, so in this section we will go through all the features of Multipass in detail.

## Band splitter



The band splitter lets you adjust the crossover frequencies for the different bands. The spectrum analyzer in the background is a visual representation of the sound as it is when it enters the band splitter (i.e. right after the pre FX lane).

To change the crossover frequencies, click and drag the vertical bars representing the splits across the spectrum. You will notice that you can't drag splits across each other.

As you enable and disable different lanes, splits will be added and removed automatically as needed.

## Lanes

Lanes are divided into three parts. The header, where you will find a few toggle buttons, the main part of the lane, which holds the snapins in the lane, and the footer where you will find some mixing controls.



In the lane header you will find the following controls:

### Enable button

This toggle button will turn on or off the whole lane.

When the lane is turned off no sound will pass through it at all, and any snapins sitting in it will have no effect. This will also turn off this band completely in the band splitter, sending the audio that would normally pass through this lane into the lanes next to it. It is advisable that you turn off all lanes that you are not using, to spare some CPU cycles, and to avoid unnecessary phase distortion from the filters in the band splitter.

### Mute button

A toggle switch for muting a lane. The band splitter will still send audio to the lane, but it will simply be discarded.

## Solo button

This toggle button will mute all other lanes. It is useful during sound design if you temporarily want to listen to the audio that passes through just one lane.

In the lane footer you will find some knobs which impact how the output of the lane is mixed down during lane mixing:

## Gain

Changes the volume of the output of the lane.

## Pan

Pans the output of the lane left or right.

## Mix

Adjust the output mix of the lane between completely unprocessed at 0% to fully processed with snapins at 100%.

## Post

Adjusts how much of the output of this lane to send to the Post FX Lane for processing. At 0% the output of this lane skips the Post FX Lane completely, at 100% all of the output is sent through the Post FX Lane.

# Snapins

To add a new snapin to a lane, click the **add snapin icon** which appears when you hover the empty space in a lane. This will make a dialog appear giving you a selection of all the snapins you have installed. Simply click one to add it to the lane. To insert a snapin between existing snapins, hold down **alt/cmd** (*Win/Mac*).



Snapins can be reordered or moved between lanes by clicking their title bars and dragging them. If you hold the **ctrl/alt** (*Win/Mac*) key when dropping the snapin you will make a copy of it instead of moving it.

To remove a snapin simply click the little X icon in the top right corner of the snapin.

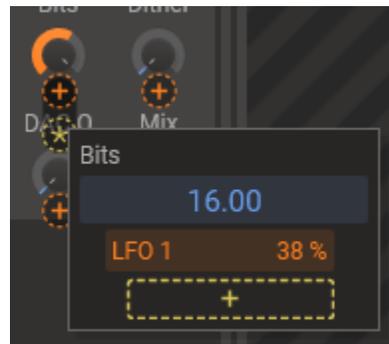
# Modulation

Almost all parameters in Multipass and in snapins can be modulated. In Multipass you will find five different **modulation sources** that can be used for modulation; **macro knobs**, **LFOs**, **envelopes**, **pitch tracking** and **MIDI**.

Hooking up a modulation source to a target parameter is done in pretty much the same way for all modulation sources. Look for the little link icon appearing when you are hovering your mouse pointer over a modulation source. Clicking the link icon selects the modulation source and switches the UI over to **modulation target selection mode**. In this mode a small orange **modulation knob** will appear next to each possible modulation target. Click and drag on the modulation knob to connect the modulation source to the target parameter and set the modulation level. The modulated control will turn an orange color to indicate that it is being modulated.

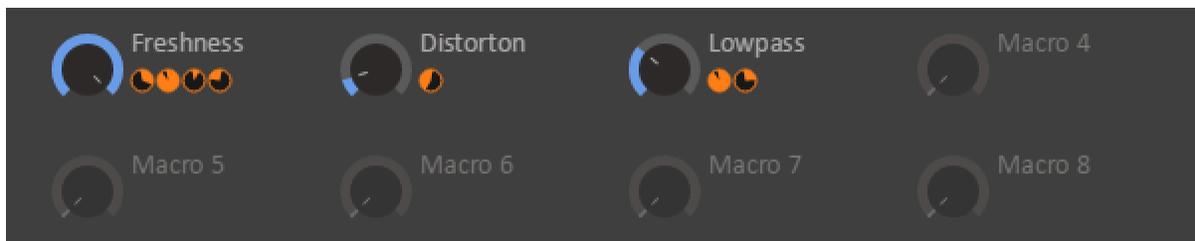
After a modulation source has been connected to a target parameter the modulation knob will be visible next to the modulation source at all times. The modulation knob will also appear next to the modulation target when the target is hovered. The modulation knob can be dragged to adjust the level of modulation. To disconnect the modulation, double click the modulation knob.

In addition to just modulating knobs and parameters directly, you can also use the modulation system to modulate the depth of other modulations. To set up this kind of modulation, enter modulation mode and then click on the yellow star icon under a parameter with an existing modulation. This will bring up a popup where you can see all the modulations for the parameter. Click on the dashed yellow rectangle under the modulation to scale that modulation.



Modulations that target other modulations will be shown as yellow in the UI.

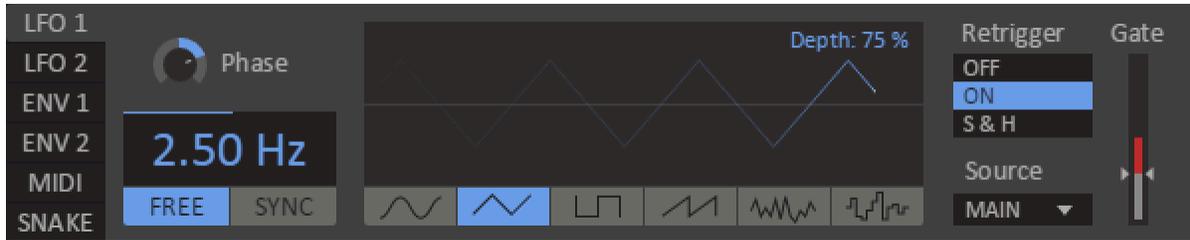
## Macro knobs



The macro knobs can be routed to any other parameter in Multipass or in Snapins using the modulation system. This lets you control many different aspects of the sound of the patch using a single macro knob. The macro knobs can be renamed by clicking on their label. The new name is stored in the preset.

The macro knobs are probably the first thing you should take a look at when trying out new presets, since the preset maker may have routed them to allow quick adjustment of some key parameters in the preset.

# LFOs



Multipass is equipped with two **low frequency oscillators**, or LFOs for short, which are ideal for modulating parameters in an oscillating and rhythmic fashion.

## Frequency

Controls the speed of the oscillator, either in Hertz when in free running mode, or as a note length when running in synced mode.

## Shape

Oscillator shape can be one of **sine**, **triangle**, **square**, **saw tooth**, **soft noise**, **hard noise**.

## Depth

Adjusts the amplitude of the LFO. Can be modulated in order to, for example, make the LFO modulation fade in using an envelope.

## Phase

Adjusts the phase of the LFO. Is especially useful when the LFO is in synced mode, or when retriggering is enabled. The phase parameter can also be modulated, for example by the other LFO, for interesting effects.

## Retrigger

The LFOs in Multipass offers two different retrigger modes. Setting retrigger to **on** causes the LFO to restart whenever the trigger condition is met. The **sample & hold** mode instead cases the value if the oscillator to be sampled whenever the trigger condition is met.

## Source

This drop down selects which input signal controls triggering. When this setting is set to **note on** the LFO will retrigger whenever a MIDI note on event is sent to Multipass (this requires that your DAW sends MIDI events to Multipass in the first place). The other option is to retrigger whenever the audio level goes over a certain threshold. You can select audio signals for retriggering between **main** (the main input to Multipass), **external** (secondary / sidechain input to Multipass) or **band** for input signal to a certain band.

## Gate

If the trigger source is set to one of the audio sources the threshold for when triggering should occur can be set using this fader. The current peak level for the selected audio channel is shown on the encoder of the fader.

# Envelopes



Multipass is equipped with two **envelopes**, which can be used to modulate parameters using the audio volume or MIDI note events.

## Mode

Three envelope modes are available. In **peak** and **RMS** modes the volume of the audio is tracked and used as the modulation value. There is a subtle difference in how peak and RMS tracks the audio volume. Peak mode tracks peaks in the audio volume and is thus very responsive to transients such as drum hits. RMS mode tracks the power of the signal using the root mean square method, which can give more stable results than peak mode, though the tracking may be less responsive. Finally, in **ADSR** mode the envelope will act like an attack / decay / sustain / release envelope of the kind that can often be found on synthesizers. The ADSR envelope can be triggered either by MIDI input or by audio volume.

## Attack

When you trigger a note the envelope will start to climb up from zero to its maximum level. This is known as the **attack phase**, the length of which is decided by the attack parameter of the envelope. Keep the attack low for a short snappy sound, or make it high for a slow sound which builds up over time.

## Decay

Next follows the **decay phase**, where the envelope drops down from its maximum level down to the sustain level. The time this takes depends on the decay parameter. The decay parameter is only available if the envelope is running in ADSR mode.

## Sustain

After the envelope has dropped down to the sustain level comes the **sustain phase**, which lasts until the note has ended. Thus, the sustain parameter does not influence the length of this phase but rather how high the sustain level is. The sustain parameter is only available if the envelope is running in ADSR mode.

## Release

When the note is released the envelope moves on to the **release phase**, where the envelope drops back down to zero. The time this takes is dictated by the release parameter.

## Source

This drop down selects which input signal to follow or to use for retriggering. When this setting is set to **note on** the envelope will retrigger whenever a MIDI note on event is sent to Multipass (this requires that your DAW sends MIDI events to Multipass in the first place). The other option is to follow the volume level of an audio signal. You can select audio signals between **main** (the main input to Multipass), **external** (secondary / sidechain input to Multipass) or **band** for input signal to a certain band.

## Gate

If the mode is set to ADSR and the source is set to one of the audio sources the threshold for when the envelope should be triggered can be set using this fader. The current peak level for the selected audio channel is shown on the encoder of the fader.

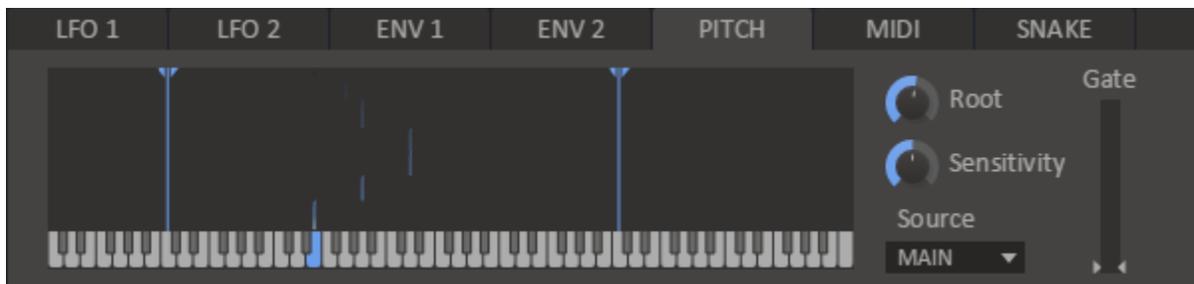
## Curve

Selects between **exponential** and **linear** falloff in the decay and release phases when the envelope is in ADSR mode.

## Legato

Selects whether the envelope should restart from zero or if it should continue from its current value when it is triggered in ADSR mode.

## Pitch tracking



The pitch tracker allows modulation using the pitch of the input signal. The modulation output of the pitch tracker is set to match any frequency based parameters at 100%. For example, this means modulating the cutoff of the Filter snapin with 100% pitch, the cutoff frequency will follow the tracked frequency of the input similarly to how 100% keytracking in a synth behaves.

### Lower and upper note limit

Two vertical handles can be used to select the expected pitch range of the input. This hint helps the algorithm perform better and reduces the risk of glitches in the pitch tracking.

## Root

The root parameter acts as an offset in the modulation output. If the input signal has the same note as root, the modulation output will be zero. Lower notes will yield negative modulation values and higher notes will yield positive modulation values.

## Sensitivity

This parameter adjusts the sensitivity of the algorithm, and higher values result in faster tracking but is more prone to glitches. The default value of 50% is usually a good compromise of speed versus stability, but this can be tweaked to improve the tracking depending on the input.

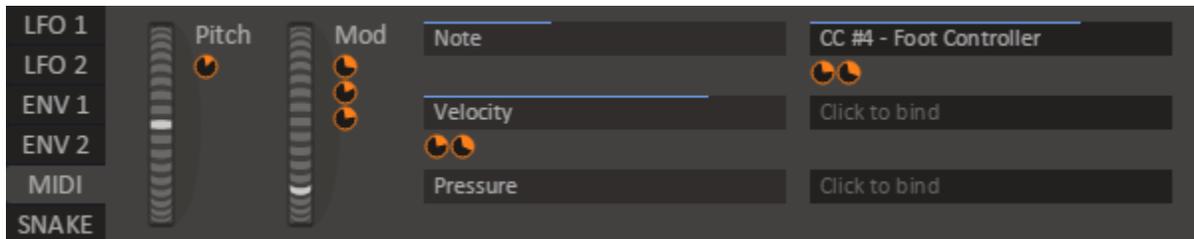
## Source

This drop down selects which input signal to track the pitch of.

## Gate

The gate parameter sets a lower limit of when to run the tracking, to help avoid trying to tracking quiet unpitched sounds like noise.

# MIDI



The MIDI tab allows modulation using MIDI input. Since Multipass is an effect rather than an instrument, many DAWs will not route MIDI events to it by default. Check the documentation for your DAW for details on how to set up MIDI routing.

## Pitch

This wheel is connected to the pitch wheel commonly found on MIDI keyboards. The pitch wheel has its zero position in the middle of the wheel, and spans in range from -1 to +1. Whenever the wheel is released it snaps back to the zero position.

## Mod

This wheel is connected to the modulation wheel commonly found on MIDI keyboards. In contrast to the pitch wheel, this wheel ranges from 0 to +1 and does not snap back when released.

## Note

This modulation source is based on the last played note on the keyboard. Higher notes give higher modulation values.

## Velocity

This modulation source is based on the velocity of the last played note, i.e. the force with which you hit the key on the MIDI keyboard when playing a note.

## Pressure

This modulation source is based on the channel pressure, i.e. the force with which you hold down the keys on the MIDI keyboard.

## MIDI CC slots

To the right of the slots for note, velocity and pressure are three general purpose MIDI CC slots which can be bound to any MIDI controller. To bind a slot to a controller, simply click on it and then move the controller on your MIDI keyboard.

## Snake



Last but not least, let's not forget that Multipass includes the revolutionary productivity tool **snake**. Move the snake around the playing field with the arrow keys and consume the fruit as fast as possible to acquire points.

If you want more of a challenge, crank up the **speed** knob to make the snake move faster.

# Multiple outputs

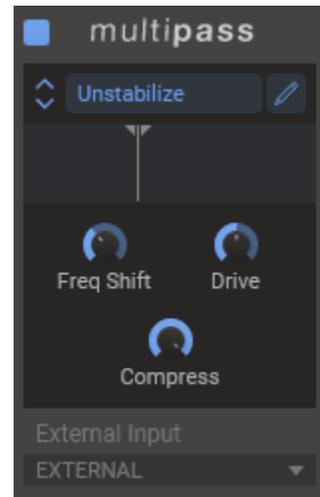


While Multipass is a regular effect, it does in fact have 5 additional stereo outputs. Usually these are left silent, but in DAWs that support it Multipass can route the separate frequency bands to these additional AUX outputs. At the bottom of Multipass there is a button which can be toggled between three states: **MAIN**, **MAIN + AUX** and **AUX ONLY**. These three modes determine where to send the output of Multipass: To only the main output, to both main and AUX, or to AUX only respectively. Refer to the manual of your DAW to see how to set up multiple output routing, if possible.

# Snapin mode

Multipass can also be loaded as a snapin in snapin hosts like Snap Heap, Phase Plant or itself. In this mode, the Snapin interface shows all named macros that have any modulation bindings. At the top, up/down arrows can be used to scan through presets and a full browser can be opened by clicking the preset name. To edit the current patch, press the pen icon. This will open the full Multipass interface in a separate window.

The **External Input** selector allows you to choose which sidechain channel in the snapin host should be mapped to the **external** sidechain channel in the contained Multipass instance.



# Acknowledgements

This development of this product was helped by the following pieces of excellent open source software:

Boost C++ Libraries

Skia Graphics Library  
*Copyright © 2011, Google Inc.*

Symbiosis AU/VST  
*Copyright © 2010-2013, NuEdge Development / Magnus Lidström*

LodePNG  
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C++ optimized SHA1 algorithm  
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miniz  
*By Rich Geldreich*

FastDelegate  
*By Don Clugston*

FFTReal  
*By Laurent de Soras*