



OPERATOR'S MANUAL

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1 Glossary

DAW

Phase Plant 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 Phase Plant works with those that support either the VST 2, AAX or the Audio Unit plugin architecture.

Patch

A patch is a configuration of Phase Plant 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 Phase Plant. In Phase Plant you will find hundreds of different presets ready to be used in any song. Presets also make good starting points for your own patches.

Snapin

Similarly to how a DAW will load Phase Plant as a plugin, Phase Plant 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 Phase Plant patch. Snapins are sold separately from Phase Plant itself.

2 System requirements

These are the minimum recommended system requirements for running Phase Plant.

CPU

2 GHz or faster

Memory

1 GB or more

Operating System

No matter if you are a Windows or Mac user, Kilohearts recommend keeping up to date with OS versions as they become available. We are not able to support OS version that are no longer supported by their respective manufacturers. If you are using an outdated OS please try our free trials to ensure compatibility before making any purchases.

Software

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

If you have many instances of Phase Plant 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 Phase Plant 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.

3 Overview

Phase Plant is a modular synthesizer where you can combine several different synthesis techniques in your sound design. Analog oscillators, samples, wavetables and a noise generator creates the initial sound, which can then be filtered and processed using any combination of snapins from your arsenal. To bring your patch alive Phase Plant supports an open ended modulation system, where you can add envelopes and LFOs as you need them and route them to almost any parameter. To top it all off, audio rate modulations can be used to modulate the phases, frequencies and amplitudes of all generator modules, to create all manner of sounds based on FM and similar techniques.

3.1 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 Phase Plant.
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 left below the macro knobs is the **generator area**. This is where you set up your signal generation with the help of different oscillators and sound generators. Click the icon that appears when you hover over the area to add modules.
4. The area to the right of the generators holds the **snapin lanes** which is where you add your effects. Each lane can hold several snapins. Adding new snapins is as easy as clicking the empty space at the bottom of a lane.
5. Along the bottom of the screen is the **modulation area**. From here you can modulate parameters of your patch using **LFOs** (low frequency oscillators), **Envelopes** or **MIDI** input. The different modulation modules are described in detail below.
6. Clicking on the little keyboard icon in the status bar will reveal the on screen keyboard. You can use this to play notes by clicking on the keys, and it will also show what notes are being played by incoming MIDI messages.

3.2 Operating the controls

Most parameters of Phase Plant 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.

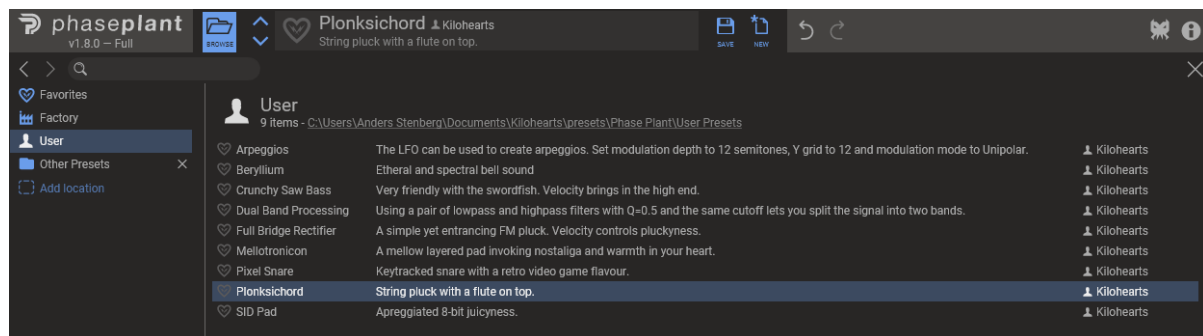
Sometimes you might want more precise control when tuning a parameter. Hold the **shift** key while moving a knob or slider to enter **fine tuning** mode, where the knob or slider will move more slowly.

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.

4 Working with patches

The first thing you want to do after installing Phase Plant 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 Phase Plant logo.



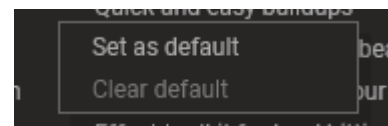
Loading a preset in the preset browser is as easy as clicking on it. Double clicking will load the preset and also close the browser. You can also step through all the presets in the current folder by using the arrow keys, or the arrow buttons in the top bar.

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 Phase Plant, 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"

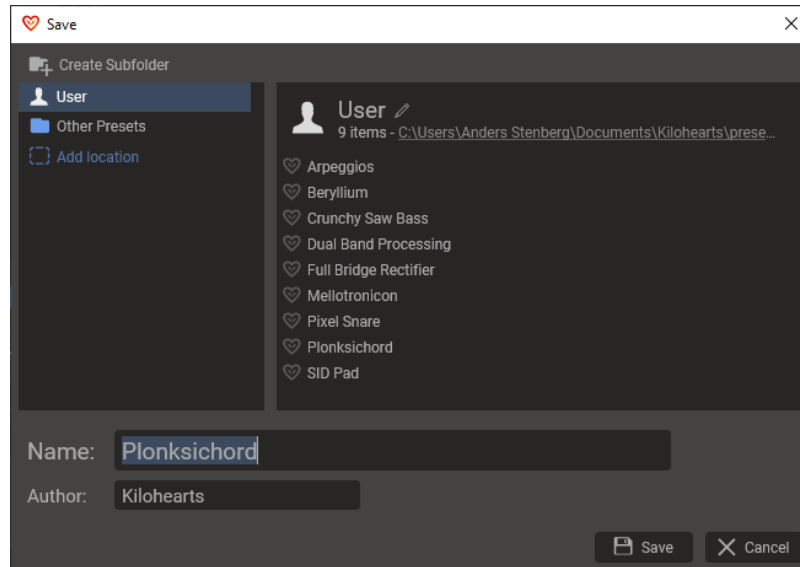
Left of the search field you will find back and forward arrows, which work much like in a web browser by taking to the previous folder or search results.

Right-clicking a preset in the browser list shows a small context menu with controls for setting the default preset for Phase Plant. 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.

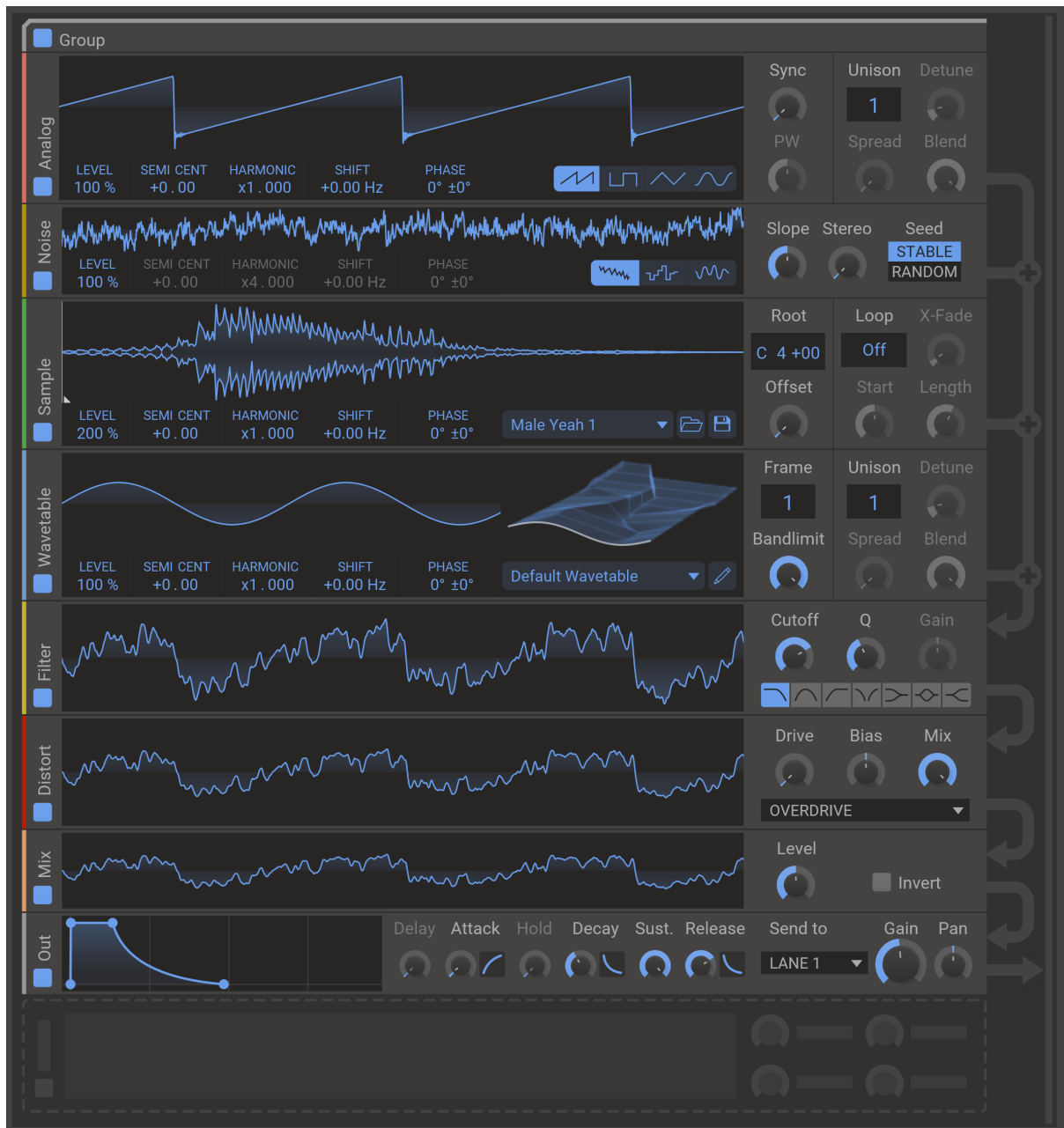
At the top of the dialog, the 'Create Subfolder' button lets you create subfolders to categorize presets in any way you like.

5 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 Phase Plant 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 Phase Plant in detail.

5.3 Generator Area

It all starts in the generator area. This is where your sound is generated, modulated and filtered before you pass it on to the effects. Like most things in Phase Plant, the generator area uses a modular approach where you add modules one by one to gradually build up your sound. You have several different modules at your disposal in the generator sections, some of them are oscillators that can generate a plethora of waveforms, and you also have access to filter and distortion effects, as well as some utility modules.



Most modulators in the generator section will show a visual representation of the sound that it outputs in the form of a scope. Most parameter changes you do will be reflected by changes in these scopes. The data for the scopes are generated using the same signal path that generates the actual sound, but the frequency is fixed and the scopes do not track the played note.

To add a module, click on the large icon that appears at the bottom of the generator area. A popup menu will appear where you can select what kind of module you want. The first time you add a **generator** module a **group** and an **output** module will be added automatically as well. The generator area can hold up to 32 modules.

Once added, modules can be moved and copied by dragging and dropping. Hold **ctrl** or **command** while dragging to make a copy.

5.3.1 Generator Modules

The generator modules are the ones that actually produce the sound in Phase Plant. There are four different kinds, the **analog oscillator**, the **noise generator**, the **sample player**, and the **wavetable oscillator**. All of these sound sources are key tracked, meaning that their frequency depend on what note you are playing.

Generator modules automatically route themselves in the module stack by mixing their output on top of the signal coming from above.

All generator modules also share a few parameters which are described below.

Level

The amplitude of the generator. The volume is scaled by this value, which ranges from 0% to 200%.

Pitch (Semi, Cent)

The pitch offset from the played note expressed in semitones and cents. This setting can be used to make this generator play a pitch which is a set interval from the played note. For example, to play one octave higher, set this parameter to +12.00, to play one octave lower, set it to -12.00. You can also use the cent part to fine tune generator.

Harmonic

This setting is similar to the **pitch** parameter, but it is expressed as a multiplier. The frequency of this generator is multiplied with whatever this parameter is set to. For example, to play this generator at four times the frequency, set this to x4.000, which corresponds to a relative pitch increase of two octaves. You can also set this parameter to x0.000, which will completely turn off key tracking for this generator. The frequency can then be set with the **shift** parameter.

Shift

The shift parameter applies a fixed detuning expressed in Hz (cycles per second) on top of the frequency computed after applying the **pitch** offset and **harmonic** multiplier. The shift can both be positive and negative. The shift can even push the final frequency of the oscillator below zero, which is allowed and will result in the generator running backwards in a sense.

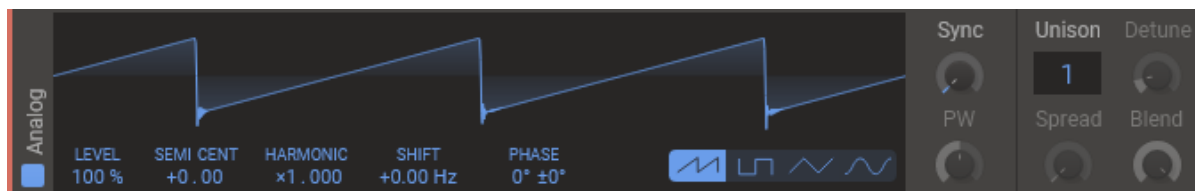
Phase Offset

The phase offset, as the name implies, adds a fixed phase offset to the output. It can be used to set what phase an oscillator starts at, and it can also be used as a modulation target when doing phase modulation.

Phase Randomness

To avoid every note sounding the same some randomness can be added to the phase offset for each played note. If you use several oscillators this will cause them to sometime start in phase, and sometimes out of phase. If you are using **unison** then this setting will randomize the phase of each unison voice individually.

5.3.2 Analog Oscillator



The analog oscillator is one of the **generator modules**, and it's probably also the generator that is easiest to understand and get started with. The goal of the analog oscillator is to reproduce a few classic waveforms with as high fidelity as possible. The Analog Oscillator is a great choice for presets based on subtractive synthesis techniques, and it also does really well when FM is used.

This oscillator supports **unison** which is described in detail in the unison chapter.

Waveform

Selects what waveform the oscillator plays. Sawtooth wave, pulse wave, triangle wave and sine wave are available.

Sync

Simulates oscillator sync by running the oscillator at a higher frequency, but resetting its phase back to zero at the normal frequency.

PW

Adjusts the pulse width of the pulse waveform.

5.3.3 Noise Generator



The noise generator is, as the name implies, one of the **generator modules** that is used to produce noise. Noise can be used to synthesize inharmonic elements like wind or drum hits. The noise generator supports three different types of noise, two of which are key tracked.

Noise type

Selects noise type. The options are colored noise, stepped keytracked noise, smooth keytracked noise.

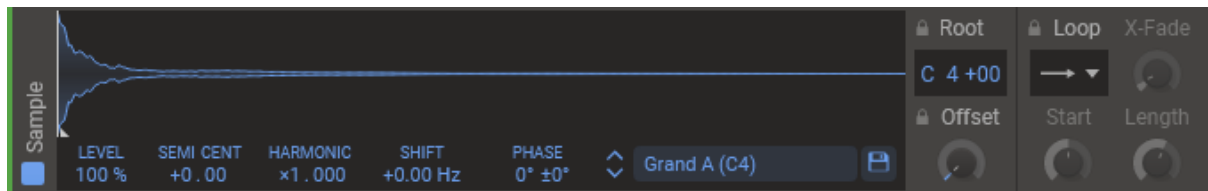
Slope

Adjusts the falloff of the spectrum for the colored noise. Ranges from flat (white noise), through 3 dB/octave (pink noise) to 6 dB/octave (brown noise).

Stereo

Blends between mono and stereo noise.

5.3.4 Sample Player



The sample player is a **generator module** which allows you to use sampled audio as a building block in your generator stack. It will play the sample at different speeds depending on the played note, which of course also adjusts the pitch of the sample. You can load any sample you like into the sampler by browsing for it or by dragging and dropping it onto the sampler module. Phase Plant also comes bundles with a library of samples that you are free to use as you see fit.

Instead of showing a scope of the waveform like the other modules the sampler will instead show a visual representation of the loaded sample. This view will also allow you to drag the **offset** and adjust the **loop** points.

Sample selector

The name of the currently loaded sample is shown in the field below the sample view. Clicking the name will open a browser to let you load a sample from the sample library. In the browser you can also add your own user folders to the library.

Save button

The save button next to the sample name let's you save the current sample. The **root**, **offset** and current loop is saved in the sample file as well.

Root

To be able to play the sample at the correct pitch the fundamental frequency of the sample must be set. While you adjust the root pitch two zoomed portions of the sample will appear, taken one cycle apart from the sample. You can use this to help you tune the sample by eye in addition to tuning it by ear. When the blue and the grey waveform align, with one cycle inbetween the white bars, the sample is in tune.

Offset

The offset parameter adjust the starting position of the playback in the sample.

Samples can be looped in several different ways, which is controlled by the parameters in the rightmost panel:

Loop Mode

Selects different kinds of looping. **Infinite** will loop forwards forever, **sustain** will loop forwards until you release the key and then keep playing without looping, **fwd-rev** will alternate between playing the looped region forwards and backwards, and finally **reverse** will play the loop only backwards.

Start

The loop start point.

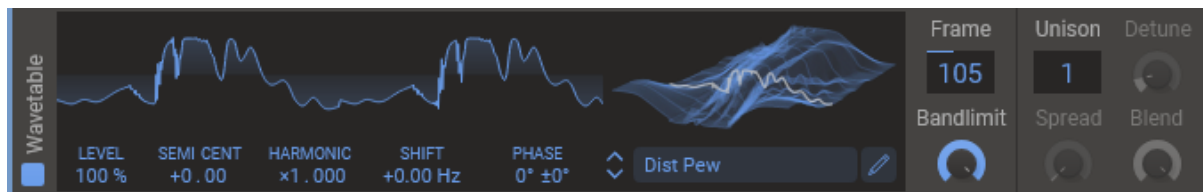
Length

The length of the loop. As you adjust this you will see a zoomed in portion of the sample around the loop start point (grey curve) and the loop end point (blue curve). You can use this visual feedback to find a seamless loop point by aligning the two curves. Remember that holding the **shift** key while dragging will enter fine-tuning mode.

X-Fade

To avoid clicks and pops when the loop wraps around Phase Plant supports crossfading across the loop boundary. This parameter adjusts the length of the crossfade region.

5.3.5 Wavetable Oscillator



The wavetable oscillator is a very versatile **generator module** that can replicate pretty much any waveform you can think of. It is backed by a wavetable, which contains 256 **frames**, each one holding a sampled waveform 2048 samples long. By modulating the current frame over time all sorts of interesting movement can be created.

A versatile library of wavetables is included with Phase Plant, and you can also use wavetables from other sources if they are in a compatible format. Finally you can also create or edit wavetables with the included wavetable editor. Phase Plant can load wavetables from **wav** and **flac** files provided they have the right length ($256 \times 2048 = 524\,288$ samples). Furthermore, the wavetable editor has a tool for converting any sample to a wavetable.

This oscillator supports **unison** which is described in detail in the unison chapter.

Wavetable selector

The name of the currently loaded wavetable is shown in the field below the wavetable view. Clicking the name will open a browser to let you load a wavetable from the wavetable library. In the browser you can also add your own user folders to the library.

Frame

Selects what frame in the wavetable to play back.

Bandlimit

Bandlimits the wavetable using a very sharp internal low pass filter. This feature can be used to tame a wavetable which is under heavy phase modulation, since the filter is applied before the phase modulation.

5.3.6 Filter Effect



The filter is an **effect module** which can apply a variety of filters to the incoming signal from the modules above it. It is very similar to the filter snapin in its capabilities, but since it lives in the generator area it can also partake in audio rate modulation, both as a source and as a target.

Type

The type of filter. Select between low pass, band pass, high pass, notch, low shelf, peak and high shelf filters.

Cutoff

The operating frequency of the filter. In a low-pass filter this is the frequency where the signal is reduced by 3dB.

Q

The filter Q setting. High values for Q will make the filter resonate at the cutoff frequency.

Gain

The gain value for the low shelf, peak and high shelf filter types.

Slope

The slope of the filter cutoff, with 1x representing a classic 2-pole filter.

5.3.7 Distortion Effect



The distortion is an **effect module** that distorts the incoming signal from the modules above it. It is a lightweight version of the snapin with the same name, but since it lives in the generator area it can also partake in audio rate modulation, both as a source and as a target.

Type

The flavor of distortion. Select between overdrive, saturate, foldback, sine, hard clip and quantize.

Drive

The drive setting will boost the input signal, causing a heavier distortion.

Bias

The bias will add a DC offset to the signal before distorting. Adding some bias can prevent the distorted audio from sounding hollow and uninteresting.

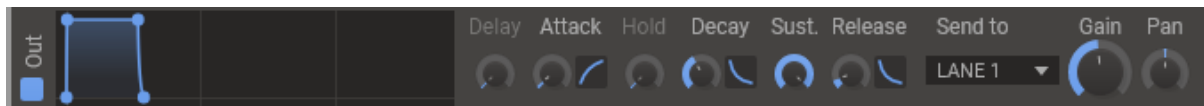
Spread

The spread will add different amount of bias to the left and right channels. This can give some nice and subtle stereo widening.

Mix

The dry/wet mix of this effect. A lower value will let some of the unmodified signal through.

5.3.8 Output Module



The output module is a **utility module** which does two things. First off it applies an amplitude envelope to the incoming signal. Secondly, it can send the enveloped signal on to other parts of Phase Plant. You will need at least one output module in the module stack to be able to actually create any sound with Phase Plant.

The envelope that is build into the output module works exactly like the envelope modulator, and is described in more detail in that chapter.

Send to

Selects what bus to send this output to. This can be either one of the lanes to the right of this one, or straight to the **master** bus, or to the **sideband** bus which can be used as a sidechain input in snapins that support it. You can also disable sending of the signal, if you only want to use the amplitude envelope for audio rate modulation.

Gain

Changes the volume of the sent signal.

Pan

Pans the sent signal left or right.

5.3.9 Mix Module



The mix module is a **utility module** that you can think of as an effect that only applies a gain to the signal. The most common use of the mix module is to mix together the output of several generator modules above it to be able to use the mixed signal for audio rate modulation.

It also allows you to adjust the volume of a signal and invert it. Since the level can be target for audio rate modulation you can also use the mix module for amplitude- and ring modulation.

Level

Adjusts the amplitude of the signal.

Invert

Inverts the signal, turning it upside down.

5.3.10 Aux Module



The aux module is a **utility module** which is very similar to the mix module. The only difference is that instead of automatically routing itself and using the signal coming from the modules above, it expects you to route its input to it using the audio rate modulation system. You can use the aux module to send audio to different parts of the generator stack, even to a different **group**. The aux module mixes its output onto the signal coming from above, much like a **generator module**. For technical reasons, the aux module adds one sample of latency to the signal.

The **level** and **invert** parameters work in the same way as in the mix module

5.3.11 Groups

Groups are used to divide the generator stack into different logical units. The group header breaks the automatic routing of modules, and an audio signal will never automatically flow between two different groups. You can however route audio between groups using the audio rate modulation system.

A common use case for groups is to create layered sounds, where each layer lives in its own group and has its own output modules. It can also be useful to create groups for modules that act as modulation sources, so that they are isolated from the modulation targets that they act on.

Groups can be renamed and folded to aid in navigating complex patches. They can also be moved and copied as a whole by dragging and dropping. Hold **ctrl** or **command** while dragging to make a copy.

5.3.12 Audio Rate Modulation

As if all the different module types in the modulation lane wasn't enough, Phase Plant also support audio rate modulation between all the modules in the generator area. This can be used to create FM patches and other interesting sounds.

To set up an audio rate modulation, hover over the module you want to use as a source. A green circle with a plus symbol will appear on the right hand side of the module. Click the plus symbol to enter modulation mode. Other green plus symbols will now appear on all viable targets. Simply click and drag on the plus icon of the parameter you wish to modulate. After a modulation is set up the target will turn from blue to green to show that it is being modulated.

For classic FM sounds you probably want to modulate the **phase** of the target oscillator. It is also possible to do linear FM and exponential FM by modulating the **shift** and **pitch**, respectively. Modulating the **level** of another oscillator will result in multiplying the two signals together, also known as ring modulation.

5.4 Effects

Phase Plant leverages the snapin in eco system of effects to bring a wide and ever expanding range of effects to its effect section. After sound has been produced by the generator area it is sent to one of three effect lanes, which in turn can be routed to either process the audio serially or in parallel.

5.4.1 Effect 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. This will bypass all snapin effects in this lane, but it will still send its output to its designated target.

Poly button

One unique feature of Phase Plant is that it allows all snapin effects to run in polyphonic mode, where the effects processing is done for each voice separately instead of on all voices mixed together. Polyphonic mode is enabled on each lane separately by clicking this button so it lights up. For technical reasons polyphonic mode can only be enabled on the lanes in order from left to right. In other words, if lane 2 is polyphonic then lane 1 also has to be.

Mute button

A toggle switch for muting the lane.

Solo button

This toggle button will mute all other lanes.

In the lane footer you will find some controls for where the output of the lane is sent:



Gain

Changes the volume of the output of the lane.

Mix

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

Send to

Selects what bus to send the result of this lane to. This can be either one of the lanes to the right of this one, or straight to the **master** bus.

5.4.2 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.

Detailed descriptions of all the snapins can be found in their respective manuals.

5.5 Modulation

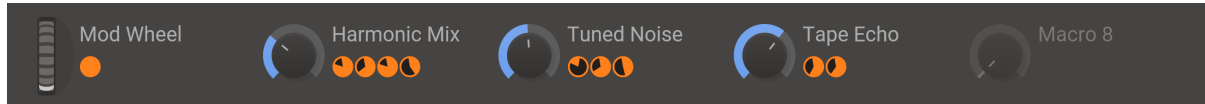
Almost all parameters in Phase Plant and in snapins can be modulated. Modulators can be added as modules in the horizontal lane along the bottom of the screen. The **macro** buttons at the top of the screen also use the modulation system and are hooked up to their targets in the same way as other modulators like envelopes and LFOs.

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 plus icon appearing when you are hovering your mouse pointer over a modulation source. Clicking the plus 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.

Modulations are color coded. Control rate modulations are shown in orange in the UI, audio rate modulations are shown in green, and modulations scaling other modulations are shown in yellow.

5.5.1 Macro knobs



The macro knobs can be routed to any other parameter in Phase Plant 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.

The macro knobs are also useful when setting up automation from your DAW. Many parameters in Phase Plant can't normally be targeted for automation, but the macro knobs can be. A common practice is to automate the macro knobs and then use the modulation system to route them to any other parameter.

5.5.2 Modulator Lane



Along the bottom of the screen is the **modulator lane**. Here you can add modules that can be used for modulation such as LFOs and envelopes. It's possible to add up to 32 modulator modules. To add a modulator, click on the icon that appears in the lane as you hover it.

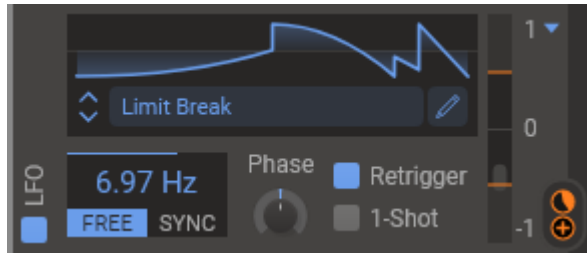
All modulator modules have a small animated display at the right hand side that shows the current value that the modulator outputs. The value for the most recent voice is shown in blue, and the other voices are drawn in grey. Some modulators also have a global value which is used when modulating parameters which are not tied to a voice. This is also displayed in grey.

The output depth of all modulators can be scaled by clicking and dragging on the animated output display. The depth can also be modulated by routing another modulation to this parameter.

By clicking the little blue triangle that you can find at the top right of most modulator modules you can change its output range. The available options are **unipolar** (0 to 1), **bipolar** (-1 to 1) and **inverted** (1 to 0).

5.5.3 LFO Modulator

The LFO (Low Frequency Oscillator) module is one of the **modulator modules** you can add in the modulator lane at the bottom of the screen. They are ideal for modulating parameters in an oscillating and rhythmic fashion. The LFOs in Phase Plant are very versatile since you can design your own LFO curves.



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.

Phase

Adjusts the phase offset of the LFO.

Shape

The LFO have a few predefined shapes: **saw**, **sine** and **square**. You can also edit the LFO curve yourself by clicking on the edit icon, which opens the LFO editor in a separate window.

Retrigger

When retrigger is enabled the LFO will start from the beginning each new voice. When it is disabled all voices will share a single global LFO value.

1-Shot

When 1-Shot is turned on the LFO will not loop back to the start after one cycle. With this mode enabled the LFO will act more like an envelope.

You can move control points around by clicking and dragging. Clicking and dragging on the curve rather than on a control points creates a new control point at that location. Right clicking on a control point toggles it between being a smooth or a hard point. The view can be zoomed by using the scroll wheel on the horizontal axis below the curve, and panned by clicking and dragging on the axis. The magnet button at the bottom left toggles snapping to the grid, and clicking the cogwheel allows you to adjust the grid resolution along both the vertical and horizontal axis.

5.5.4 Envelope Modulator

The envelope modulator is a **modulator module** that provides an envelope that you can use as a modulation source. It is based on a standard ADSR envelope, but it adds the states **delay** and **hold**, making it a DAHDSR envelope.



Delay

Initial delay before the **attack phase** start. Not widely used, which is why this knob is slightly dimmer than the others.

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.

Attack Curve

Adjusts the shape of the curve for the attack phase. Can be quickly at the start and then slowly, or start slowly and then go quickly at the end.

Hold

Time to hold at the maximum level before the **decay phase** start. Not widely used, which is why this knob is slightly dimmer than the others.

Decay

Next follows the **decay phase**, where the envelopes drops down from its maximum level down to the sustain level. The time this takes depends on the decay parameter.

Decay Curve

Adjusts the falloff curve for the delay phase. This blends between linear falloff and exponential falloff.

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.

Release

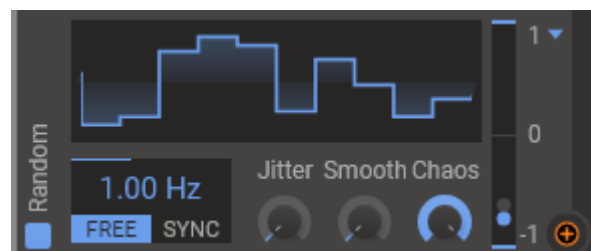
When the note is released the envelope moves on to the **release phase**, where the envelope drops back down to zero. The time this takes is dictated by the release parameter.

Release Curve

Adjusts the falloff curve for the release phase. This blends between linear falloff and exponential falloff.

5.5.5 Random Modulator

The random **modulator module** outputs a stream of random values that you can use to create random movement in your patch. For polyphonic patches this modulator will output different random values for each voice.



Frequency

Controls how often new random values are picked, either in Hertz when in free running mode, or as a note length when running in synced mode.

Jitter

Randomly adjusts the timing for when values are picked, making the modulator less rhythmic.

Smooth

Blends between the random numbers to create a smooth sequence instead of a stepped one.

Chaos

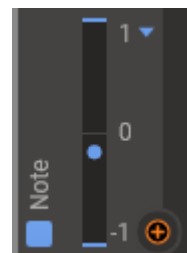
Adjust the length of each random step. For lower chaos values the next random value will be closer to the previous one

5.5.6 MIDI Modulators

There are three different MIDI based **modulator modules** which will help you build more expressive patches.

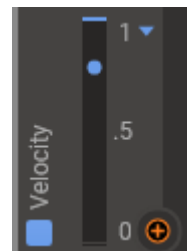
Note

The note modulator let you use the played note as a modulation source. The range of this modulator is tuned to be the same as many of the cutoff and frequency knobs you will come across in Phase Plant and in the snapins. This means that you can modulate these parameters at 100% they will perfectly track the note you play.



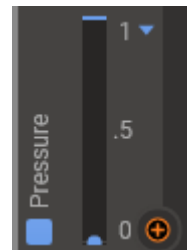
Velocity

This modulator tracks the velocity of each played note (how hard the note has played). Use this to make your patches velocity sensitive so they can be played both softly and loudly.



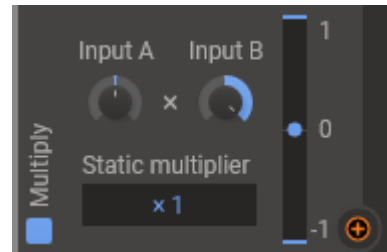
Pressure

The pressure, also known as monophonic aftertouch, tracks how hard you push down on the keys after a note is struck. Not all keyboards support this feature.



5.5.7 Multiply Modulators

The multiply modulator is a utility where you can multiply two different modulations. It also allows you to multiply a modulator with a static value to boost or attenuate it.



Input A / Input B

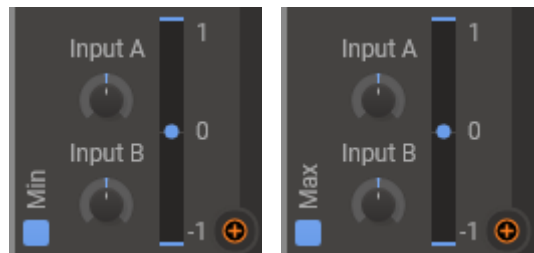
The values of these knobs will be multiplied with each other and used as the output of this modulator. You can set these manually or modulate them with another modulator.

Static multiplier

This parameter is also multiplied with the result and can be used to boost or attenuate the output of the modulator greatly. For example, you can use it to boost the range of the note modulator, or scale an LFO with 0.001 for super fine modulations.

5.5.8 Min and Max Modulators

The min and max modulators will output the smallest or largest of two values, respectively. This can be used to output the largest or smallest of two modulators, or to clamp a modulator at a fixed value.



Input A / Input B

The values of these knobs will be compared with each other and only one will be used as the output of this modulator. You can set these manually or modulate them with another modulator.

5.5.9 Modulation Scaling

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. Both audio rate (green) and control rate (orange) modulations can be targeted.

5.6 Voice settings

Below the generator are a few parameters that control some overarching behavior of Phase Plant.

Glide Enable

Enables glide, also known as portamento. This will make the pitch of new voices slide from the pitch of the last voice.

Glide Time

Adjusts how quickly a voice glides to the target pitch.

Glide Auto

When glide auto is enabled the glide will only occur when the notes are played legato, without any gap in between.

Polyphony

You can use the polyphony setting to adjust how many voices can be active at once. If you play a note and all voices are in use, the oldest and quietest voice will be recycled. There are many reasons to keep this setting at a reasonably low number. Having too many voices ringing out at once can cause the mix to be muddy, and it can also have a negative impact on performance. Setting polyphony to 1 will make your patch monophonic.

Monophonic Mode

This setting only applies when **polyphony** is set to 1. When you set it to **retrig** envelopes will be retriggered for every new note you play. When in **legato** mode envelopes will not be retriggered when notes are played without a gap inbetween.

Master Pitch

The master pitch controls the pitch of all generator modules at the same time. You can easily create a vibrato by modulating it with an LFO.

Bend Range

The bend range adjusts the pitch bend range in semitones for the pitch wheel. This parameter is not stored in presets, but it is saved in your project.

Master Gain

The master gain fader sits at the very bottom right corner of the screen. It allows you to adjust the volume of your patch as a whole.

5.7 Unison

Unison is the effect you get when you play several slightly detuned voices at once. Phase Plant supports unison in two different ways.

First off, there is oscillator unison, which is implemented in the **analog oscillator** as well as the **wavetable editor**. This is the type of unison you should reach for first, since it is much more resource efficient. When you enable unison on an oscillator it will generate several waveforms at once internally. The output of the oscillator will be all waveforms mixed together, so if you use it as a modulation source this is what you will get as well.

The second type of unison is global unison, which you enable below the **generator area**. This type of unison will create several parallel voices for every note you play. This includes the whole generator stack as well as any **effect lanes** which are set to **polyphonic**. If you aren't careful this can eat up quite a lot of computer resources. The benefit of global unison is that it allows you to add unison to FM patches, and patches that require polyphonic effects.

Voice Count

Number of voices to play simultaneously.

Detune

Amount to detune each voice.

Spread

How much to pan the voices to create a wider stereo image.

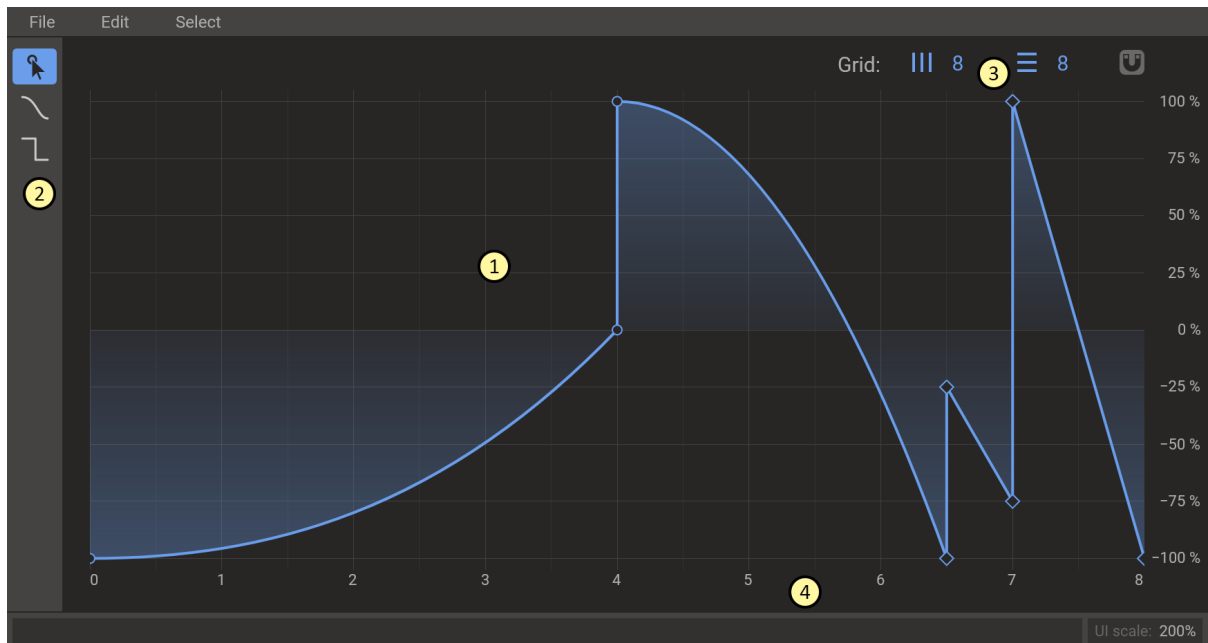
Blend

Adjusts the balance between side voices and the middle voices.

6 LFO Editor

The LFO editor can be used to create complex custom modulation curves.

6.8 Overview



1. The main area of the editor shows the LFO curve.
2. At the left side of the screen is the toolbar. You can enable different tools here. By default the selection tool is enabled.
3. On the top right you will find grid controls for horizontal and vertical grid divisions, as well as a magnet button for turning grid snapping on and off. You can also temporarily toggle snapping by holding down the ctrl/cmd (Win/Mac) key.
4. The view can be zoomed by using the scroll wheel on the horizontal axis below the curve, and panned by clicking and dragging on the axis.

6.9 Tools

6.9.1 Point tool

You can move control points around by clicking and dragging. Clicking and dragging on the curve rather than on a control points creates a new control point at that location. Right clicking on a control point toggles it between being a smooth or a hard point. Clicking and dragging outside of the curve or while holding down shift lets you select multiple points at once. Double clicking a point or pressing delete or backspace while a point is selected will delete it.

6.9.2 Free draw tool

The free draw tool allows you to, as the name suggests, freely draw any shape.

6.9.3 Stepped draw tool

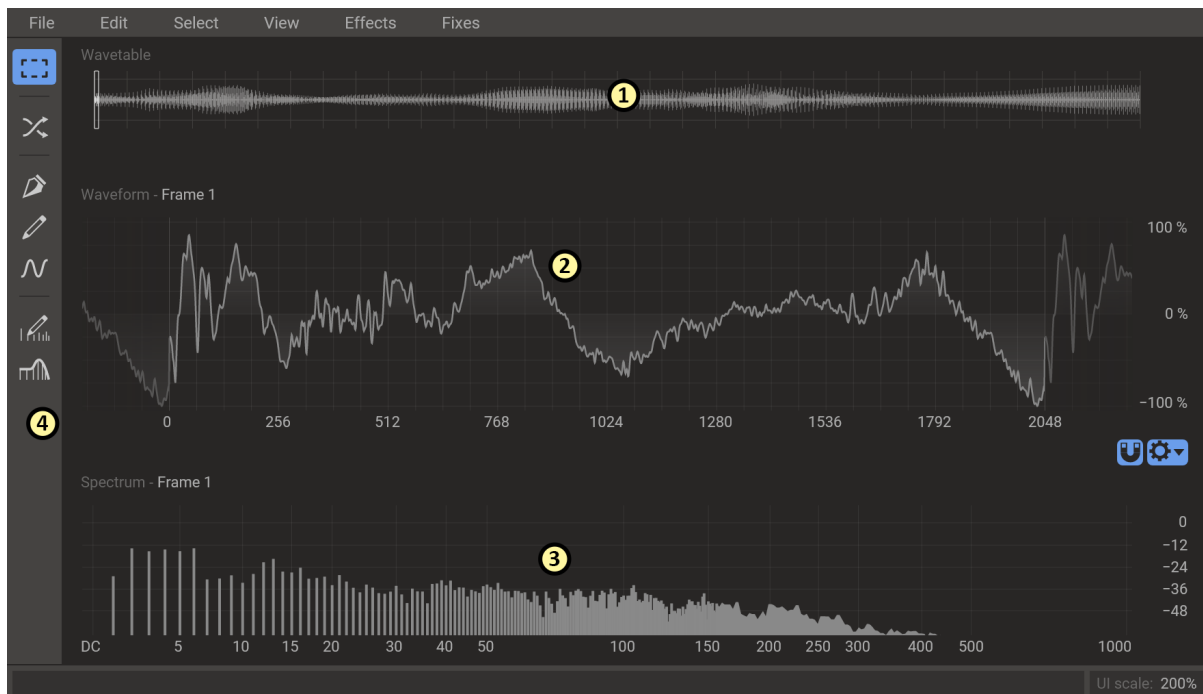
Stepped drawing will always use the horizontal grid and draw vertical bars, no matter if the grid snapping is enabled or not. This lets you draw patterns in a way similar to a step sequencer.

7 Wavetable Editor

Phase Plant has a very capable wavetable editor built in. You can use it to edit any wavetable, or even to create novel wavetables from scratch. The wavetable editor also has a powerful tool for converting any sample to a wavetable.

To launch the wavetable editor, click on the little pen button next to the wavetable selector on the wavetable oscillator. This will allow you to edit the currently loaded wavetable for that oscillator.

7.10 Overview



1. At the top of the screen you will see a miniature version of the whole wavetable. You can use this view for navigating between frames, and as we will see later, work with keyframes inside tools.
2. Below the wavetable view is the waveform view. This shows the waveform of the currently selected frame.
3. Below the wavetable view is the spectrum view. Here you can see the magnitude of all partials for the selected frame.
4. At the left side of the screen is the toolbar. You can enable different tools here. By default the selection tool is enabled.

You can pan and zoom the waveform view and the spectrum view by clicking and dragging or scrolling the mouse wheel on the horizontal and vertical axis.

7.11 Tools

Most of the tools in the wavetable editor are **modal** meaning that you enter a special mode when you enable the tool. When you have a modal tool enabled a tool options bar will appear at the top of the screen, under the menu bar. The tool options bar may contain some options and parameters for the tool. During the duration of the mode you can do several different non-destructive edits using the tool. The changes you make will be reflected in the sound that you hear as you play, even while editing. When you are happy with the result you click on the button labelled **done** in the tool options bar to commit your changes to the wavetable. Activating a different tool will also commit your changes. Clicking on the **cancel** button will discard your changes.

Most modal tools in the wavetable editor support **keyframe animation**. This powerful concept will allow you to create movement across the whole wavetable with a single application of a tool. You place keyframes on wavetable frames by clicking on the frame in the wavetable view and simply start to do edits with the active tool. A blue marker will appear under the wavetable view to show that a keyframe is placed there. You can drag and drop keyframes or delete them by double clicking.

Tools that work on a section of the waveform or the spectrum often have handles that appear above the view which lets you crossfade the edges of the edited region.

7.11.1 Selection tool

The default tool in the wavetable editor is the selection tool. It allows you to select parts of the wavetable, waveform or spectrum and copy and paste it. When pasting a piece of the waveform or spectrum a keyframe-enabled mode will be entered where you can transform the pasted section.

7.11.2 Morph tool

The morph tool allows you to crossfade between different frames in the wavetable. Simply place a keyframe on each frame you want to crossfade, and the intermediate frames will be filled in with a crossfaded version of the two neighboring keyframes. You can either do a **linear** or **spectral** morph.

7.11.3 Pen tool

The pen tool lets you draw a curve between several control points which can be animated across the wavetable using keyframe animation. The way you interact with the curve is similar to the LFO editor.

You can move control points around by clicking and dragging. Clicking and dragging on the curve rather than on a control points creates a new control point at that location. Right clicking on a control point toggles it between being a smooth or a hard point. The view can be zoomed by using the scroll wheel on the horizontal axis below the curve, and panned by clicking and dragging on the axis. The magnet button at the bottom left toggles snapping to the grid, and clicking the cogwheel allows you to adjust the grid resolution along both the vertical and horizontal axis.

7.11.4 Brush tool

The brush tool lets you freehand draw on the waveform view. Each frame you draw on will become a keyframe. Inbetween frames are interpolated linearly from the keyframes.

7.11.5 Wave tool

The wave tool lets you insert a standard waveform into a wavetable frame. The phase, frequency and position of the inserted wave can be adjusted and keyframe animated.

7.11.6 Harmonic Edit Tool

The harmonic edit tool will let you directly edit the partials in the spectrum view by freehand drawing. The result is interpolated similarly to the brush tool. If you zoom in small round widgets will appear under each partial which represent the phases of the partials. Click and drag these widgets to adjust the phases.

7.11.7 Filter Tool

The filter tool lets you apply a filter to the wavetable. Standard filter types are supported, and the slope of the filter can be set freely. All parameters can be animated across the wavetable using keyframes, which allows you to bake filter sweeps into your wavetables.

7.12 Sample conversion

A powerful feature of the wavetable editor is its ability to convert a sample to a wavetable. Drag and drop a sample onto the wavetable editor or browse for a sample using **File/Convert Sample** to start a conversion.

The conversion is implemented as a keyframe animated modal tool. The old wavetable data is still present underneath the sample data you are importing, and you can blend between them using the **mix** parameter.

When you have selected a sample to use, a visual representation of the input sample will be added to the UI over the wavetable view.

For conversion to work well the tool needs to know the root pitch of the sample. It will try to detect this automatically, but you can also edit the root pitch manually in the tool options bar. The pitch of each keyframe can also be offset from the root pitch by using the **pitch bend** parameter for samples where the pitch is not static. Playing around with the pitch bend can also create interesting effects similar to a formant shift.

Adjusting the **source** parameter for keyframes will let you adjust which location of the sample that they map to.

Since it is unlikely that the root pitch is spot on for the whole sample some phase drift will occur. The tool mitigates this problem by trying to align the phases. There are a few different strategies that can be used for this task that you can choose between. Try them out to see which one performs best for your use case.

7.13 Effects

In the effects menu at the top of the screen you will find many interesting effects that you can apply to your wavetable. All of these effects are modal tools whose parameters can be keyframe animated.

Automatic EQ

Applies equalization to the wavetable frames which will try to flatten out the spectrum somewhat to a gentle slope, while still preserving the finer detail in the spectrum. You can use this to clean up a wavetable where different frame vary wildly in spectral energy.

Comb Filter

Applies a comb filter. Since this effect is implemented in the frequency domain it can do some things that normal comb filter can't, like warping the comb pattern in the spectrum.

Disperse

This effect is similar to the Disperser plugin. It will add a phase shift to all partials which increases in amount for higher partials.

Phase Offset

Adds a phase offset to the wavetable frames. You can blend between a linearly frequency dependent phase shift, which simply offsets the waveform, to shifting every partial by the same angle.

Power Sync

Creates a novel sync-like effect to the wavetable.

Rectify

Rectifies the waveform, i.e. flips the negative part of so it's all positive.

Reset Phases

Resets the phases of all partials to a specified value. The effect can be blended.

Self FM

Phase modulates the waveform with itself as the modulator.

Sine FM

Phase modulates the waveform with a sine wave as the modulator.

Sync

Applies an effect to the waveform similar to oscillator sync.

Tilt EQ

Applies a sloped EQ curve to the waveform.

7.14 Fixes

In the **fixes** you will find some commands that can help you fix problematic wavetables. These are not modal tools, and will apply their effect immediately.

Normalize

Removes DC and normalizes the volume of all frames, measured using RMS. Also makes sure that no peak goes over 100%.

Remove DC

Removes any DC from the wavetable.

8 Acknowledgements

The 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
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