



# Zebra<sup>3</sup>



## USER GUIDE

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# Introduction

## About Zebra 3

Zebra 3 is a wireless modular synthesizer. Like its predecessor, Zebra2, it is uncompromisingly complex / comprehensive: Almost all parameters are valid modulation targets.

Zebra 3 panels only appear if they are in use. Add an oscillator to the grid and it will appear on the left, use an LFO anywhere and it will appear on the right. After some practice you should find programming Zebra 3 logical and lightning-fast... which ultimately translates to **more fun**.

Tip: Master the unique Zebra 3 oscillators by exploring **Zebralette 3** (freeware, included in the Zebra 3 installer but also available separately at [u-he.com](http://u-he.com)). Zebralette 3 presets can be loaded directly into Zebra 3, but please note that any **direct modulation** of [Pan, Volume and Width](#) as well as the effects will be removed in the process.

## Installation & Updates

Go to the Zebra 3 web-page and download the latest installer for your system (macOS, Windows, Linux). Unzip the compressed file, open the Zebra folder and start the installer.

While in demo mode Zebra 3 emits a crackling noise at irregular intervals. If you have already purchased a Zebra 3 license you can remove that restriction by using a [License Card](#).

During installation, files are written to the following locations by default:

### macOS

Presets (local)	<i>MacHD/Library/Audio/Presets/u-he/Zebra 3/</i>
Presets (user)	<i>YOU/Library/Audio/Presets/u-he/Zebra 3/</i>
Preferences	<i>YOU/Library/Application Support/u-he/com.u-he.Zebra3...</i>
Module presets	<i>MacHD/Library/Application Support/u-he/Zebra3/Modules/</i>
Microtuning	<i>MacHD/Library/Application Support/u-he/Tunefiles/</i>

### Windows

Presets (local)	<i>C:\Users\YOU\Documents\u-he\Zebra3.data\Presets\Zebra3\</i>
Presets (user)	<i>C:\Users\YOU\Documents\u-he\Zebra3.data\UserPresets\Zebra3\</i>
Preferences	<i>C:\Users\YOU\Documents\u-he\Zebra3.data\Support\ (*.txt files)</i>
Module presets	<i>C:\Users\YOU\Documents\u-he\Zebra3.data\Modules\</i>
Microtuning	<i>C:\Users\YOU\Documents\u-he\Zebra3.data\Tunefiles\</i>

## Online Resources

For downloads, news articles and support, go to the [u-he website](#)

For lively discussions about u-he products, go to the [u-he forum at KVR](#)

For video tutorials and more, go to the [u-he youtube channel](#)

For our soundsets and bundles, go to [u-he soundsets](#)

For third party presets, go to [Patchlib](#)

## Showtime...

To explore the wide range of sounds available in Zebra 3, click on the [Presets] button top left, then select the **Showcase** folder. For a random selection, click on the **Discover** smart folder.



## Team 2026 (Q2)

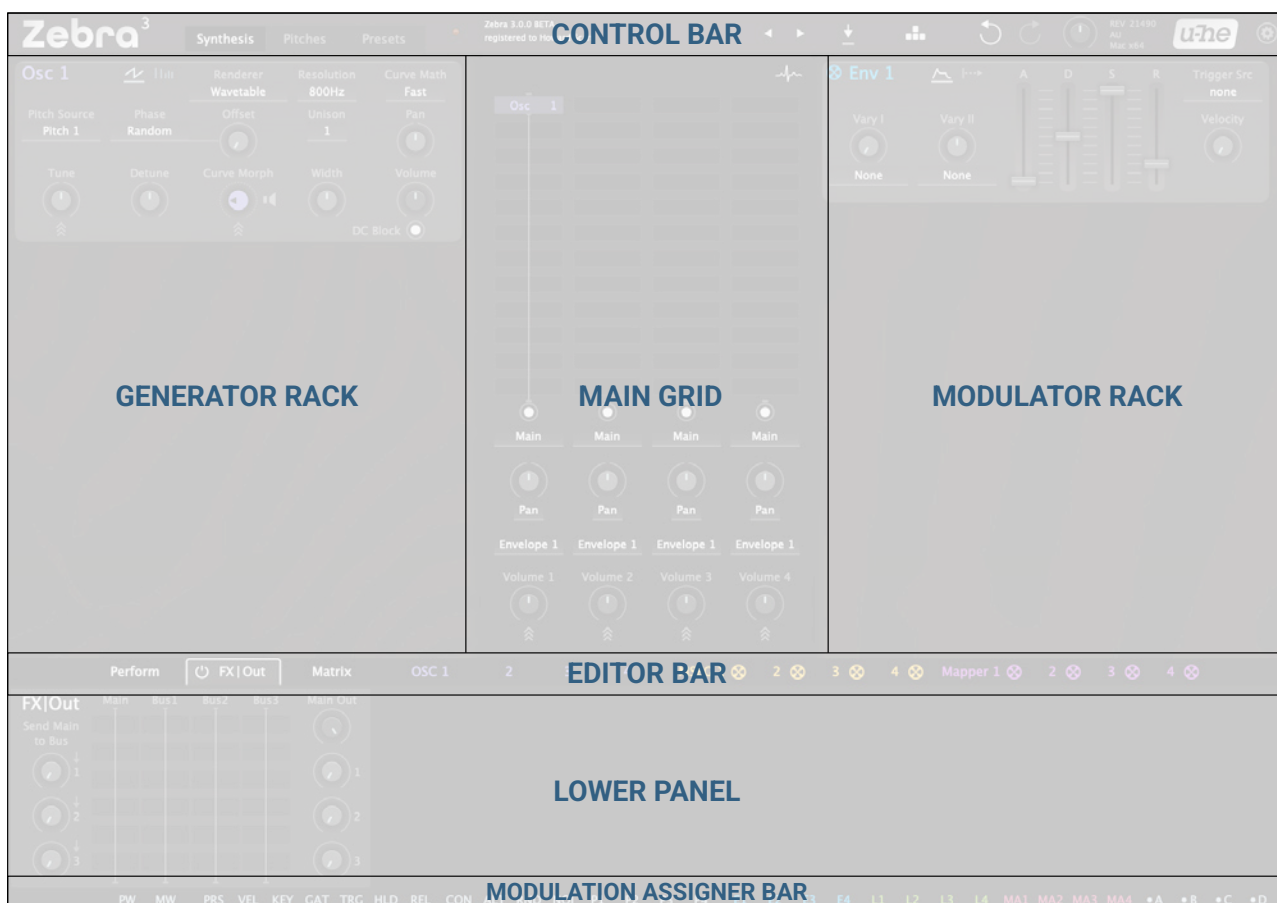
Urs Heckmann (concepts, code); Jayney Klimek (accounting, procurement); Howard Scarr (sound design, user guides, grump); Sebastian Greger (UI design, 3D graphics); Jan Storm (framework, hardware code); Oddvar Manlig (business development); Viktor Weimer (customer support, sound design); Thomas Binek (QA, betas, customer support); Henna Gramentz (accounting, customer support); Frank Hoffmann (framework, browser); Sebastian Hübert (media); David Schornsheim (framework, CLAP); Kay Knofe (hardware development); Sadjad Siddiq (DSP); Petros Karagkounidis (web dev); Simon Schrape (web dev); Henry Lau (accounting, customer support); Mine Hahn (DSP); Vadim Zavalishin (filter design, DSP), Yoel Kumbolu (sound design assistant)...

Thanks to alumni Alf Klimek (studio), Rob Clifton-Harvey (support), Tim Fröhlich (code), and Max Steimel (DSP). Special thanks to Philipp Granzin for his invaluable contributions to the UI design.

## The Interface

### Synthesis View

The three buttons to the left of the CONTROL BAR and the entire LOWER BAR affect the content of the central area and the lower panel, respectively. Here's a simple overview of the Zebra 3 panels when the **Synthesis** button is active:



Right-clicking anywhere in the background, but most reliably on the '**Zebra 3**' label, opens a menu offering GUI sizes from 50% to 200% in 10% steps. More permanent GUI size settings are available in the [Preferences](#).

## Footer Navigation

You can jump between sections of this user guide with the row of links at the bottom of each page. The link for the current section appears darker than all the others.

Some entries expand to show extra links below the main line. For example, selecting [intro](#) reveals [control bar](#) > [generator rack](#) > [main grid](#) > [lane mixer](#) > [modulator rack](#) > [perform](#) > [effects grid](#).

## Knobs and Switches

The knobs and envelope sliders react to click & drag (vertical) as well as to the mouse wheel. For finer steps, hold SHIFT before clicking the control or rolling the mouse wheel. Double-click to recall the default value.

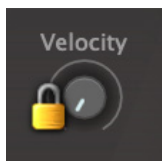
Right-click to *Add Modulation* assignments to the [matrix](#), remove again via *Remove Modulation*. At the bottom of this same menu is the 'Lock' option (see Parameter Locking below).

## ≡ Direct Modulation



Some parameters allow high resolution modulation within the module panel—click on the triple **chevron** below the knob to select a source. The modulation depth is adjusted via a small knob which appears to the left. For more details, see [Modulators](#).

## Parameter Locking



Right-clicking on any control and selecting *Lock* prevents values from changing when you switch presets, including module presets (see below). Note that locking doesn't prevent you from adjusting those values!

To unlock, right-click and untick *Locked*.

## Module Presets

Clicking on the title of a module opens a menu where you can copy/paste, save or load 'module presets'—snapshots of all settings, including modulation sources and depths. Use **Copy/Paste** to transfer settings between modules of the same type, even across different instances of Zebra 3.

**Save (module) Settings** opens an alert box where you can name the module preset before saving it. Your new module preset will appear in the menu the next time it is opened. Tip: Make sure you don't include any unwanted modulation sources before saving.

**Show in Finder / Explorer** takes you to the module presets folders (Factory and User). You will find your saved module preset files in the **User** folder—it is best not to mess with the factory presets! User-created folders—but not subfolders—will appear in the menu. Caveat: To update the menu, Windows and Linux users will need to close and reopen the GUI.

## Pips

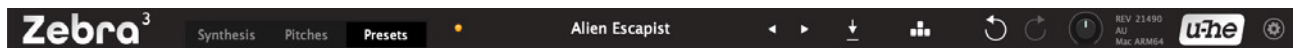


Each [modulator panel](#), as well as the MSEG and [Mapper](#) tabs in the [Editor Bar](#), includes a modulation source "pip" symbol for creating assignments via **drag & drop**—see [Drag & Drop Assignment](#). If unused, the pip appears as a 4-spoked wheel. If used at least once, it appears as a wave.

Note: The entire [modulation assigner bar](#) works in the same way, but without visible pips.

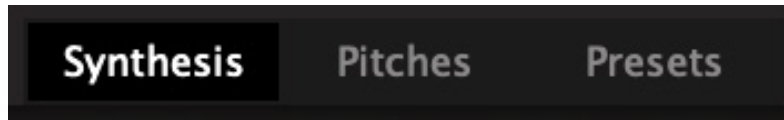


# Control Bar



The control bar at the top gives you access to several global parameters and a few utility functions.

## Synthesis | Pitches | Presets



These 3 "radio buttons" select what will appear in the main area:

**Synthesis** .....The two racks containing module panels, the main grid, and the lane mixer

**Pitches** .....The 4 [Pitches](#) panels (expanded **key follow** settings)

**Presets** .....The [preset browser](#).

Right-click and choose *Set as Default View* to specify which view will open for every new instance.

## MIDI Indicator

The small red dot to the left of the data display flashes whenever MIDI data is being received.

## Data Display



Apart from showing the preset name, the central text display has several other duties...

**Loading presets:** Click on the arrows step through presets, or in the middle of the data display to select a preset from the current directory. Another little helper: If you drag a preset from e.g. your desktop and drop it onto the Data Display, it will be loaded but not automatically saved.

**Show values:** While a parameter is being adjusted you will see its value.

**Initialize preset:** Whenever you want to program a new sound from scratch, right-click on the data display and select *init*.

## Save Preset



Clicking on the **[Save]** button opens a window where you can give your sound a name, enter your name (as author) and other details. For line breaks in the editable fields, use SHIFT+Return. The preset will be saved in the User folder by default (see [Preferences](#)). Hit Return to confirm.

Shortcut: cmd + [Save] (Mac) / alt + [Save] (Win) saves immediately, without the dialog box.

Right-click on **[Save]** beforehand to select a format: The standard, cross-platform compatible *.h2p* is recommended. The *.h2p extended* option is similar but allows comments on each line.

Clicking on the bottom entry, *Tag this Patch*, opens a window where you can specify CATEGORY, FEATURE and CHARACTER tags for the currently loaded preset. See [Preset Tagging](#).

## Key Control



Note: Key Control is work in progress!

Activate [**KEY CTRL**] then either click directly on an active element (knob, slider etc.), or use the cursor keys on your computer keyboard to navigate between them.

Highlight an element, type a number and press Return to confirm. You should see that value appear in the data display. For negative values, include a minus sign (–) any time after the first numeral.

Like double-click, **backspace** key resets the highlighted parameter to its default value. Use '+' and '-' keys to increment / decrement integer values (this also works for modulation source selectors). Hold **shift** for fine adjustments. Hold **option** (Mac) or **ctrl** (Windows) for larger steps if available.

Standard OS copy/paste and undo/redo shortcuts are also supported. For a video and discussion about these features, go to <https://www.kvraudio.com/forum/viewtopic.php?t=611856>.

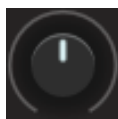
The Key Control 'box' around each element is its **active area**: You can click anywhere within that box and drag vertically to adjust the value—especially useful if you find that the modulation indicators are making it difficult to adjust the knob value instead of modulation depth.

## Undo / Redo



The curved arrows are used to fix recent 'mistakes'. The number of steps in the undo buffer is limited to 30, but as you can undo a change of preset, switching presets before saving doesn't mean losing any work.

## Master Output



The sum of the four outputs in the FX grid (Main, Bus 1, Bus 2, Bus 3). Normally set to 100%, a preset's volume can be boosted to 200% here if necessary.

## Version Info

The revision number, the plug-in format and computer platform.

## Badge

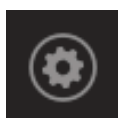


Click on the u-he badge to open a menu containing links to our homepage, to the documents folder containing this user guide, to our KVR support forum, to our presence in various social networks and to our YouTube channel.

[Install Soundset...](#) is a failsafe method of adding presets in *.uhe-soundset* format, but is usually only necessary for Linux users. *Import a License Card* activates an unlicensed Zebra 3 installation.

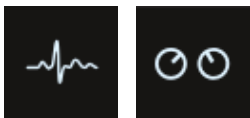
*Module Performance Meter* opens a window showing the CPU usage of your preset. As it is still **work in progress**, this feature will only be described in the next version of this user guide. For now you can watch this entertaining video, <https://www.youtube.com/watch?v=he33jQkjTaQ>, in which Urs describes how performance metering worked in the previous beta version of Zebra 3.

## Configuration

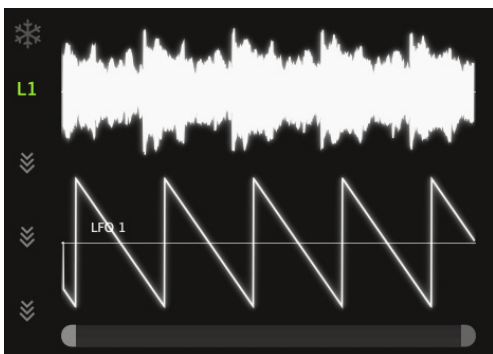


The cogwheel icon in the top righthand corner opens the global configuration pages where you can adjust the UI size and brightness as well as set up remote control of parameters via [MIDI CC](#).

## Oscilloscope



The button in the top right of the main grid switches between the lane mixer and an oscilloscope ('scope'), which defaults to showing stereo audio.



To zoom horizontally, adjust the scrollbar handles at the bottom. Hold SHIFT for finer resolution, double-click in the scrollbar to maximize again.

You can drag & drop any modulation source, or even the target field of a matrix slot, into the central area. The audio waveform will switch to a mono sum to make room.

To control the vertical order, drag & drop the modulation source onto one of the four chevrons instead. Alternatively, click there and select from the menu.

To remove a signal from the Scope again, click on its label and select the first entry, *none*.

The [**Freeze**] button (resembles a snowflake) takes a motionless snapshot of the signal. Click again to return to 'realtime' viewing. To see different parts of the frozen signal, zoom in using the pair of handles, then click on the bar between them and drag horizontally. For finer control, hold SHIFT. If the view bar gets too short, roll your mouse wheel instead.

Right-click in the display area to set *eco* (especially CPU-friendly), *fast* or *glow* display mode.

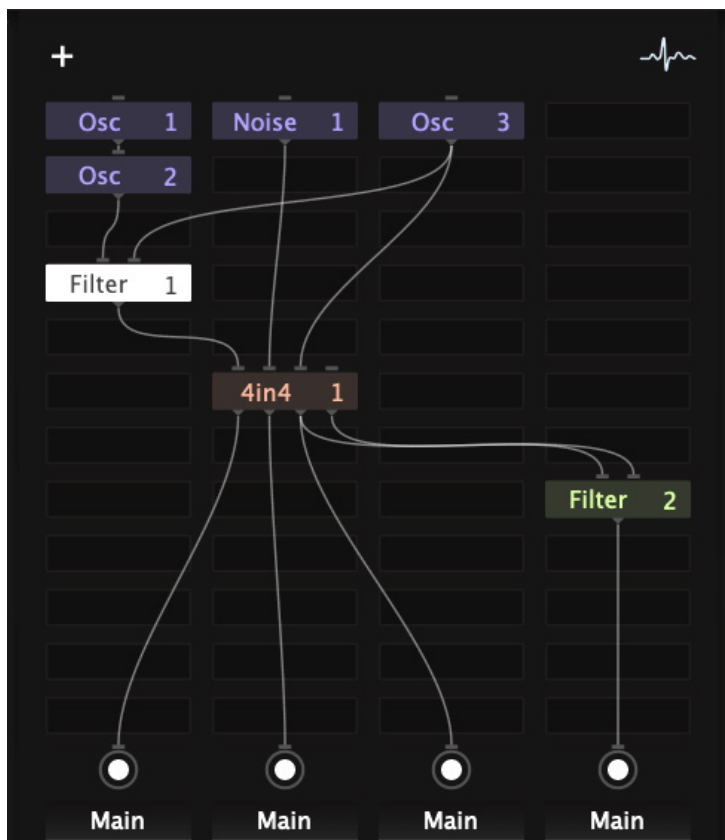
## Generator Rack

The area to the left contains panels for each active module in the [main grid](#). The module selected there is highlighted. If there is not enough room to show all active modules, a scrollbar will appear.

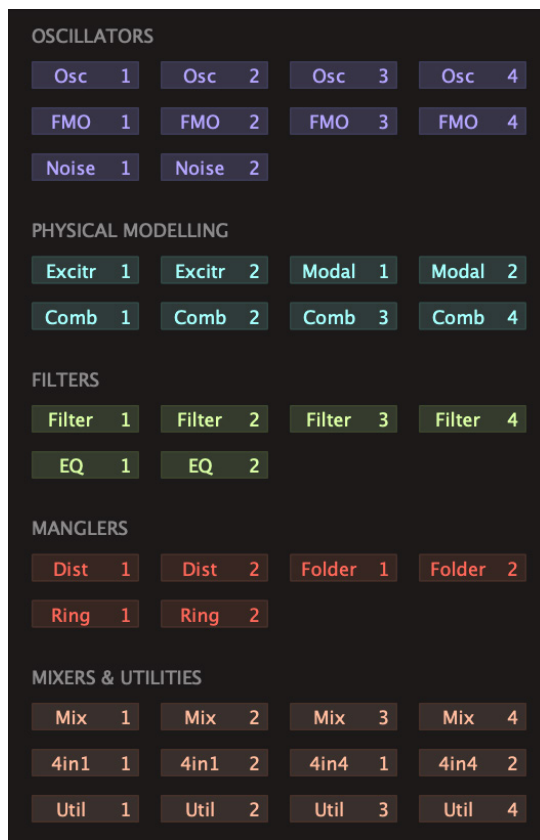


## Main Grid

In the middle of the Synthesis view is a large grid consisting of four vertical **lanes** which is used for patching generator modules together. The signal flow is from top to bottom, although inputs can be re-routed (note: the 4in4 mixers even have multiple outputs).



*main grid*



*module palette*

To add a module either left-click on an **empty cell** and select from the **palette** which appears on the right, or right-click and select from the large menu. Clicking on a module in the grid will highlight its control panel in the [generator rack](#), automatically scrolling if necessary.

**IMPORTANT:** As oscillators, noise generators and Exciters do not process audio, they simply allow signals above them to pass through. Instead of requiring a mixer, you can simply stack them up. In the example above, oscillators 1 and 2 are both routed into Filter 1: The two signals are effectively mixed together.

## The Module Palette

Clicking on an empty cell opens the module palette. Modules are colour coded, and sorted into the following types:

OSCILLATORS .....[oscillators](#), [FM oscillators](#), [noise generators](#)

PHYSICAL MODELLING .....[exciters](#), [modal resonators](#), [combs](#)

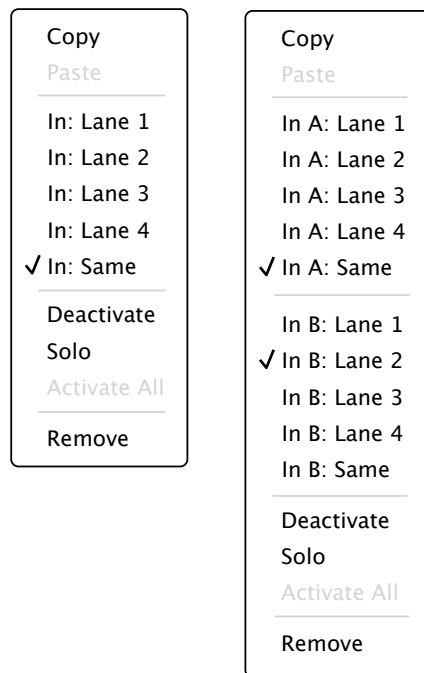
FILTERS.....[filters](#), [equalizers](#)

MANGLERS .....[distortion](#), [wavefolders](#), [ring modulators](#)

MIXERS & UTILITIES .....various [mixer](#) types, [utility](#) modules

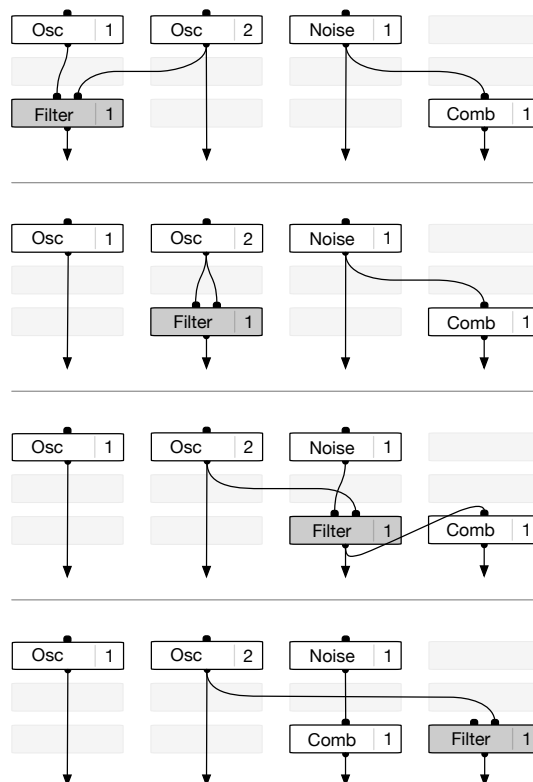
## Routing

Right-clicking on a module opens a dynamic context menu:



The menu shown on the right is for a filter, which has a sidechain input 'B' for audio rate [cutoff](#) frequency modulation. The main input is the current lane (Same), while the FM source is Lane 2.

This graphic shows how routing is **automatically** adjusted as the filter is moved to the right:

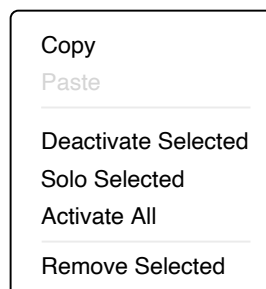


## Deactivate / Solo / Remove Modules

Double-click on a module in the grid to deactivate / mute it. If multiple modules are selected, right-click on any one of them and choose *Deactivate Selected*. For example, here's the simple but dynamic context menu of a [4in1](#) mixer:



*one module selected  
module has already been copied  
all modules are active*



*multiple modules selected  
module has not been copied  
at least one inactive module*

To **solo** one or more modules means deactivating all others in the grid. To 'un-solo' again i.e. unmute everything, select *Activate All*.

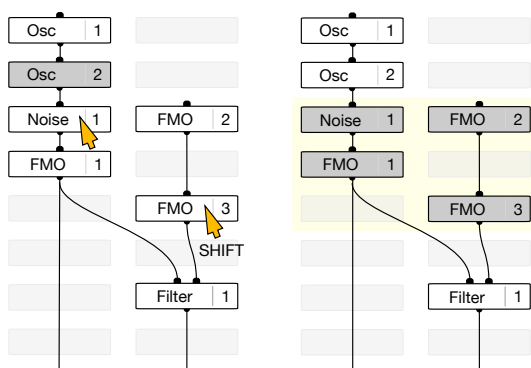
**Remove** is an alternative to option (Mac) / alt (Win) + double-click.

## Copy / Paste Modules

Settings can be transferred between modules of the same type without leaving the grid: Right-click on a module and select *Copy* from the menu. Right-click on another module of the same type and *Paste*. See also [Module Presets](#): The clipboard functions are identical and can be freely mixed (e.g. copy in the panels, paste in the grid).

## Module Groups

As the generator rack can fill up quickly and require scrolling, the 'Group' feature lets you focus on specific parts of your patch by hiding everything else:



Use shift + click to select a block of modules. In this example, the group includes Noise 1 and all 3 FMOs.

Use alt (PC) / command (Mac) + click to add or remove individual modules.

Click on any module to clear the group and reveal all panels in the generator rack again.

Groups can be saved...

## Saving and Naming Module Groups

Clicking on the [+] button above the grid creates a new **module group**. Double-click the field to give it a more descriptive name than the default 'New Group'. Click once to focus on the group, click again to clear.

If you want to redefine the content of a group after having added or removed modules, right-click on the group name and choose *Update To Selection*.

Up to four module groups can be saved per preset.



## Lane Mixer

Below the main grid is a 4-channel mixer with mute **[M]** function, [FX grid](#) routing, pan position and mode, amp envelope selector and Volume control for each lane.



\* **Panning** to the left (for example) moves some of the right input channel over to the left output. **Balancing** to the left fades out the right input channel.

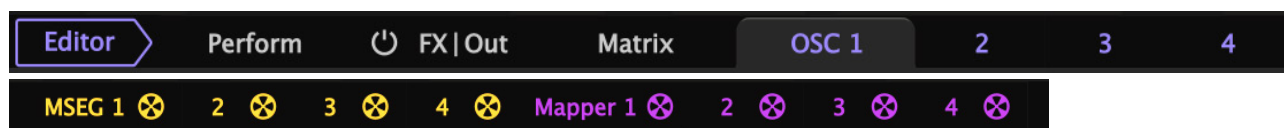
## Modulator Rack

The area to the right of the grid is dedicated to [envelopes](#), [LFOs](#), [MSEGs](#) (multi-segment envelope generators), [Mappers](#) and [Math](#) panels—anything to do with modulation that uses a panel. Unlike audio generators, **modulators** are not defined in the grid, but automatically appear when used.



## Editor Bar / Lower Panel

Below the racks and grid is a bar containing several tabs:



Note: The MSEG and Mapper tabs include drag & drop [modulation assigner pips](#).

## Editor / Exit

Opens/closes the main editor for the selected oscillator, MSEG or Mapper. Otherwise invisible.

## Perform (Keyboard +)

Global voice options, on-screen keyboard and performance controls:



## Voice Mode

*Poly* .....polyphonic: each note you play is assigned its own voice

*Mono* .....monophonic (single voice): each new note retriggers the envelopes

*Legato* .....monophonic: envelopes are only retriggered after leaving a space between notes

Notes: *Mono* and *Legato* apply **per MIDI Channel**, so using all channels is like having 16 mono synthesizers playing the same sound but with different MIDI controller settings.

## Overlap

Only available if the Voice Mode is set to *Legato* or *Mono*, and Reallocation is set to *Iterate*. Adds a characterful ringing effect by allowing a voice to release completely instead of being stolen by the next note. Note: Multiple overlaps up to the value of the Voices parameter are possible.

## Voice Allocation

How envelopes, Osc Phase etc. react whenever the number of played notes exceeds the number set by Voices (poly mode), or whenever a note is played on a channel in Mono/Legato Mode while another note is still playing / ringing out. Immediately available are the following:

*Continue* ..... The stolen voice is repurposed for the new note: envelopes continue from their current positions instead of restarting at zero. Modules that can be triggered (e.g. Exciters) will still receive a trigger signal. *Continue* emulates typical classic analogue synth behaviour.

*Iterate* ..... The stolen voice is quickly released while the new note is started. For a brief period, more voices can be audible than the Voice setting (most digital synths work this way). The release rate of such 'Ghost Voices' is determined by the [Discharging](#) parameter (see below).

Mono/Legato with *Continue* reuses the same voice per MIDI channel. In Poly mode, *Iterate* is more common, but higher CPU usage and possible voice stealing can still favour *Continue*, e.g. for pads.

## Voice Allocation Context Menu

Right-click on the Voice Allocation field to open a menu of further options...

---

### Duplicates (how do we handle notes that are the same?)

- Allow Duplicates* .....duplicate notes are assigned new voices i.e. the older matching notes are not replaced—which means that duplicate notes can stack up
- Allow on other channels* .....duplicate notes received on the same MIDI channel will either reuse or fade out the older matching notes, depending on the Voice Allocation setting (*Continue* = reuse, *Iterate* = fade out)
- Never Allow* .....duplicate notes fade out all matching notes across all MIDI channels
- 

### Steal Strategy (which voice do we steal?)

Only available when the Voice Allocation is *Iterate*. If absolutely no idle voice is available, a voice that is currently playing must be 'stolen' and repurposed...

- Steal Closest* .....Steals the voice whose pitch is closest to the new note: Good for holding chords and playing lead lines on top
- Steal Oldest* .....Steals the voice that has been playing for the longest time: Good for playing fast runs while not sustaining many notes
- Adaptive Stealing* .....A hybrid of the above: Chooses the closest in pitch from voices in their Sustain phase (amp envelope) and the oldest from voices in their Release phase

Note: The setting also determines which voice is faded out or continued when 'Voices' is exceeded.

---

### Steal Method (what do we do with the stolen voice?)

Only available if Voice Allocation (see above) is set to *Iterate*. Comes into play when there is no idling voice available for a new note. In that case, a **currently playing** voice must be chosen using the 'Steal Strategy' (see above) and quickly repurposed by one of the following methods:

- Continue Stolen Voice* .....If Voice Allocation is *Iterate*, it is briefly switched to *Continue*. Fast and mostly click-free, this option sometimes causes inconsistent attacks
- Steal with Min. Latency* .....Minimize latency: The stolen voice is faded out within a millisecond, the voice restarts and envelopes are triggered immediately. Fast, with consistent attacks, but can result in audible clicks
- Steal with Min. Clicking* .....Minimize clicking: Up to 5 ms of latency is added before a new envelope is triggered, allowing the stolen voice to fade out first. Often acceptable latency, virtually click-free with consistent attacks

## Discharging

"Discharging" here means putting a voice into a stable condition before the next note starts.

Whenever the [Voices](#) limit set by the user is exceeded in *Iterate* mode (see Reallocation above), the excess voices (whether *closest*, *oldest* or *adaptive*) must be faded out. Discharging specifies how quickly this happens: Either *Instant* (about 1ms), *Fast* (~10 ms) or *Smooth* (~50 ms). Set *Instant* for the fastest response with the occasional click, and *Fast* or *Smooth* if you wish to reduce the risk of clicks at the cost of a slightly slower response. See also [Overlap](#).

## PW | MW

The standard pair of performance controls **Pitch Wheel** (center sprung) and **Modulation Wheel**.

## Voices (polyphony)

The maximum number of notes (from 1 to 16) allowed to play at the same time. The default lets you play up to 8 notes at once—higher values will be more CPU intensive. Note: With Voicing set to *Mono* or *Legato*, this still sets the maximum number of voices available across all MIDI Channels.

## Transpose, Pitch Bend

These two mirror the values in [Pitch 1](#) for quick access to the most important parameters in the most commonly used Pitch module. See [Transpose](#) and [Pitch Bend](#) a few pages down.

## MPE

Activates *multichannel polyphonic expression*. For details, see [MPE](#) (MIDI Specialities chapter).

## Microtuning

Zebra 3 supports the relatively popular **TUN** format. If you look around the Internet you can find hundreds of tables, most of which are free. Clicking on the selector opens a menu containing a list of microtuning tables plus *Show in Finder/Explorer*. After selecting a microtuning file here, switch it on using the button to the left.

Zebra 3 also supports [Oddsound](#) **MTS-ESP**, a system for microtuning multiple plug-ins within a DAW environment. The freeware 'Mini' version is all you need to get started. MTS-ESP can be overridden by activating Zebra's own microtuning, for instance with the *.tun* file *Default Scale*.

## Keyboard

Playable by clicking or dragging. A double-click latches the note—click any key to unlatch again. The Key Follow modulation source appears as KEY in the [Modulation Assigner Bar](#).

## Control A | B | C | D

User-definable ([MIDI CC](#)) performance controls. The knob values are not saved with the preset.

The button below each knob activates **Bipolar** mode, with zero at the centre... but **CAUTION!** In the current version, knob positions are not affected. 0.00 will become -100.00, and if the control knob was set to **reduce** something e.g. a Volume, or Delay feedback, switching Bipolar on will immediately **increase** that parameter. Take care of your speakers and ears!

## Baking

Knob values can be 'baked' into all modulation targets: If you are particularly happy with the sound at a certain position of Control A, for instance, and would like that to become your new zero point, right-click on the knob and select 'Bake Modulation'. You can then remove the assignment(s)...

**Note:** This feature is work in progress. You will need to **left-click once** on the knob before trying to bake its position—baking is disabled if the most recently received value was via MIDI CC.

These sources appear at the far right of the [Modulation Assigner Bar](#) as ●A, ●B, ●C and ●D.

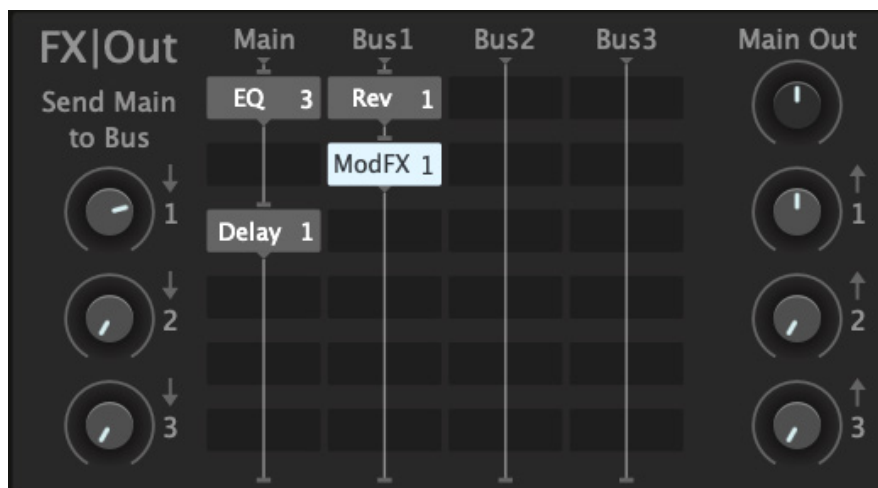
See the [Audio & MIDI](#) preferences and [Per Instance Control](#).

## FX|Out

### The Effects Grid

The principle of the FX grid is the same as the main grid except that it is not per-voice, but 'global'.

**Remember:** Use the [FX Bus Selector](#) below the main grid to route signals into the effects grid.



To add a new module, click on an empty cell. Double-click a module to (de)activate, alt+click to remove, right-click to select its input(s). For details about each effect see the [Effects](#) chapter.

### Effect presets and bypass

Click on the panel label to copy, load or save **complete effects setups** as 'module presets'.

To bypass all effects, click on the button to the left of the FX|Out label in the [editor bar](#).

### Send

The three knobs to the left of the FX grid route the input of the Master (M) lane directly into the other three lanes. In the above example, the Reverb is receiving 75% signal from the Master lane (without EQ or Delay), as well as anything routed into bus 1 from the [main grid](#). Tip: Modulating the reverb send level (Send 1 here) often sounds smoother than modulating its Dry/Wet mix.

### Levels

The knobs to the right of the FX grid set the output levels for each lane: Main, Bus 1, Bus 2, Bus 3.

### Effects panels

Panels for active effects appear to the right of the FX grid. The lane in which the effect or string of effects sit is indicated to the left of the first panel in each lane (vertical text):

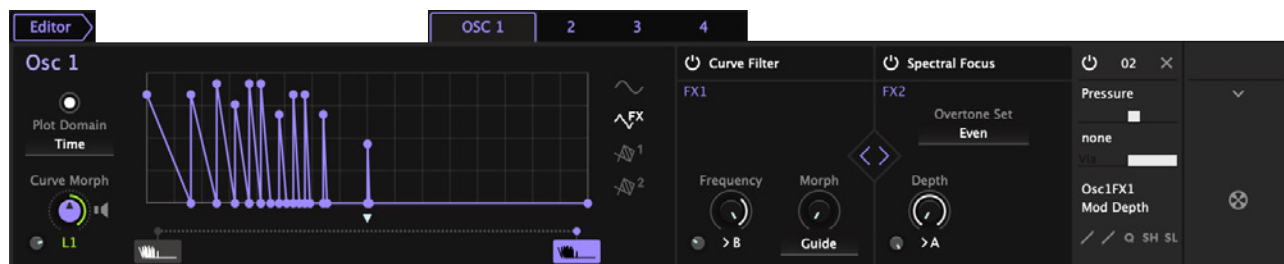


## Matrix

Opens the modulation matrix where you can connect 'modulation sources' to 'target parameters'.

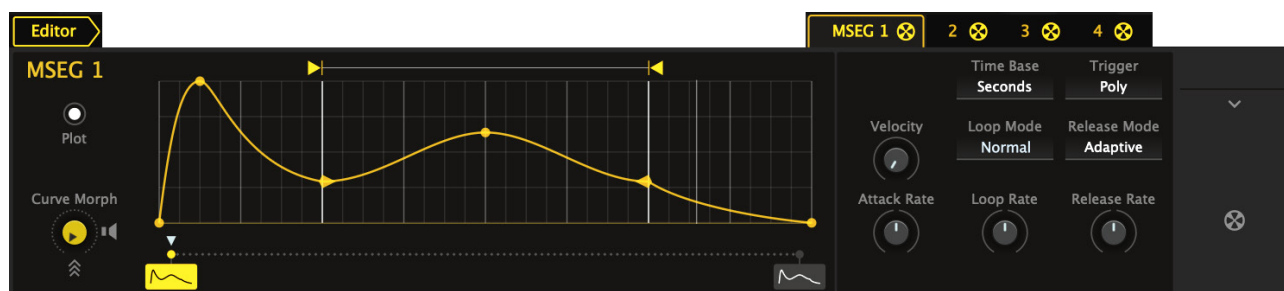
For details, please refer to the dedicated [Modulation Matrix](#) chapter.

## Oscillators



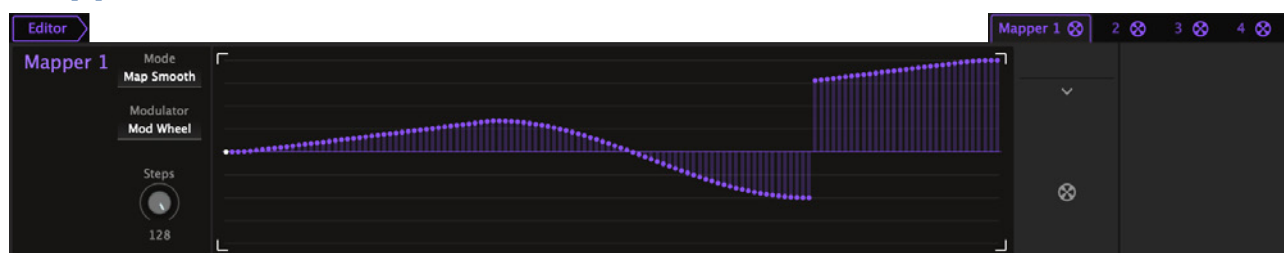
These buttons open the **Easy Editor** panels for each oscillator, which in turn can access the Main Editor with its toolbox and many options. For details, go to the [Oscillator](#) chapter.

## MSEG



These buttons open the **Easy Editor** panels for each MSEG. For details, go to the [MSEG](#) section.

## Mapper



These tabs open the [Mapper Easy Editor](#) panel for each Mapper. If a Mapper is used as a mod source, a simplified version of its Rack Editor will appear in the Modulator Rack (unless the [Hide MSEGs and Mappers](#) preference is active). Note: These tabs include [modulation source pips](#) you can drag and drop onto any valid target.

## Modulation Assigner Bar

PW	MW	PRS	VEL	KEY	GAT	TRG	HLD	REL	CON	ALT	RND	NOI	P1	P2	P3	P4
E1	E2	E3	E4	L1	L2	L3	L4	MA1	MA2	MA3	MA4		•A	•B	•C	•D

The narrow strip along the bottom of the window gives you access to most modulation sources for [Drag & Drop](#) assignment, which remotely populates the modulation matrix. The modulation source abbreviations (MW, PW etc.) are listed in the [MIDI Sources](#) section.

You will find 'pips' for assigning the **MSEGs** and **Mappers** in the [Editor Bar](#). For details about the Modulation Assigner Bar and Modulation Assigner Pips, see the [Drag & Drop Assignment](#) section.



# Pitches

To open this view, click on the **[Pitches]** button in the control bar:



## Concept

Traditionally, the pitch control settings **key follow**, **pitch bend**, and **glide rate** are 'global' i.e. they apply to all oscillators and filters in the synth. While key follow is often adjustable per module, pitch bend range(s) and glide rate seldom are.

Zebra 3 addresses these limitations by means of four advanced pitch modulation sources, which not only replace key follow but also serve as versatile, general-purpose modulators.

## Pitch Source selectors

Each OSC, FMO, filter, modal resonator and comb module lets you select either a simple *Key Follow* (without any pitch bending or glide), or one of four almost identical Pitch modules...

## One leader, three followers

Pitch modules 2, 3 and 4 adopt settings from Pitch 1 unless individual sections in these 'follower' modules are activated by clicking on the [ << ] switches.

## Tuning

### Tuning Type

<i>Key</i> .....	Normal tuning. The Key Follow range is -200% to +200%.
<i>Overtone</i> .....	The first 24 overtones in the harmonic series, via the Value knob. Note that octaves are not evenly spaced but are at 1.00, 3.00, 7.00 and 15.00. Similarly, fifths are at 0.50, 2.00, 5.00, 11.00, 23.00. Rule: "Double the previous, plus one."
<i>Undertone</i> .....	The first 24 'subharmonics'. Again, the octaves aren't evenly spaced but are at -1.00, -3.00, -7.00 and -15.00. For details about the undertone series, go to <a href="http://en.wikipedia.org/wiki/undertone_series">http://en.wikipedia.org/wiki/undertone_series</a> . You might also be interested in Oskar Sala's 'Mixtur-Trautonium', which applies subharmonic oscillator tuning: <a href="https://en.wikipedia.org/wiki/Oskar_Sala">https://en.wikipedia.org/wiki/Oskar_Sala</a> .
<i>Hertz</i> .....	Fixed frequency, no key follow. <b>2.00 = 1 Hz!</b> Use Modify/Multiply (see below).
<i>Hertz x 10</i> .....	Like <i>Hertz</i> but 10 times faster
<i>Hertz x 100</i> .....	Like <i>Hertz</i> but 100 times faster
<i>Kilohertz</i> .....	Like <i>Hertz</i> but 1000 times faster

Note: Tuning in *Hertz* or *Kilohertz* will not be 100% perfect. The Value (see below) is based on Volts per octave, which is exponential, and precision is affected by rounding and truncation of floating point numbers anyway. Tip for those of us who need maximum precision here: Use an audio spectrum analyzer that displays peak frequencies.

### Source Key

Which MIDI note to use for pitch. Doesn't apply to *Hertz* or *Kilohertz* tuning types.

<i>Current</i> .....	The most recently played note
<i>Lowest</i> .....	The lowest note currently being played
<i>Highest</i> .....	The highest note currently being played
<i>2nd Lowest</i> .....	The second to lowest note currently being played
<i>2nd Highest</i> .....	The second to highest note currently being played
<i>Oldest *</i> .....	The earliest note still being played
<i>First *</i> .....	Like <i>oldest</i> , but the pitch is generally retained for a longer time—it will only be updated after all notes have been released and a new note is played
<i>Previous</i> .....	The note played immediately before the most recent one

\* The difference between *Oldest* and *First* can be quite subtle.

### Value

Offsets pitch according to the chosen tuning Type (see above). Replaced by Key Follow if the Type is set to *Key*. A curious detail: Even though the range of the Value parameter is 0.00 to 24.00, none of the Type options actually interprets Value as semitones!

### Key Follow

Only available if Type is set to *Key*. -200% to +200%: Double-click to reset to the default 100%.

### Transpose

Shifts the pitch in semitones within an 8 octave range (−48 to +48). Disabled for all *Hertz* options. Mirrored in the [Perform](#) panel.

## Modify

A value between -50.00 and 50.00, the meaning of which is determined by Modify Mode...

## Modify Type

Specifies how Modify affects tuning.

*Cents* ..... Detune by +/- 100 cents (each integer step is actually 2 cents)

*5 Hz* ..... Detune by +/- 5 Hertz (tuning is independent of the MIDI note)

*Beats* ..... Similar to 5 Hz, but host-synced. 1.00 = a 4/4 bar, 4.00 = a quarter note

*Multiply* ..... Multiply or divide by a constant (e.g. -8.00 will divide the frequency by 8).

Note: All values between -1.00 and +1.00 are interpreted as 1.00.

## Calibration

### Type

Choice of three kinds of pitch manipulation:

*Uncalibrate* ..... Reduces tuning precision for a more traditional analogue character

*Hypercalibrate* ..... 3-note chords are analysed and retuned to minimize beating

*Destabilize* ..... Moving instability akin to tape 'wow and flutter'

### Amount

From none (0.00) through fairly subtle (50.00) to exaggerated (100.00).

## Pitch Bend

### Up, Down

Independent up and down ranges for pitch bending directly from the pitch wheel. The options are 0 to 24 semitones in single semitone steps, 36, 48 (all +/-), or [MPE](#).

Tip: As there's no menu here it is easiest to set these values by rolling your mouse wheel instead of clicking and dragging. Note: The Pitch 1 bend ranges are mirrored in the [Perform](#) panel.

## Glide

A smooth pitch transition between consecutive notes. Glide is applied to all modules that include a Pitch Source selector (oscillators, FMOs, combs, filters, ring modulators and modal resonators).

### Amount

Glide strength. See Mode on the next page.

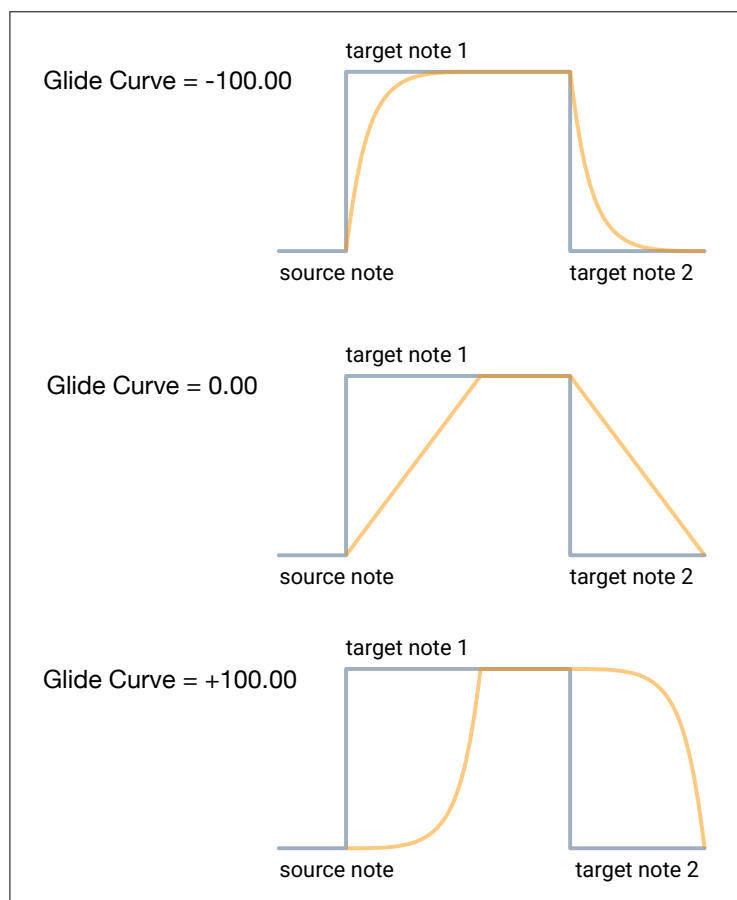
### Range

Lower values shift the start of the slur closer in pitch to the target note. Lower ranges can be used to make the 'swoop' of polyphonic glide much more subtle without affecting the time taken.

If Mode (see the next page) is set to *Auto Up* or *Auto Down*, the Range control determines the bend interval. As the total bend range is two octaves (24 semitones), each semitone corresponds to approximately 4.17% of the full range ( $100 / 24 = 4.166666...$ ), so for a precise 5-semitone auto bend you will need to set the Range to 20.83 (closest approximation of  $5 \times 4.166666$ ).

## Curve

Negative values speed up the first part of the glide while slowing down the final part. Positive values do the opposite: they slow down the first part of the glide while speeding up the final part.



## Mode

*Rate* .....the glide **rate** is kept constant so that wider intervals result in longer glides

*Time* .....the glide **time** is kept constant, however wide the intervals between notes

*Auto Up* .....automatic pitch bend from a lower note (max. 2 octaves)

*Auto Down* .....automatic pitch bend from a higher note (max. 2 octaves)

## Trigger

*Always* .....glide between successive notes

*Legato* .....only glide between overlapping notes

*Retrigger* .....only glide between non-overlapping notes

## Vibrato

A simple sine wave modulating pitch, with **Rate** and bipolar **Depth** control.

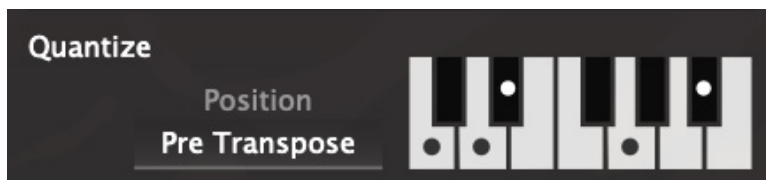
## Modulation

Specify a pitch modulation **Source** (e.g. MSEG1) and set the **Depth**. Note that pitch modulation here is calculated at the same rate as direct Tune modulation in the oscillator panels (i.e. faster than via the modulation matrix).

## Quantize

### Note Selector

Click on keys in the octave graphic to quantize incoming MIDI notes i.e. force the Pitch module to output the closest selected notes only. For instance, here's a C minor 9th chord (C, D, Eb, G, Bb):



### Scale presets

Right-click on a specific key to select a preset scale from the menu—the selected scale will appear with the clicked note as its root. The *Clear* function at the bottom of the menu removes all notes.

Chromatic

Minor

Melodic Minor

Harmonic Minor

Minor Pentatonic

Blues

Major

Major Pentatonic

Phrygian Dominant

Diminished

Dorian

Locrian

Lydian

Lydian Augmented

Mixolydian

---

Clear

---

Lock

### Position

Specifies where (within the pitch control path) notes are quantized. The choice of processing order allows several forms of generative music and note sequencing, e.g by LFOs, Sample & Hold etc..

*Pre Transpose* .....normal Transpose, normal Modulation, normal Glide

*Post Transpose* .....quantized Transpose, normal Modulation, normal Glide

*Post Modulation* .....normal Transpose, quantized Modulation, normal Glide

*Post Trans+Mod* .....quantized Transpose, quantized Modulation, normal Glide

*Post Glide* .....quantized Transpose, quantized Modulation, quantized Glide

Note that quantization always happens before any [Microtuning](#), whatever the Position setting. However, Modify (see above) is applied last i.e. after quantization.

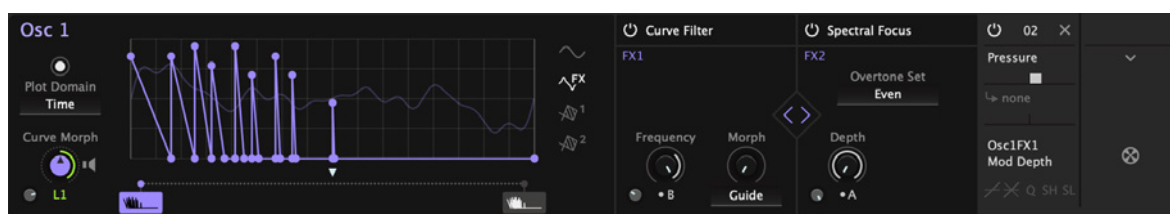
# Oscillator

## Overview of Panels

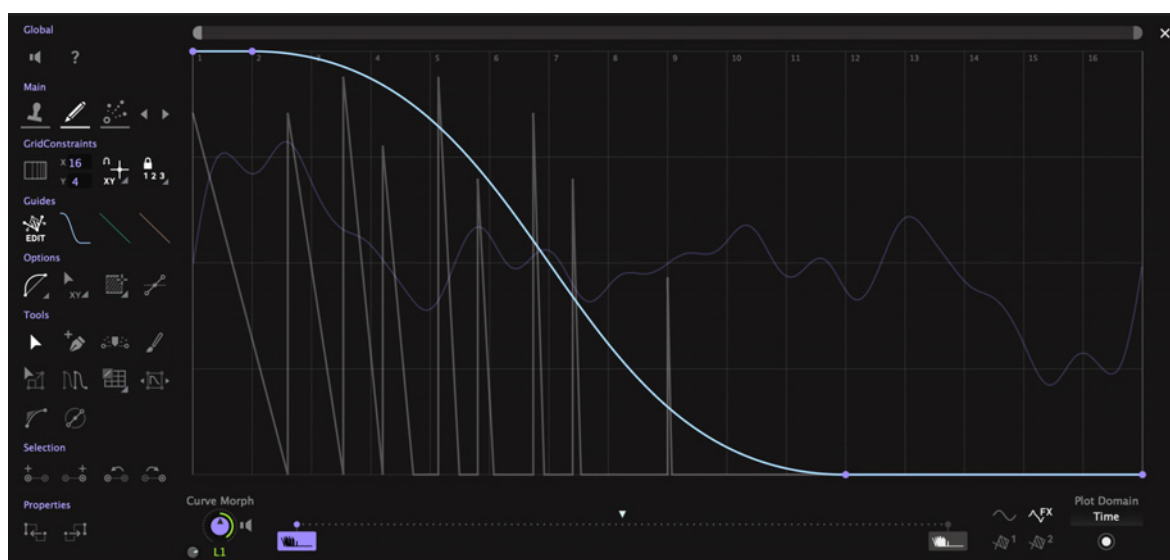
The oscillator **rack panel**:



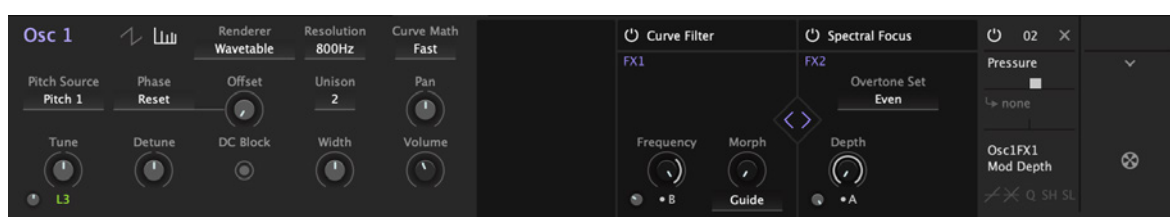
Clicking on an oscillator module in the grid or an **[OSC]** tab in the editor bar reveals the oscillator's **lower panel** with its [Easy Editor](#), [oscillator FX](#), and any relevant parts of the modulation matrix:



Clicking on the **[Editor]** button to the left of the editor bar not only reveals the [Main Editor](#)...



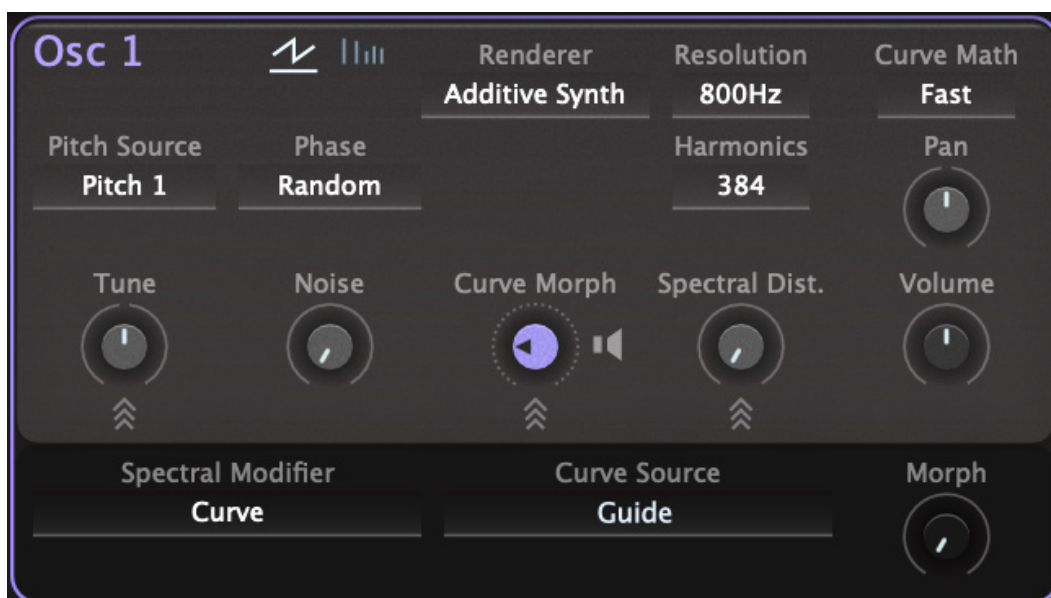
...but also replaces the easy editor with a version of the [Rack Panel](#) (the first image above):





## Rack Panel

The appearance of the oscillator panels in the rack depends on the selected [RENDERER](#):



### Osc Source (unlabelled)



**BE CAREFUL** when switching to **Curve Spectrum**: A simple triangle or sine curve can be very loud and harsh!

The drawn curves can be interpreted in two different ways...

*Curve Geometry* .....The Curve Set directly represents waveforms in the time domain.

*Curve Spectrum* .....The Curve Set represents waveforms in the **frequency domain**. In this mode, the amplitudes of 1024 harmonics are distributed logarithmically across the spectrum, spanning roughly 10 octaves.

Note: You will find a quick guide to additive synthesis in the [Tips & Tricks](#).

### Renderer

Specifies how the final waveform is rendered, either in the form of a classic wavetable, or 'additive' with up to 1024 sine wave oscillators.

<i>Wavetable</i> .....	Renders the waveform like a classic wavetable synthesizer, updating at the rate set by the <a href="#">Resolution</a> parameter.
<i>Additive Synth</i> .....	Reproduces the spectrum of the waveform using a number of partials (sine waves) set by the <a href="#">Harmonics</a> parameter. As these are free-running and independently tunable, they can easily create inharmonic sounds.  Note 1: The phases of harmonics will gradually drift apart over time. This is intentional—numerical precision is traded for faster computation here.  Note 2: Oscillator effects that rely on altering the phase of harmonics, such as <i>Dissociate</i> , often have little effect in Additive Synth mode. However, they can become noticeable when processed in FX2 (e.g. by Wrap & Zap).  Setting Additive Synth rendering opens a sup-panel whose parameters change dynamically according to the chosen <a href="#">Spectral Modifier</a> .

## Resolution

The frequency of waveform calculation (200 Hz, 800 Hz or 2000 Hz). The slowest setting (200) is usually fast enough—only in certain cases do the higher, more CPU-intensive resolutions deliver smoother results. Let your ears decide, but go easy on your CPU!

## Curve Math

This setting balances the precision of curve calculation against CPU usage:

<i>Precise</i> .....	the cleanest but most CPU-intensive option
<i>Fast</i> .....	a good compromise, usually sounds identical to <i>Precise</i>
<i>Rough</i> .....	minimum CPU usage at the expense of some precision

Note: the effect of this parameter also depends on your computer's CPU instruction set.

## Pitch Source

Selects either simple Key Follow or one of the [Pitch modules](#).

## Phase

<i>Random</i> .....	If the Renderer (see above) is <i>Wavetable</i> , the oscillator phase is reset to a random value each time a note is played. If the Renderer is <i>Additive Synth</i> , the phase of <b>each harmonic</b> is independently randomized.
<i>Reset</i> .....	Ensures that each note starts at the same phase. If the Renderer is set to <i>Additive Synth</i> , the phases of individual harmonics are unaltered.

## Offset

Only available if the Renderer is set to *Wavetable*. Bipolar phase shift, -180° to +180°. For a static offset, use Constant as source in the [modulation matrix](#).

## Unison

Only available if the Renderer is set to *Wavetable*. Specifies the number of stacked oscillators from 2 to 16. Because unison 'voices' are processed in **blocks of four**, CPU-usage does not rise linearly: For instance, Unison = 5 requires significantly more CPU power than Unison = 4, but Unison = 8 is no more CPU-intensive than Unison = 5.

## Pan (panorama)

Shifts the stereo image to the left or right.

## Tune

Pitch offset below / above standard. The range is -48 to +48 semitones.

## Detune

Only available if the Renderer is set to Wavetable. The function depends on the **Unison** setting: With Unison at 1 it fine tunes within a range of +/- 50 cent, while for all other values it spreads the tuning of the unison 'voices'.

## Curve Morph

Position within the oscillator's [Timeline](#). **Direct modulation** of this parameter generally operates at a higher [resolution](#) than indirect modulation via the modulation [matrix](#).

## Listen (loudspeaker icon)

For checking the sound of individual Curves while the oscillator's editor is open (the button also appears in the rack panel as a reminder in case you forget to disable it after using the main editor).

While Listen is activated, only the selected Curve in the [Timeline](#) is audible—the Curve Morph value and any modulation thereof are ignored ('Curve Morph Disabled' appears in the editor).

Note: Listen status is global and is not saved with the preset—remember to disable it afterwards!

## Width

Only available if the Renderer is set to Wavetable. Controls the stereo width when **Unison** is greater than 1, otherwise unused.

## Volume

Oscillator output level.

## DC Block

Only available if the Renderer is set to Wavetable. Removes 'Direct Current' (static offset components of a signal) as well as any extremely low frequencies. See also the [Utility](#) mode *Signal*.

## Spectral Modifier

Only available if the Renderer is set to Additive.

*Expansion*.....Stretches harmonics up one octave. At maximum Spectral Distortion the result is odd-numbered harmonics only.

*Compression*.....Compresses all harmonics down towards the fundamental.

*Curve* .....Shifts overtone pitches according to the Guides or Curve Set. Note: Like the other two options, the fundamental is not affected.

Depending on the selected mode, the **Morph** knob either morphs between Curves or crossfades between the Guides (Guide #2 = 50.00).

Note: While editing source curves for this modifier, the Harmonic Grid view is often best, as each vertical line corresponds to a particular harmonic. Zoom in to view more grid lines / harmonics and their indices (numbers).

Negative Y values along the curve bend pitches towards the fundamental, while positive values bend them upwards. The range increases with the harmonic index, peaking at about +/- an octave.

*Harmonic Clusters* ..... At maximum Spectral Distortion this mode organizes the spectrum into equally spaced 'clusters' according to a pattern set by Cluster Select...

#### Cluster Select

0	Even Harmonics
10	Odd Harmonics
20	Every 3rd harmonic, starting from the 2nd
30	Every 3rd harmonic, starting from the 4th
40	Every 4th harmonic, starting from the 2nd
50	Every 4th harmonic, starting from the 5th
60	Every 5th harmonic, starting from the 2nd
70	Every 5th harmonic, starting from the 6th
80	Every 6th harmonic, starting from the 2nd
90	Every 6th harmonic, starting from the 7th
100	Every 7th harmonic, starting from the 2nd

Intermediate values are crossfades: The pitches of clusters are shifted while retaining the relative tuning. Tip: Unwanted beating effects created by Spectral Distortion can often be remedied by adjusting the [Noise](#) knob.

*Log Clusters* ..... Similar to Harmonic Clusters, but instead of clusters being spaced evenly across the spectrum, they are distributed in a way that ensures equal energy across the spectrum. Starting with 3 clusters, at maximum level 10 clusters are spaced precisely octaves apart—great for bells or organs etc..

*Chaos Patterns* ..... Reorganises harmonics into random patterns. [Seed] selects one of 100 preset patterns. [Distortion Range] selects one of the following:

*Full Spectrum*: Harmonics can be shifted anywhere within the spectrum.

*One Octave*: Each harmonic is randomly shifted +/- one octave.

*Four Octaves*: Each harmonic can be randomly shifted by maximum four octaves above or below its original frequency.

*Ordered*: The frequency of each harmonic is sent up or down, but cannot cross paths with neighbouring harmonics: the order is preserved.

*One Harmonic*: Each harmonic is randomly shifted toward neighbouring harmonics only. This option lets you sequence or otherwise modulate randomness during playback: good for cymbals and other percussion.

*Wild Randomness* ..... Reorganises harmonics in a randomised pattern sampled at Note On. Like Chaos Patterns (see above) but without any repeats.

## Harmonics

Only available if the Renderer is set to Additive. The number of sine waves used for the **Additive** render, from minimum 16 to maximum 1024. 256 is the recommended maximum—unless you can hear a significant improvement at higher values.

## Spectral Distortion

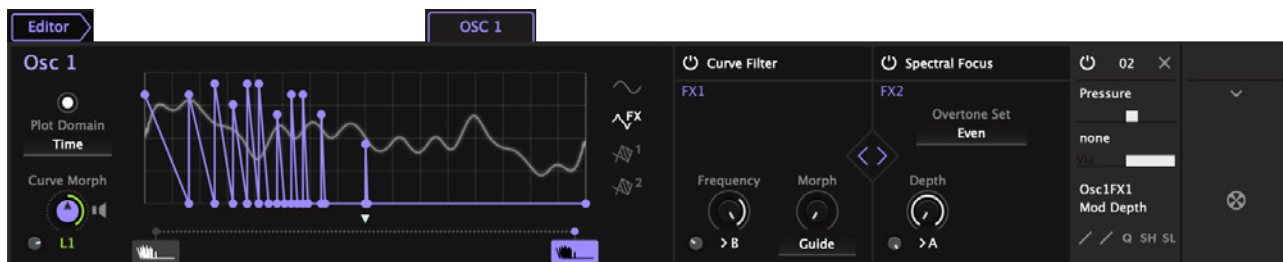
Only available if the Renderer is set to Additive. The strength of [spectral modification](#).

## Noise

Only available if the Renderer is set to Additive. Adds random fluctuations to the amplitudes of all partials except the fundamental.

## Easy Editor

When an oscillator is selected, the lower panel contains a simplified Curve editor, the two oscillator effects (FX1 / FX2), and any relevant [modulation matrix](#) slots:



### Editor / Exit



The button on the far left of the [Editor Bar](#) opens / closes the oscillator's [Main Editor](#).

### Plot Enable (round button)

Switch on to view the Curve in realtime, or off to save CPU ('Plot disabled' appears in the editor).

### Plot Domain

Time .....the plot line represents the realtime waveform—like an oscilloscope

Frequency .....the plot line represents amplitudes of frequencies—like a spectrum analyzer

### Curve Morph

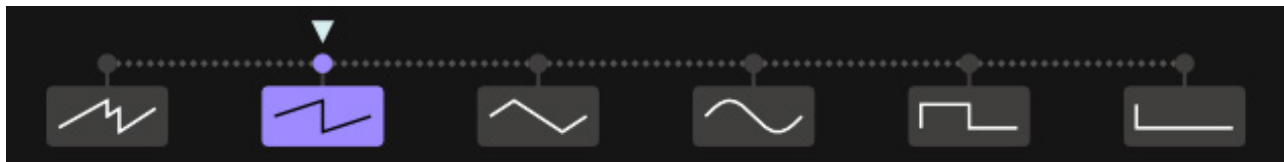
Sets a position within the oscillator's Timeline (see below).

### Listen (loudspeaker icon)

Especially useful for checking the result of [Morph editing](#). While active, only the selected Curve is audible—the Curve Morph value and any Curve Morph modulation are ignored. The Listen icon flashes and 'Curve Morph Disabled' appears in the editors to remind you to disable it after use!

## Timeline

Representation of the Curve Set with 2–16 moveable thumbnails. Single-click a thumbnail to select the Curve for editing, or double-click to (also) set the [Curve Morph](#) parameter to that position.



Click and drag a Curve to reposition it. Click and drag in the background to move the selected curve to that position. Select a Curve and press the Backspace key to remove it, or right-click and choose *Delete Curve*. To add a curve, either double-click immediately below the dotted line, or right-click **on** the line (the position is indicated in the data display) and choose *Add Empty Curve*.

The value of Curve Morph (see above) is indicated by a small triangle above the line.

## Timeline Context Menu

Right-click along the dotted line to open this menu:

- Add Empty Curve* .....insert a saw at the clicked position (alternative to double-click)
- Add Morphed Curve* .....insert an interpolated Curve ("frozen morph")
- Duplicate Selected* .....insert a copy of the currently highlighted Curve
- Paste From Clipboard* .....insert whatever has been copied via Copy / CopySVG (see below)
- Distribute Evenly* .....move Curves so that they are equally spaced between 0 and 100
- Reverse Order* .....reverse the positions of all Curves (100 minus the original positions)

## Graphic Editing

- Add points .....double-click in the background or option+click (Mac) / ctrl+click (Win)
- Merge points .....drag one point on top of another then release
- Move a point .....click+drag
- Move a selection .....click+drag any selected point
- Quick copy a selection .....option+drag (Mac) / ctrl+drag (Win) any selected point
- Select multiple points .....click+drag in the background (invisible marquee)
- Extend / reduce selection .....shift+click points
- Clear selection .....click anywhere in the background
- Remove a point .....double-click on the point
- Remove a selection .....press Backspace, or right-click and select *Delete*
- Adjust curvature .....click+drag on segments
- Straighten segment(s) .....click on a segment
- Zoom in/out .....roll the mouse wheel (the hover point is stationary during zoom)

## Editor Context Menu

The dynamic context menu of the editors (Easy and Main) reveals several useful functions:





- Copy / Paste .....Clipboard functions: *Copy Curve* has a high resolution and uses our 'UHM' scripting format, while *Copy Curve as SVG* has a slightly lower resolution but lets you paste the selection into any graphics program that supports Scalable Vector Graphics (SVG).  
This part of the menu is **dynamic**: If one point is selected you will see *Copy Value*, if several points are selected you will see *Copy Selection*.  
If [Key Control](#) is active the system clipboard shortcuts will also work.
- Flip X / Flip Y* .....Inverts the Curve or selection horizontally (X) or vertically (Y).
- Beautify* .....Smooths the Curve or selection (Note: *Beautify* doesn't affect steps).
- Simplify* .....Removes any points that have little or no impact on the shape of the Curve or selection, altering curvatures wherever necessary.
- Sine-O-Matic* .....Similar to *Beautify*, but approximates sine arcs. Can transform a triangle wave into an almost perfect sine.
- Line Up* .....Vertically realigns selected points so that they form a straight line between the first and last points. Try the keyboard shortcut 'L'.
- Distribute On X-Axis* .....Evenly distributes all points in the Curve or selection horizontally.
- Clean Up* .....Removes points that have little or no impact on the shape.



- Select All* .....Selects the entire Curve.
- Select Similar* .....Selects all points / segments that 'perform a similar function' to the current selection. This function will only appear in the menu if at least one point is already selected.
- Invert Selection* .....Selects all unselected points instead. This function will only appear in the menu if at least one point is already selected.
- Export Wavetable* .....Saves the entire Curve Set, including all morphed intermediates, as a 101-frame wavetable file in .WAV format. See [Transferring Curves](#).

## Plot Source

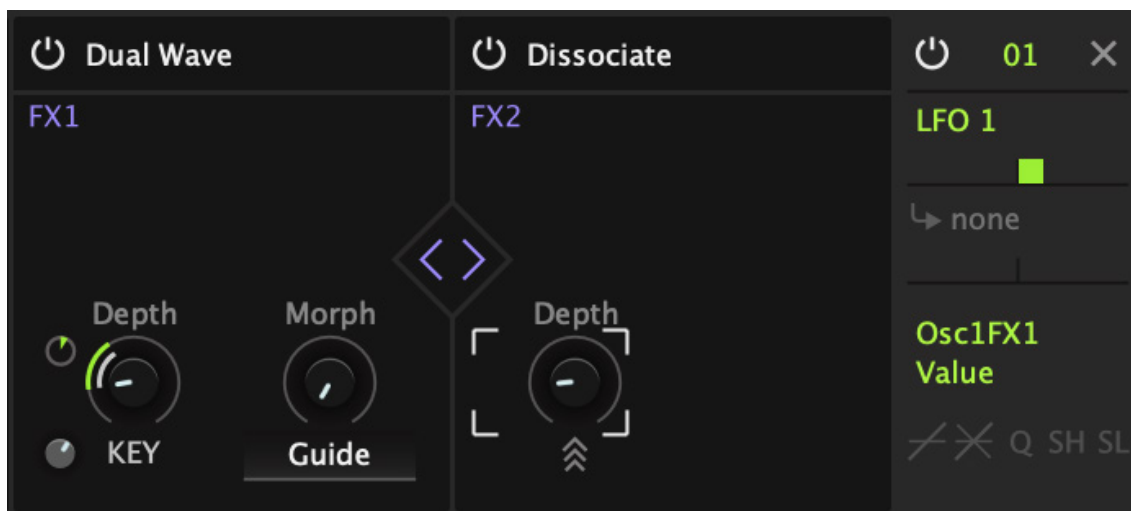
Appearance of the "realtime oscilloscope" trace in the editor window.

- |   |                         |                                     |
|---|-------------------------|-------------------------------------|
|  | <i>Osc Wave pre-FX</i>  | Waveform without oscillator effects |
|  | <i>Osc Wave post-FX</i> | Waveform with oscillator effects    |
|  | <i>FX1 Guide/Curve</i>  | The source used in OSC FX1          |
|  | <i>FX2 Guide/Curve</i>  | The source used in OSC FX2          |

To save CPU the plot is pre-Renderer and is independent of the editor area's zoom factor (you can check that by rolling your mouse wheel).

# Oscillator FX

These can alter the sound dramatically—see e.g. the preset *Acetate Bass*.



## Morph Source

All oscillator effects include at least one modulatable parameter, the role of which is as diverse as the effects themselves. Several let you choose whether to use Guides or the Curve Set itself (see CAUTION below) as source for the "Morph" parameter...

If the Source is set to the CPU-friendly option **Guides**, the Morph parameter actually *crossfades* between all three [Guides](#), whereby Guide 1 is at 0.00, Guide 2 at 50.00, and Guide 3 at 100.00.

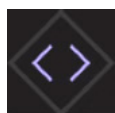
If the Source is set to **Curves**, the Morph parameter *morphs* between curves applied to the effect. Different parts of the Curve set can be dedicated to different tasks, for example 0-50 for the audio and 60-100 for the effect. These parts can even overlap, and you can use the very same Curve for the audio as well as for the effect.

**CAUTION:** Before you get TOO adventurous with Source = Curves, please note that each use of a morphed Curve for oscillator effects can seriously increase CPU usage because these Curves are calculated at the audio rate set by the [Resolution](#) parameter).

## On/Off

 Click to activate or bypass each oscillator effect.

## Swap FX1 | FX2



Exchanges the two oscillator effects so that FX1 becomes FX2 and vice versa. Any oscillator FX targets in the modulation matrix are swapped accordingly.

## FX1 | FX2 selectors

The two large selectors offer the following:

✓ none	
Curve Filter	
Filter	
Formant	<a href="#">Spectral Effects</a>
Sparse	
Spectral Focus	
Tone Works	
DeltaX	
Map-o-Matic	
Phase Distortion	
Scrambler	<a href="#">Warping Effects</a>
Symmetry	
Sync	
Wrap & Zap	
Dual Wave	
Window	<a href="#">Windowing Effects</a>
Zoom	
Dissociate	
Posterize	
Spectral Decay	<a href="#">Animation Effects</a>
Spectral Noise	
Twinkles	

## Spectral Effects

The first six oscillator effects in the menu *differentially* process harmonics:

### Curve Filter

Guides or part of the Curve Set define the frequency response of a filter within a range of about 10 octaves. The levels of frequencies below and above this range are set by the vertical position of the left and right end points. **Frequency** shifts that curve for the full audible range of about 20 Hz to 20 kHz. Curve Filter includes about 50% pitch follow, slightly less for higher notes.

### Filter

Simple, non-resonant lowpass, bandpass or highpass. Includes more pitch follow than Curve Filter.

### Formant

Like Curve Filter except that the source attenuates partials within a **fixed spectrum** (no key follow!) the lines of the harmonic grid represent the overtones of **20 Hz**, with a maximum close to 20 kHz.

### Sparse

Randomly generates gaps in the spectrum. Depth controls the number of gaps as well as how strongly they are attenuated. The Sparse effect is great for randomized bell-like sounds, especially in combination with the animation effect [Spectral Decay](#) (see a few pages down).

## Spectral Focus

Attenuates harmonics:

- Odd* ..... Reduces even-numbered harmonics while boosting adjacent odd harmonics.
- Even* ..... Reduces odd-numbered harmonics while boosting adjacent even harmonics.  
Note: As the fundamental is an odd harmonic, its level is also reduced.
- Octaves* ..... Reduces harmonics that are not octaves of the fundamental, boosting adjacent ones that are. Turns a sawtooth into an organ-like waveform.
- Fundamental* ..... The level of the lowest harmonic, from zero to about 150%.

## Tone Works

- Brilliance* ..... Boosts upper harmonics
- Smoothness* ..... Attenuates upper harmonics
- Compression* ..... Boosts quieter overtones (typically increases brilliance)
- Expansion* ..... Attenuates quieter overtones (effectively similar to Smoothness)

## Warping Effects

The next seven effects directly process the complete waveform:

### Delta X

Similar to FM synthesis, but with a choice of transfer modes: Linear, Absolute, Square, Sqr Abs, Exponential or Exp-. The closest equivalent to the original DX7-type phase modulation is Linear.

The Index option offsets the pitch of either the FM modulator or the carrier. The modulator is usually the waveform itself while the carrier is an extra sine wave, but you can swap these by switching the Direction to Sine • Wave.

### Map-o-Matic

Four different kinds of waveshaping. In these descriptions, the Source is assumed to be 'Guides'.

- RePhase* ..... The Guide acts as a *timing map* for oscillator phase, effectively telling each part of the waveform when to play. At 0% Influence, playback is unchanged. At 100% Influence, the Guide fully controls the read position: steep sections sweep through the waveform quickly, while flatter sections move more slowly. RePhase is akin to Phase Distortion (see below), but more flexible—but more CPU-intensive.
- Phase Offset* ..... Adds a phase shift based on the Guide. It nudges the read position forward or backward by an amount proportional to the Guide value. Like classic FM you can think of this as audio-rate vibrato frozen into the Curve—samples are shifted earlier or later in the cycle.
- Value Grade* ..... Uses the Guide as a transfer function i.e. waveshaper. Each sample's amplitude determines where to read in the Guide: Loud samples look up near the Guide's end, quiet samples near the center, very negative samples near the start. Influence blends the result with the original. Value Grade is good for soft saturation, folding, or reshaping dynamics.
- Curve Distort* ..... Direct waveshaper—the Guide is the distortion curve. Input values index into the Guide centered at the midpoint. Unlike Value Grade, the output fully replaces the input (the Influence parameter is practically input gain).  
Guide = sine → soft clipping. Stairs → bit-crush. Chaos → harsh distortion.

## Phase Distortion

Form of digital synthesis popular in the 1980s. The Curve is a transfer function for the phase of a raised cosine. Depth crossfades between a ramp (rising saw) and the current Curve.

## Scrambler

Similar to operator feedback in FM synthesizers, the curve's phase is modulated by the curve itself, creating many new overtones. Scrambler is processed by the same transfer functions as DeltaX (*Linear, Absolute, Square, Sqr Abs, Exponential or Exp-*) before modulating the phase of the original.

## Symmetry

Moves the center of the wave to the left or right, expanding / compressing each half. With Depth set to 50.00 there is zero effect. Tip: Create classic PWM by applying Symmetry to a square.

## Sync

Classic oscillator sync with a twist: The Center parameter adjusts the phase of the leader while the follower frequency is controlled by Depth. The effect is symmetrical if Center is set to 50.

Tip: Sync sweeps can be made smoother by applying a Window (see below) in OSC FX2.

## Wrap & Zap

Foldback distortion with several extras...

*Mirror* ..... The Depth control increases the gain and (recursively) folds back any parts of the wave that exceed the maximum.

*Rotate* ..... Like Mirror, but folds from the opposite maximum. Resembles Sync if applied to a sawtooth wave.

*Multiply* ..... Sync-like effect similar to a sinusoidal wavefolder.

*Clip / Soft Clip* ..... Simple clipping distortion in two flavours.

## Windowing Effects

These effects change the 'view' of the Curve:

## Dual Wave

Appends a curve from within the Curve Set itself or from the Guides. The Depth parameter controls the relative sizes of the two waves, while Morph specifies the morph position of the extra curve. Note that the extra curve is always interpreted as Curve Geometry.

## Window

Applies a Guide or Wave as a kind of 'envelope' for the waveform. Includes a *Polarity* option:

+ (*unipolar*) ..... Source curve values below zero (i.e. below the central horizontal line) will drag waveform values towards the bottom (-1).

+ - (*bipolar*) ..... Source curve values below zero drag waveform values towards the center (0).

Practically: You can remove the grunge from Sync sweeps by effectively fading the left and right edges out. Try a sine or trapezoid as source curve.

## Zoom

Zoom in / out of the waveform. The Depth parameter sets a zoom factor, while Center specifies the position along the Curve that remains fixed while zooming.

## Animation Effects

These five functions create animation / motion.

### Dissociate

Independently shifts the phases / pitches of partials, often creating inharmonic timbres. Note that the phases of partials are random per note, even if oscillator Phase is set to *Reset*.

Used in OSC FX2 with Depth set to about 20 it adds subtle motion without any detuning. But Dissociate can be used very dramatically in OSC FX1! Set OSC FX2 to e.g. Wrap & Zap! Then check out the other Wave Manipulation effects.

### Posterize

Like a lowpass filter applied to wave morphing: Depth determines the smoothness of transitions, and the Trigger Source effectively applies a sample & hold to the waveform.

### Spectral Decay

Uses Guides or part of the Curve Set to make harmonics decay differentially: Higher values anywhere along the curve mean longer decays for those frequencies. Using the [Harmonic Grid](#), individual decay times from 1 ms to about 16 seconds can be set for each overtone.

Spectral Decay is particularly good for natural-sounding plucked strings. Experiment! Load init, select Spectral Decay, turn Depth up to maximum then edit Guide 1.

**Depth** acts like a sustain level i.e. where the decay stops, while **Morph** is the position between the 3 Guides or along the oscillator Timeline.

Tip: Modulating Depth down can restart the decay: Try using an LFO or looped MSEG here!

### Spectral Noise

Creates a fuzzy, moving 'cloud' effect, adding a little drift at first followed by increasingly rapid random modulation of the spectrum.

### Twinkles

Random overtones. The Trigger Source 'pings' an overtone each time it leaves zero in the positive direction. Tip: Try an LFO first, then an MSEG with several points set to zero. The Depth knob controls how slowly the overtones decay: Low values generate short clicks.

Pure Twinkles without any of the original oscillator can be achieved by 'flatlining' the waveform.

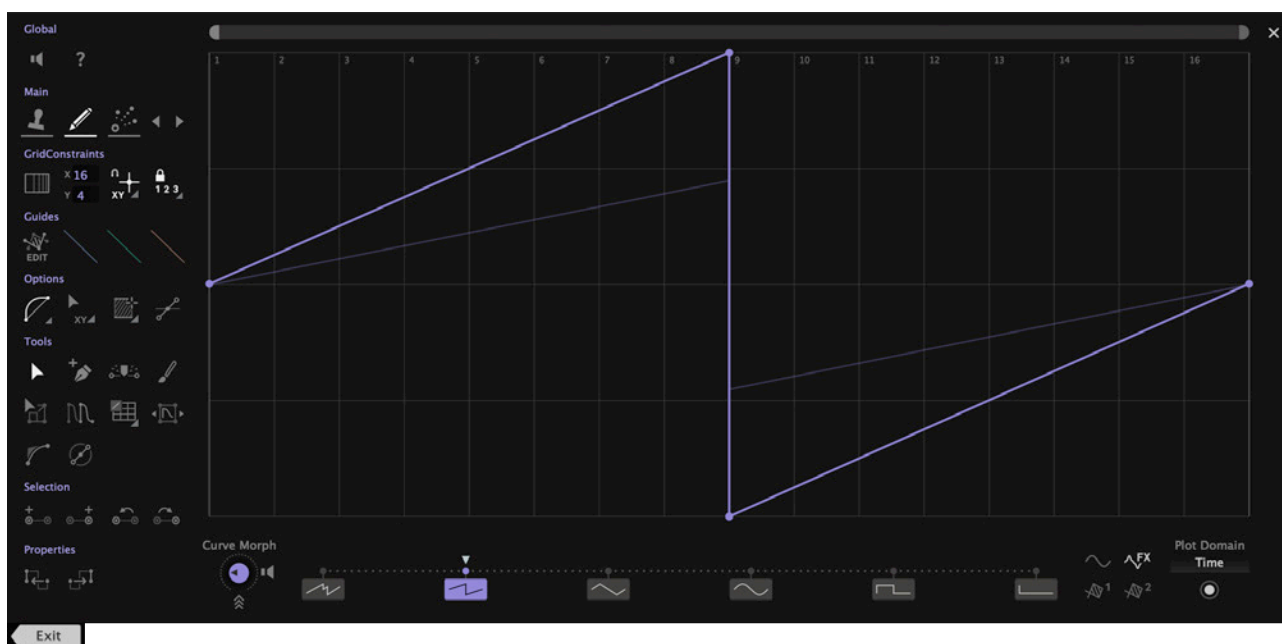


# Oscillator Editor

To open an oscillator's **Main Editor**, select the oscillator in the editor bar then click on **[Editor]**.



Note: The oscillator's main editor also gives you access to the its three [Guides](#).



Assuming you have explored the [Easy Editor](#) you should already be familiar with many of the options available in the Main Editor. The [Timeline](#) is not described again here, but it is worth repeating the graphic editing options:

## Graphic Editing

- Add points .....double-click in the background or option+click (Mac) / ctrl+click (Win)
- Merge points .....drag one point on top of another then release
- Move a point.....click+drag
- Move a selection .....click+drag any selected point
- Quick copy a selection.....option+drag (Mac) / ctrl+drag (Win) any selected point
- Select multiple points.....click+drag in the background (invisible marquee)
- Extend / reduce selection .....shift+click points
- Clear selection.....click anywhere in the background
- Remove a point .....double-click on the point
- Remove a selection.....press Backspace, or right-click and select *Delete*
- Adjust curvature .....click+drag on segments
- Straighten segment(s) .....click on a segment
- Zoom in/out.....roll the mouse wheel (the hover point is stationary during zoom)

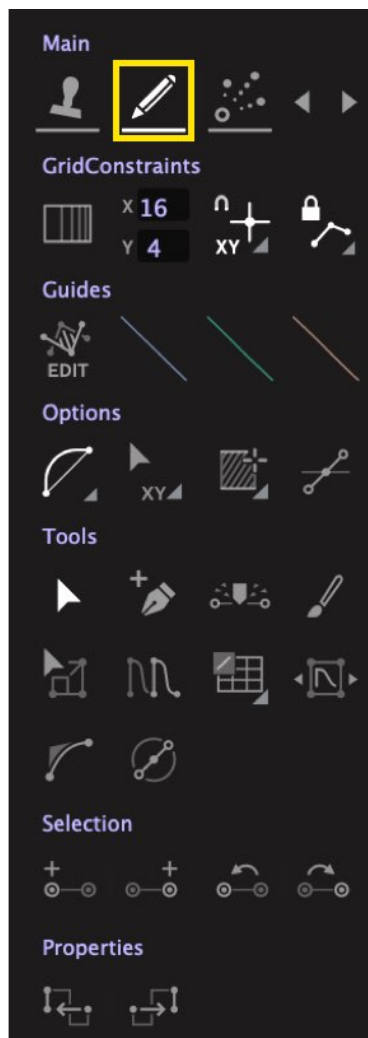
## Toolboxes

To the left of the editor window is a dynamic toolbox full of options and drawing tools: The content of the toolbox depends on what is selected in the Main palette:

### Shape Tools



### Drawing Tools



### Morph Tools

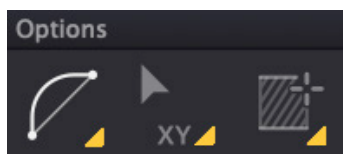


## Context Help



Click on the question mark icon at the top of the toolbox to view appropriate help text, which will appear above or below the graphic editor while you work.

## Context Menus



Clicking on the triangle in the bottom righthand corner of Options icons (highlighted yellow here) is an alternative to right-clicking the tool: Either action opens a small menu of options for each tool.

## Shapes Toolbox



Opens options and tools with which you can quickly draw complex forms using preset shapes.

### Harmonic Grid



Activate this to replace the regular grid with one representing the harmonic series. The stronger lines are at harmonics 2, 4, 8, 16, 32, 64, 128, 256, 512. Note: This defeats Grid X...

### Grid X / Grid Y



The number of lines in the grid, horizontally and vertically. X is ignored if the Harmonic Grid is active. Either hover and roll your mouse wheel, or click and drag the numbers.

### Flip X



Horizontally flip all shapes in the toolbox (see *12 Shapes* below).

### FlipY



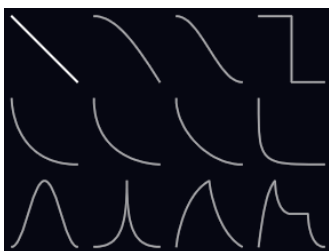
Vertically flip all shapes in the toolbox (see *12 Shapes* below).

### Auto Flip



Automatically flips the curve, depending on the direction of drawing.

### 12 Shapes



Select a shape you want to use as 'brush' in the graphic editor. The image here shows the 'un-flipped' palette.

Note: [Grid Snap](#) is always active while using shape tools.

### Grid Move Y



Click and swipe left or right, then while still holding down the mouse button, vertically shift the highlighted content.

### Grid Step



Click and swipe left or right to draw horizontal lines, creating steps.

Tip: Click and swipe across the entire width to erase a curve.

## Drawing Toolbox



Opens a set of options and tools used for creating complex curves. Currently (beta version!) appears as "Edit" in the data display.

### Harmonic Grid



Activate this to replace the regular grid with one representing the harmonic series. The stronger lines are at harmonics 2, 4, 8, 16, 32, 64, 128, 256, 512. Defeats Grid X...

### Grid X / Grid Y



The number of lines in the grid, horizontally and vertically. X is ignored if the Harmonic Grid is active. Either hover and roll your mouse wheel, or click and drag the numbers..

### Grid Snap



The grid lines can be magnetic – click to enable. Right-click to select whether points should snap to X (vertical lines), Y (horizontal lines) axes, or both.

### Shape Constraints



*Squish* compresses a selection dragged to any edge (left/right/top/bottom). As soon as you release the mouse button, the new form becomes permanent.



*Keep Shape* ensures that the shape and size of the selection remains intact when it reaches the left or right edge.



*Keep Order* is like *Keep Shape* except that movement is limited by neighbouring points. Often the best option when you are moving individual points.



*Env Mode* is like *Keep Order* except that movement to the right is unlimited. Although also available here it is most useful in the [MSEG](#) editors. See [Envelope Mode](#) for details.

### Guide Select



EDIT: While a Guide is selected this button is highlighted and the editor's context menu contains guide-to-curve functions. Click for Curve editing with curve-to-guide functions.



Select a [Guide](#) to be edited: 1 = [blue](#), 2 = [green](#), 3 = [salmon](#). Click again to return to normal Curve Set editing.

### Curvature Select

Click to select a curvature type:



**L** is a unidirectional curve.



**S** is a bidirectional curve.



**Lpointy** is similar to L, but with a 'knee'.



*Lsharp* is like L except that all spline handles are either horizontal or vertical while dragging a segment. Check: Activate [Handles](#), select a segment and adjust it using the [Arrow](#) tool.



*Ssharp* is like S except that all handles are either horizontal or vertical while dragging a segment. Check: Activate [Handles](#), select a segment and adjust it using the [Arrow](#) tool.

## Move (X/Y)



Optionally restricts movement of points or selections to the X or Y direction only. Also acts as a kind of ARROW tool (see below) but without the ability to adjust curvature.

Move XY .....movement in any direction

Move X .....only horizontal movement possible

Move Y .....only vertical movement possible

## Selection Mode

Right-click, or left-click on the little triangle bottom right to choose a selection mode. Note that selection is always available, whatever the current drawing tool.



*Box Select* lets you select all points that lie within the invisible rectangle defined by clicking and dragging in the editor are.



*H-Select* (horizontal select) ignores the Y position and is thus more inclusive.

## Handles



Reveals the spline handles of a selection for detailed editing. Handles cannot be dragged outside an invisible rectangle defined by the two neighbouring points. Note: Perfectly horizontal and vertical segments have no handles, as their curvature cannot be defined.

## Arrow



**The standard tool!** Swipe to select points. Double-click to create a new point. Click & drag a selected point to move the selection. Click & drag a segment to adjust its curvature.

## Add Points



A single-click in the background inserts a point at that position. Clicking on a segment (the symbol changes from an ink-pen to a blade) splits it at that position.

## Split Points



Click on a point and drag upwards to insert a horizontal segment, compressing the rest of the curve to make room. Note: All selected points or segments will be split.

## Paint



Freehand drawing. The curve is optimized as soon as you release the mouse button.

## Scale



For horizontal scaling i.e. resizing, click & drag on the selection's leftmost or rightmost point (but not if this point is at the left or right edge). For vertical scaling, click & drag the lowest or highest point in the selection.

## Multiply



'Clone' a selection to the left via click & drag on its leftmost point, or to the right via click & drag on its rightmost point. You will need to drag at least the width of the selection.

## Warp



*Warp Linear*: Linearly warp the curve or selection via click & drag on any point.



*Warp Expo*: Similar but exponential.



*Warp Cubic*: Similar but cubic (more extreme).

## Rotate



Shifts the 'phase' of the entire Curve or selection. Click & drag on a point.

## Expo Form



Create an exponential segment across multiple points. The more points there are in the selection, the more closely the result will resemble a proper exponential curve. Similar to 'L' curvature if there is no selection, overriding the *Curvature Selector* (see 2 pages up).

## Handle Rotate



Clicking on a single point resets its spline handles to a straight line (activate the [Handles](#) option to view this). Click & drag a point or selected segment to rotate both/all handles.

## Expand Selection



*Expand Selection L*: Add a point to the left.



*Expand Selection R*: Add a point to the right.

## Move Selection



*Move Selection L*: Shift the selection one point to the left.



*Move Selection R*: Shift the selection one point to the right.

## Close Shape



*Close Shape Left*: Creates a mirror of the final point and positions it before the first point.



*Close Shape Right*: Creates a mirror of the first point and positions it after the final point.

Note: Under certain conditions the new point can become independent. Just try it!



## Morph Control Toolbox



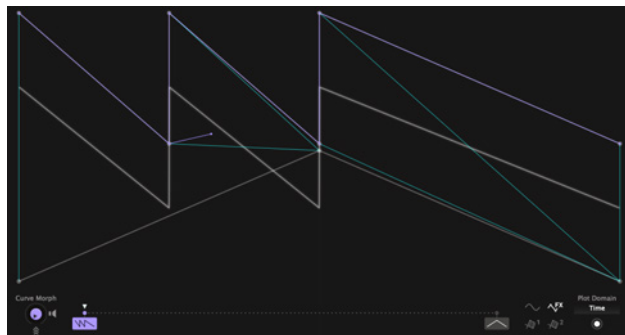
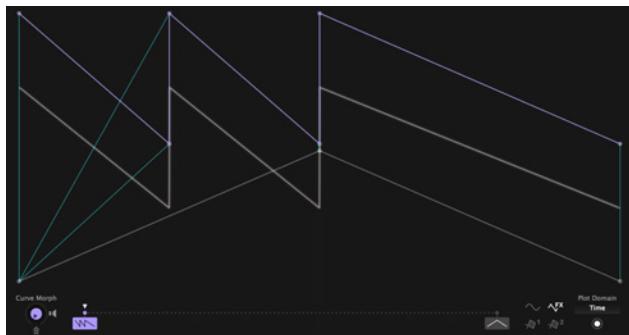
Opens a small set of tools used to specify how each Curve morphs to the next. The selected Curve appears above the one to its right in the timeline, with blue **transition paths** showing how points morph between the two Curves. To check the morph manually, activate [Listen](#) then click anywhere in the background and drag downwards.

### Morph Vectors



Note: This only works with the two *Closest* [morph types](#). Clicking and dragging any point (except the first or last one) makes that point 'pretend' to be elsewhere as far as the morph calculation is concerned. To remove a morph vector again, simply click on its handle.

Example: Morphing between the 3-tooth saw and the triangle here doesn't sound particularly interesting. Adding a **morph vector**—the little extra tag in the righthand image—results in a much more dramatic, PWM-like effect, as more of the points are shifted horizontally during the morph:



The morph vector here makes that point 'pretend' to be closer to the triangle's central point than to its first point. As the point above the morph vector has the same X value, it also connects to the triangle's peak. Mysteriously, the third tooth now connects to the end point of the triangle...

Morph vectors can be used to create dramatic transitions, which are often especially effective between complex curves—things can get wild!

## Morph Type

Morphing methods to apply between successive Curves in the Curve Set. Morph types are set **individually** for each **pair** of Curves along the Timeline (so it cannot be set for the final curve):



**Crossfade:** No actually morphing—points from both curve are used to interpolate vertically only (points are not moved along the x-axis).



**Point By Point:** Connects points by index, left to right. Surplus points in the more complex Curve are connected to the final point in the simpler one.



**Closest X:** Connects points by proximity along the X axis – see [Morph Vectors](#).



**Closest X & Y:** Connects by proximity along both X and Y axes – see [Morph Vectors](#).



**Peaks & Valleys:** Connects high points to high points and low points to low points. Peaks & Valleys is the default setting.

## Ease In/Out

The linearity of morphing between adjacent Curves.

**OUT**.....how smoothly the morph vector exits the currently selected Curve

**IN** .....how smoothly the morph vector enters the next Curve along

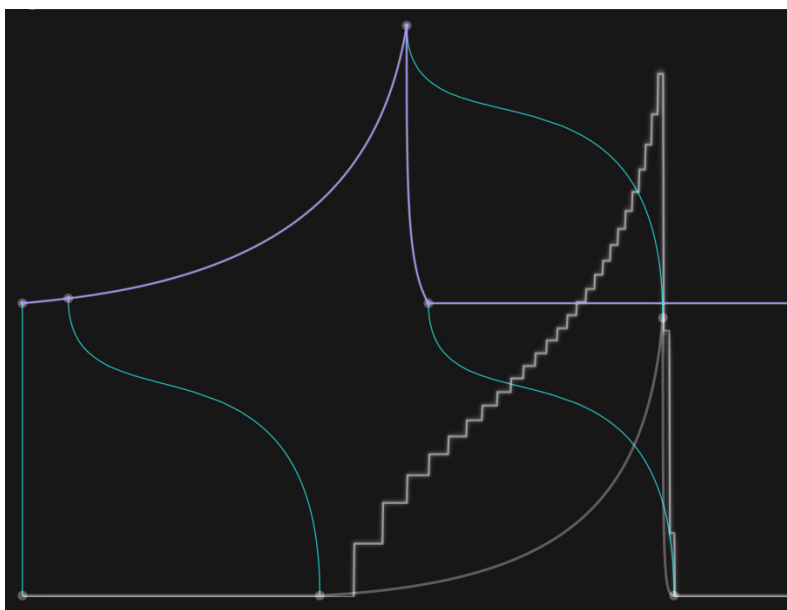
Note how the various values (0 to 100) affect the curvature of the connecting lines...

### Demonstration

Load the preset 'Ploppies', set [Plot Domain](#) to *Frequency* and [Plot Source](#) to *Osc Wave PreFX*, then open the OSC EDITOR. Activate the [Harmonic Grid](#). Hold a note and watch / listen to how successive harmonics are picked out when the morph is linear. The steps are faster where the harmonics are close together.

Now open the [Morph](#) toolbox. Set Transition EASE OUT to 50, EASE IN to 100, and hold a note: The morph starts more slowly than before, picks up speed in the middle, then finishes more slowly.

Compare once more by setting both EASE OUT and EASE IN back to zero.



## Transferring Curves

As well as saving/loading oscillator settings as module presets, or copy / pasting individual waveforms in .SVG (Scalable Vector Graphics) format, Curve Sets can be exported as 101-frame wavetables in .WAV format. Import also works, but due to the wide range of possible WAVs, from single cycles to entire songs, importing is a hit-and-miss affair. See Wavetable Import below.

### Wavetable Export

Right-click in the oscillator editor area and select the last entry in the menu, Export Wavetable. A dialog box notifies you that the wavetable has been exported to a location which can be viewed by clicking on the [Show Export Folder] button.

The naming convention for exported wavetables is CurveWavetable dd-mm-yyyy hh-mm-ss.wav (i.e. CurveWavetable day-month-year 24hour-minute-second). Feel free to rename it afterwards!

All exported wavetables contain 101 frames, the number of possible positions on the timeline. Intermediates are interpolated according to the selected Morph Types (see the previous page).

### Wavetable Import

#### Experimental feature, work in progress

To import a .wav file, drag & drop the file onto the oscillator editor. Single cycle files will be recognized as such and will only replace the currently selected Curve, while multi-cycle samples will replace the Curve Set.

#### CAUTION

Importing large .WAV files can cause Zebra 3 to stall or crash the host app. It is best to run Zebra 3 in a simple host while experimenting, one that can be quickly restarted should problems occur, e.g. *Ju-X Hosting AU* (Mac) or *SaviHost* (Win).

After dropping the .WAV file, several import options will appear in the Toolbox.

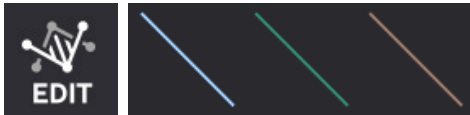
The import routine detects pitch then slices the sample into individual cycles, noting which ones represent the most significant differences. This is repeated whenever you click on **[UPDATE]**.

The sample rate, bit depth etc. of the source .WAV are not very important, but remember that low pitched samples naturally contain more detail than high pitched samples.

The parameters can be adjusted and applied via **[UPDATE]** as often as you like, but no further changes can be made after the import panel is closed via **[X]**.

**Note:** As the import feature is currently at an intermediate stage of development, the individual parameters are not described here. If you want to keep up with news at u-he, please check out our [user forum at KVR](#) and/or subscribe to our [newsletter](#).

## Guides



'Construction lines' primarily used for manipulating Curves—if you have used a vector graphic program you should be familiar with the concept. The oscillator includes three guides, which also serve as CPU-efficient shapers for [oscillator effects](#).

The **EDIT** button on the left activates Guide editing. Disable this to return to Curve editing.

### Guide Context Menu

While Curve and Guide are both visible (one is highlighted) the editor menu includes several extra functions (see the [Editor Context Menu](#) for all other menu items). Tip: Disable the [Plot](#) so you can concentrate on the Curve and Guide. Use the EDIT button to toggle between the two menus. If one or more segments are selected, only those areas will be affected by the functions.

Some of these functions are quite difficult to grasp—see the example graphics on the next page!

#### While the Guide is in EDIT mode, menu functions affect the **Curve Points**:

*Move Points Down To Guide* ..... Points above the Guide are moved down to the Guide  
*Move Points Up To Guide* ..... Points below the Guide are moved up to the Guide  
*Scale Curve Below Guide* ..... The Curve is scaled to fit in the area below the Guide  
*Scale Curve Above Guide* ..... The Curve is scaled to fit in the area above the Guide  
*Cut Away Curve Above Guide* ..... All parts of the Curve above the Guide are removed \*  
*Cut Away Curve Below Guide* ..... All parts of the Curve below the Guide are removed \*  
*Replace Curve With Guide* ..... The Curve is replaced by the Guide (they become identical)  
*Skew Curve With Guide* ..... The Guide is added to the Curve, skewing it vertically

#### While the Guide is in the background, menu functions affect the **Guide Points**:

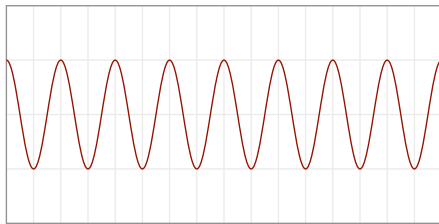
*Move Points Down To Curve* ..... Points above the Curve are moved down to the Curve  
*Move Points Up To Curve* ..... Points below the Curve are moved up to the Curve  
*Scale Guide Below Curve* ..... The Guide is scaled to fit in the area below the Curve  
*Scale Guide Above Curve* ..... The Guide is scaled to fit in the area above the Curve  
*Cut Away Guide Above Curve* ..... All parts of the Guide above the Curve are removed \*  
*Cut Away Guide Below Curve* ..... All parts of the Guide below the Curve are removed \*  
*Replace Guide With Curve* ..... The Guide is replaced by the Curve (they become identical)  
*Skew Guide With Curve* ..... The Curve is added to the Guide, skewing it vertically

\* Points are created / deleted wherever necessary.

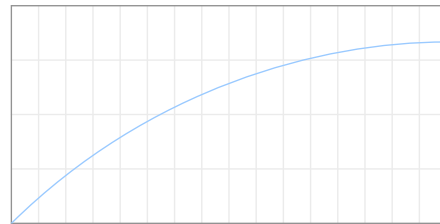
Note: Guides used for the [oscillator FX](#) *Curve Filter*, *Formant*, *Map-o-Matic*, *Dual Wave*, *Window* and *Spectral Decay* can be cross-faded via Morph. 0.00 = Guide 1, 50.00 = Guide 2, 100.00 = Guide 3.

## Guide Function Examples

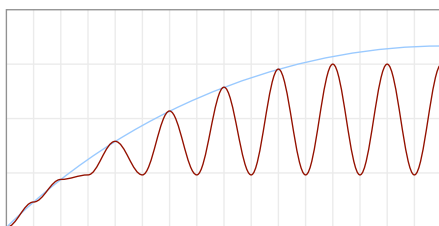
Activate EDIT in the Guides section of the toolbox:



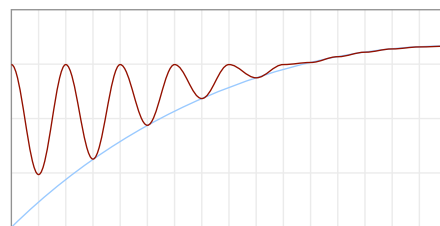
*Curve*



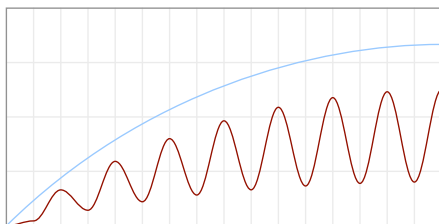
*Guide*



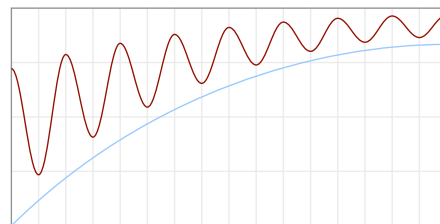
*Move Points Down To Guide*



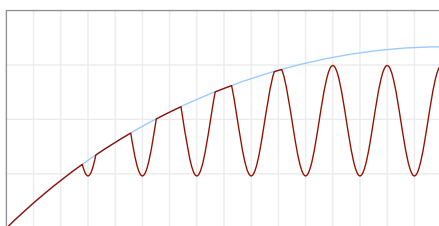
*Move Points Up To Guide*



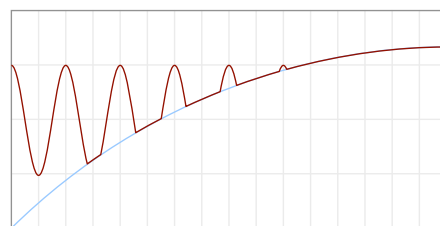
*Scale Curve Below Guide*



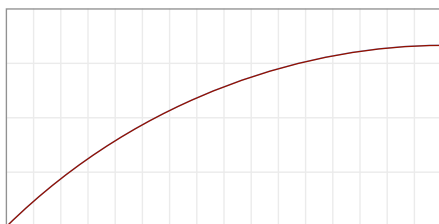
*Scale Curve Above Guide*



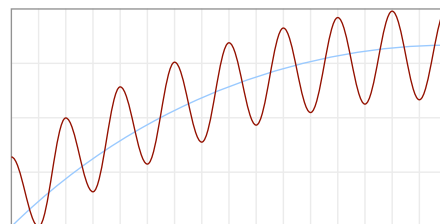
*Cut Away Curve Above Guide*



*Cut Away Curve Below Guide*



*Replace Curve With Guide*



*Skew Curve With Guide*

# FM Oscillator

FMO stands for 'Frequency Modulation Oscillator', and this module is indeed capable of Yamaha's DX-style FM (actually linear phase modulation) synthesis method. However, the FMO is more flexible than the older design as it includes an **internal modulator** (pure sine), as well as various FM modes and feedback options.



The FMO **output volume** control is the **Carrier** knob.

## M | L/R

Mono or stereo. If Stereo (L/R) is highlighted you can use Detune and Width for spatial effects. Note: The phase always starts at zero i.e. the FMO has no 'Random' phase option.

## Pitch Source

Selects either Key Follow or one of the [Pitch modules](#).

## Tune

Pitch offset (+/- 48 semitones), with direct modulation selector.

## Input

DX .....classic linear FM

TZFM .....though-zero FM

Dry.....input signal (no modulation)

The knob controls either the level of frequency modulation from the input or, if the selected type is *Dry*, the amount of input signal passed directly to the output: In this case, input routing is ignored.

**Routing:** In the above image, the *DX* input type and the blue arrow indicate that the FMO's input is phase-modulating the Carrier. To change the routing so that the input modulates the internal oscillator instead, click on either arrow you can see pointing away from the Input knob.



## Carrier

FM carrier level, practically the FMO's output volume control.

## Ratio

Pitch offset between the carrier and the internal modulator: Positive values affect modulator pitch, while negative values affect Carrier pitch. Integer values correspond to the overtone series, with the fundamental at index 0 so that Ratio can be bipolar: The values are classic DX "Ratio" minus 1.

## FM Index

How strongly the internal oscillator **modulates** the Carrier.

*DX* .....classic linear FM

*TZFM* .....though-zero FM

*ModFM* .....modified FM (carrier x  $e^{\text{modulator}}$ )

## Feedback

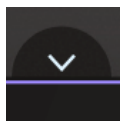
**Routing:** Click on the arrows to step through the options. Adjust feedback amount with the knob.

*Modulator to Modulator* .....Feeds the Modulator signal back into its own input.

*Carrier to Carrier* .....Feeds the Carrier signal back into its own input

*Carrier to Modulator* .....Feeds the Carrier signal back into the Modulator's input

## Sub-Panel



Click on this button to open the sub-panel containing a few extra parameters...

## Detune

If the FMO is in mono mode, Detune lowers or raises the pitch by +/- 50 cents. In stereo mode, it is a detune spread – it sharpens the left channel while flattening the right channel. Note that you can always fine tune the FMO via Shift+Tune if necessary.

## Pan

Shifts the stereo position to the left or right. Works for mono or stereo (see above).

## Width

Stereo spread (see Stereo above).

## Quality

Aliasing and DAC inaccuracies gave early FM hardware a unique sonic character that is well worth emulating or even exaggerating. Of course the FMO also offers cleaner quality settings:

*Ancient* .....wavetable sines, exaggerated compander error, low bit depth

*Retro* .....wavetable sines, milder compander error, most DX7-like

*Classic* .....wavetable sines, no oversampling – the most CPU-friendly option

*Modern* .....calculated sines, oversampled, anti-aliased, clean

## FB\*Vol

"Feedback times volume". If this is switched on, the feedback circuit includes the FM and/or Carrier **level controls**, depending on the selected feedback path.

# Noise

The Noise module in Zebra 3 is not only capable of creating a constant wash of chaos, but can also deliver single or multiple hits, making this module a capable alternative to the Exciter.












*Appearance of the panel when the Shape is Multi Hit and Single Hit*

## Type

9 basic noise flavours:

- White* .....Random signal with equal power across the spectrum.
- Pink* .....Darker, as frequencies are attenuated by 3dB / octave.
- Digital* .....Random pulses (positive only). Playable in tune i.e. as a lo-fi oscillator if LP is modulated by Key Follow / Pitch with Depth = 64.00. HP increases the irregularity.
- Crackles* .....Random impulses, like a Geiger counter or a scratched vinyl record. Turning HP up reduces the number of impulses.
- Static* .....Like *Crackles* but with a different probability distribution: Low HP values make it sound similar to white noise, higher HP values add extreme amplitudes.
- Velvet* .....A random sequence of pulses evenly distributed over time.
- Grey* .....Like *White* but compensated for the non-linearity of human hearing.
- Green* .....Like *White* but with emphasized mid frequencies (more natural).
- Low Bit*.....Like Digital except that the pulses are randomly either positive or negative.

## Shape

<i>Constant</i> .....		Sustained (Duration, Rate, Jitter and Trigger are disabled)
<i>Multi Hit</i> .....		Repeated percussion (see Duration / Rate below)
<i>Multi Rise</i> .....		Repeated upward ramp / backwards effect
<i>Multi Bump</i> .....		Repeated smooth waves
<i>Multi Pulse</i> .....		Repeated rectangle / gating effect
<i>Single Hit</i> .....		One-shot percussion
<i>Single Rise</i> .....		One-shot rise, sudden stop
<i>Single Bump</i> .....		One-shot smooth wave
<i>Single Pulse</i> .....		One-shot rectangle

## Filter 1

Controls **lowpass** filter cutoff except for the *Digital* and *Low Bit* types (see above), where it controls the clock rate / pitch.

## Filter 2

For the *White*, *Pink*, *Grey* and *Green* types, this controls the cutoff of a **highpass** filter. For all other Types it is effectively a density control—see Type on the previous page for a few more details.

## Width

Stereo spread.

## Duration, Rate

Both of these controls are disabled if Shape is set to *Constant*.

**Duration** sets what percentage of the time slice defined by **Rate** each noise burst occupies, i.e. how fully the selected Shape (see above) fills the available space. How Duration and Rate interact is quite intuitive—so rather than learning unnecessary technical details, simply play with them both!

## Jitter

Irregularity of repeated pulses. Disabled if Shape is set to *Constant* or one of the *Single* options.

## Pan | Volume

**Pan** shifts the stereo position left or right, while **Volume** sets the overall level.

# Exciter

A multi-purpose impulse generator originally conceived to 'excite' resonators, filters, combs.



## Trigger

The Exciter can be (re)triggered via LFOs, MSEGs, keyboard performance controls etc..

## Stereo

This switch has no affect unless the Number (see above) is turned up.

ALT .....Multiple impulses are alternately (ALT) panned hard left and right

R LR .....Multiple impulses are randomly (R) panned either hard left or hard right

R PAN .....Multiple impulses are randomly (R) panned anywhere across the stereo field

## Noise, Colour

Adds **Noise**, which also tends to soften the clicks. The **Colour** parameter adjusts its tone.

## Number

Multiple impulses, from 1 to 100.

## Distance

The time interval (in milliseconds) between multiple impulses.

## Stiffness

Continuous control from "thump" to "click" and beyond. Note: At 0.00 there is no midrange at all— but turning Stiffness up to 0.10 is enough to add significantly more punch. However, setting lower values is still useful, as Noise (see below) is unaffected by the Stiffness parameter.

## Envelope

Attack/Decay envelope for multiple impulses. 0.00 (top center) means constant volume.

## Bounce

Multiple impulses can start fast then slow down, or vice versa. 0.00 means constant speed.

## Jitter

Introduces a degree of randomness into the above 4 parameters.

## Volume

Output level.

# Filter

Zebra 3 offers a variety of filter types: Lowpass, bandpass, and highpass at various strengths and non-linear (Drive) attributes, as well as a few specialists such as Yellow and Allpass.



## Filter Parameters

### D-Pad

The 4 arrows surrounding the graphic on the left navigate between the various models (up/down) and slopes (left/right). For an overview of all [filter palette](#) options, click on the centre.

The image is an approximation of the filter response at six different Resonance levels.

### Cutoff

The filter's 'edge-frequency'. Integer steps are semitones, as tuning cutoff in musical terms makes more sense than 'Hertz' (which is possible by setting Pitch Source to one of the [Pitch](#) modules and selecting e.g. the Tuning Type *Kilohertz*). Note that Cutoff has **two** direct modulation selectors.

### Resonance

Resonance is generally a filter-internal feedback loop that emphasizes the cutoff frequency.

### Pitch Source

Select which [Pitch](#) module will be used for the filter's Key Follow parameter...

### Key Follow

Adjusts how strongly the selected **Pitch Source** affects Cutoff (pivoting around MIDI note 60 when Transpose in the selected Pitch module is 0).

### Drive

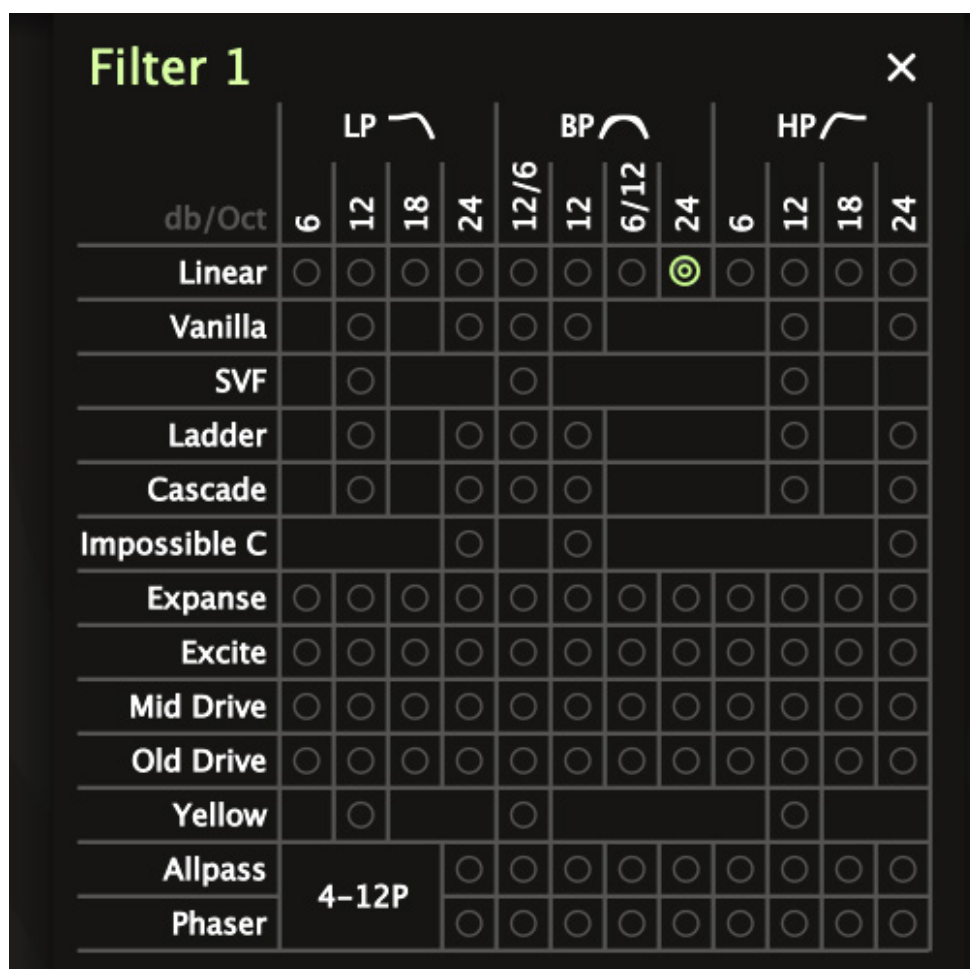
The Drive parameter or input gain of a filter usually adds a kind of distortion. In the Zebra 3 VCF this is a more generic 'flavour' parameter – see the remarks in the [Models](#) list few pages down.

### Filter FM

Frequency modulation at audio rate from the secondary input – see [Routing](#). Bipolar.

## Filter Palette

You can use the **D-pad** style arrows to jump between related filter types, or open the [filter palette](#) by clicking on the graphic representation in the center of the pad.



Select a filter type by clicking on a circle or by scrolling through them with your mouse wheel. A 2D mouse wheel (or touchpad-equivalent) will scroll vertically as well as horizontally..

After selecting a filter type here, close the palette again either by clicking on the **[X]** button at the top left or by clicking in the center of the D-Pad again. Double-click a circle to simultaneously select that filter model and close the palette.

## Slopes

Three basic types with 1 to 4 slopes / slope combinations are arranged horizontally:

**LP** (low pass).....Up to 4 slopes between 6 dB and 24 dB per octave

**BP** (band pass).....A high pass and a low pass in series:

6/12 means 6 dB per octave high pass and 24 dB per octave low pass

12/6 means 12 dB per octave high pass and 6 dB per octave low pass

**HP** (high pass).....Up to 4 slopes between 6 dB and 24 dB per octave

Note: The *Allpass* and *Phaser* models simply ignore these columns.



## Models

<i>Linear</i> .....	Clean, simple, CPU-friendliest option, Drive is unused
<i>Vanilla</i> .....	Quite CPU friendly, but with Drive—note that the HP options give you a typical 'peak' filter if you turn Resonance up
<i>SVF</i> .....	Emulation of a classic State Variable Filter
<i>Ladder</i> .....	Creamy, low notes get 'bubbly' when Resonance and Drive are turned up
<i>Cascade</i> .....	OTA model, gets 'smoky' when Resonance and Drive are turned up
<i>Impossible C*</i> .....	Analogue models of OTA cascade circuitry that cannot exist in hardware See 'The Impossible Story' below
<i>Expanse</i> .....	24 dB lowpass pulled apart—all other options mix poles and input in interesting ways, e.g. try adding a little Resonance in HP 6dB mode
<i>Excite</i> .....	Drive adds frequency-dependent 'aural excitation'
<i>Mid Drive</i> .....	Drive boosts mid-range frequencies
<i>Old Drive</i> .....	Drive adds vintage, even-numbered harmonics
<i>Yellow</i> .....	Quirky CPU-intensive model with unique distortion—can get very LOUD Tip: Experiment with adding or removing DC components to/from the input, as this model will respond accordingly
<i>Allpass</i> .....	4-pole to 12-pole all-pass. Turn up the Resonance for a simple vocal filter
<i>Phaser</i> .....	4-pole to 12-pole phaser. Same as <i>Allpass</i> but mixed with the original signal

## The Impossible Story

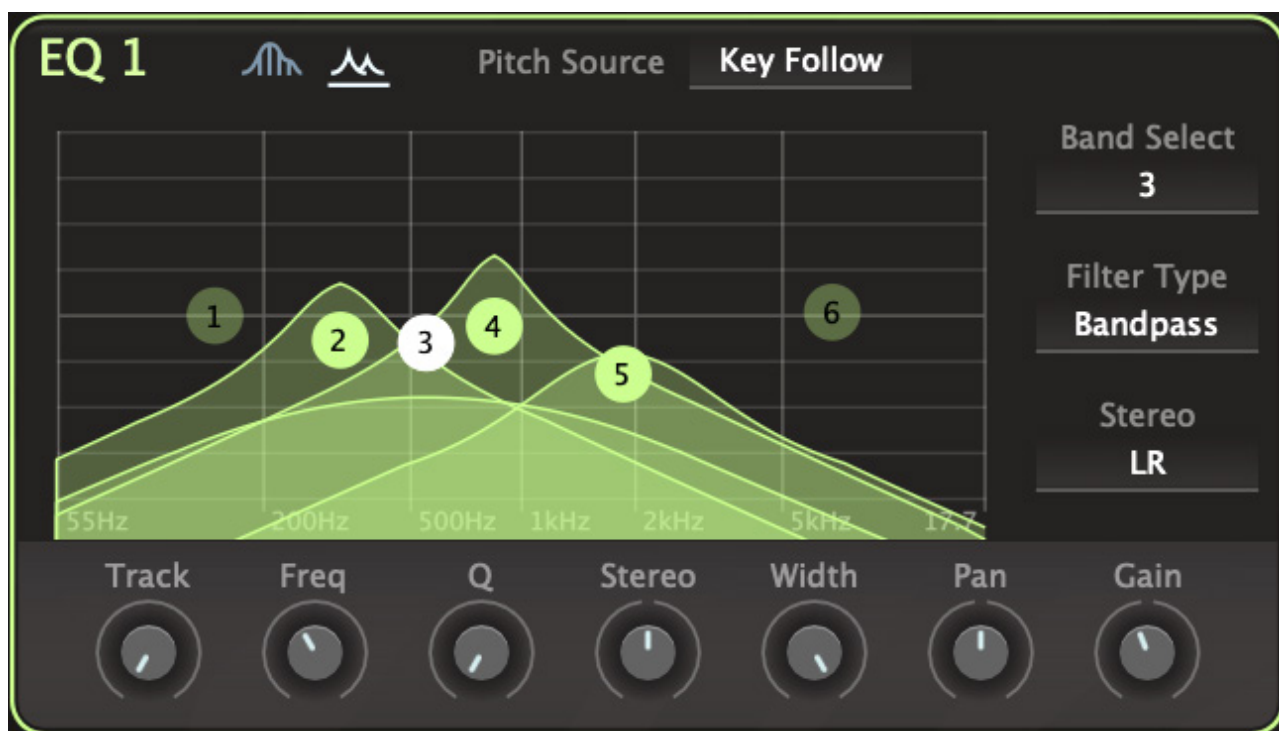
This filter model is based on an analogue circuit that—while perfectly valid on paper—simply cannot function in the real world. The hardware equivalent is literally impossible, hence the name.

Its behaviour relies on certain components exhibiting 100% ideal transfer curves. In practice, however, those components would be pushed beyond their operating specifications, leading to excessive noise, instability—even complete failure.

So while the Impossible C (stands for "cascade") filter works as a mathematical model of an analogue circuit, any attempt at a real-world implementation would sound nothing at all like it. What you can hear is a digital model of an analogue filter that can never truly exist!

# Equalizer (EQ)

6-band stereo polyphonic parametric EQ / resonator. Also available as a global effect.



*appearance of the EQ when Mode is set to Resonator*

## Operation

Drag the handles to adjust frequency and gain (the lines are 6 dB steps). Right-click a handle and drag vertically to change the band's Q (width or slope). Right-click anywhere in the background for basic editing options: *Copy*, *Paste*, or *Clear* (reset to default settings) as well as *Mode* selection...

## Mode (unlabelled switch)



*Spectral Pan* .....Bands are arranged in series for traditional EQ operation

*Resonator* .....Bands are arranged in parallel, allowing them to combine

**Caution:** The Resonator can get VERY LOUD. Make sure there are no boosted bands before switching from Spectral Pan to Resonator mode.

## Pitch Source

Selects either simple Key Follow or one of the [Pitch modules](#).

## Band Select

Select a band for editing. You can also select a band directly by clicking on its numbered handle. Remember: the controls only apply to the selected band.

## Filter Type

*Highpass* .....attenuates frequencies below **Freq**, allowing higher frequencies to pass

*Low Shelf* .....boosts or attenuates all frequencies below **Freq**, with a smooth shelf transition

*Bell* .....boosts or attenuates frequencies within a bell-shaped band centered around **Freq**

*High Shelf* .....boosts or attenuates all frequencies above **Freq**, with a smooth shelf transition

*Lowpass* .....attenuates frequencies above **Freq**, allowing lower frequencies to pass

## Stereo Mode

Switches between normal Left-Right stereo and Mid-Side.

## Track

Depth of frequency modulation by the selected Pitch Source, applied to all six bands.

## Freq

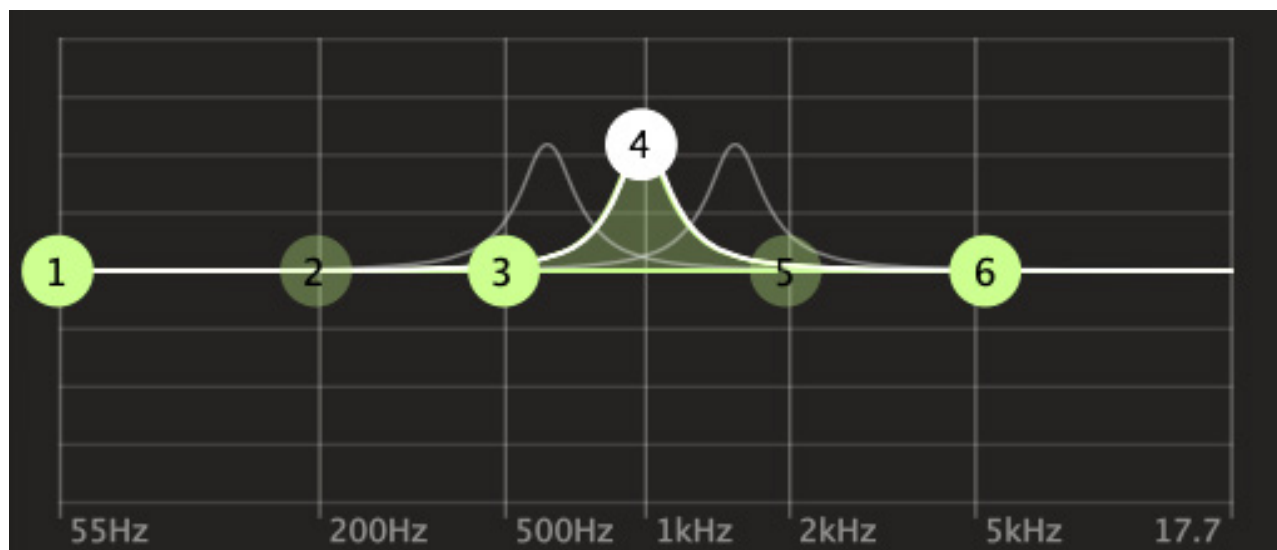
Band cutoff frequency. Alternatively, click on a handle and drag horizontally.

## Q

Band 'quality' i.e. filter steepness / band width. Alternatively, right-click on a handle and drag vertically.

## Stereo

Splits the band frequency left-right. Negative values swap the channels.

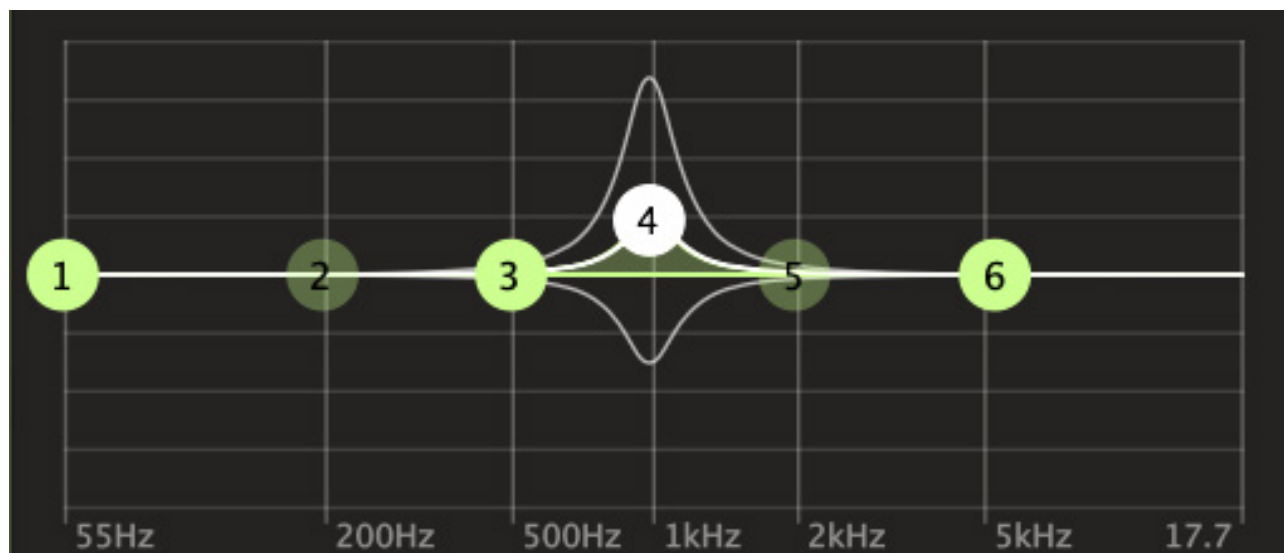


## Width

Stereo spread per band. Not available with the Lowpass or Highpass filter types (see below).

## Pan

Shifts the pan position of the selected band, indicated by a vertical deflection of the pair of grey curves. Not available with the Lowpass or Highpass filter types (see below).



## Gain

Boost or attenuation per band, indicated by the vertical position of the handle. Not available for the Lowpass or Highpass filter types.

## Shortcuts

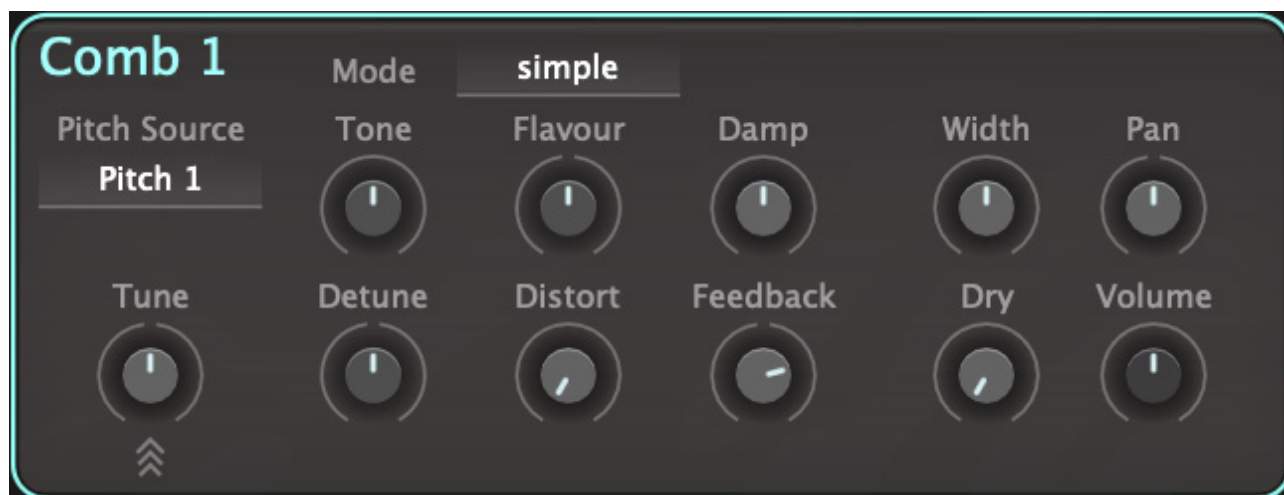
Double clicking a handle resets the Gain. As the Lowpass and Highpass filter types don't have Gain controls, a double-click resets the Q factor instead.

Option + drag (Mac) / Ctrl + drag (Win) shifts the gain and frequency of all bands. If you grab the handle of a band with filter type *Lowpass* or *Highpass*, the Q factor is shifted instead of Gain.

Option + double-click (Mac) / Ctrl + double-click (Win) switches the band off.

# Comb

Also known as "comb filters", such modules are based on ultra-short delay lines with feedback that can turn a short click (for instance) into a slowly decaying or even a sustaining tone. The frequency response curve resembles a row of spikes, hence the name "comb".



Combs are great for creating realistic plucked / bowed strings, flutes, tuned percussion... in the Zebra 3 implementation even polyphonic flanging and polyphonic reverb effects.

**Caution:** Be careful while experimenting with this module—it can suddenly get VERY LOUD, especially if you feed the comb with a sustained oscillator and play certain notes.

The **Tone** and **Flavour** knobs shown here are replaced by other functions depending on the MODE.

## Pitch Source

Selects either simple key follow or one of the [Pitch modules](#).

## Tune

Nominal pitch, with direct modulation. The range is +/- 24 semitones.

## MODE

- Simple* .....Stereo delay tuned to the played note. The input is fed to the first of two delays, which are then cross-fed. See Tone | Flavour below.
- Complex 4/8*.....4 or 8 comb filters running in parallel. See Structure | Tilt below.
- Dissonant* .....4 x 4 feedback delay network with a distinctive metallic character. See Ratio | Diffusion below.
- Blown*.....A bandpass filter in the feedback path accentuates harmonics controlled by the Pitch Offset and Resonance parameters (see below). This mode can create highly realistic overblown flute and horn sounds!
- Reverb* .....A variant with delays that are long enough to emulate resonant bodies or ambient spaces ("polyphonic reverb"). See Ratio | Diffusion below. The Detune control is disabled.

## Tone | Flavour

Only available if the MODE is set to *Simple*. The Tone parameter is the ratio between the delay times, while Flavour controls the level of input signal fed directly into the second delay.

Tip: For a phasing effect, set Flavour to maximum and modulate Tone.

## Structure | Tilt

Available only when MODE is set to *Complex 4* or *Complex 8*. Partial **Structure** distributes the resonant frequencies to multiples of the fundamental. Partial **Tilt** adjusts the relative volumes of combs according to frequency: Negative Tilt values boosts the higher-frequency combs, while positive Tilt emphasizes the lower-frequency combs.

## Ratio | Diffusion

Only available if the MODE is set to either *Dissonant* or *Reverb*. The Ratio and Diffusion parameters both affect delay ratios i.e. the pitches.

## Pitch Offset | Resonance

Only available if the MODE is set to *Blown*. **Pitch Offset** adjusts the degree of 'overblow', moving up through the harmonic series like e.g. a trumpet does. The **Resonance** parameter controls the resonance of the bandpass filter in the feedback path, effectively adjusting how much of the input signal comes through (and therefore the tonal quality).

## Damp

A 6dB lowpass filter in the feedback path simulates how e.g. a plucked string is dampened over time by various physical constraints. Damp effectively adjusts the strength of this filter.

## Width

Stereo width. At minimum, the processed signal is effectively mono

## Pan

Shifts the overall stereo position of the processed signal towards the left or right channel.

## Detune

For *split single* and *reverb* modes this is mostly fine tuning. In all other modes it detunes the two delay lines in opposite directions.

## Distort

Adds distortion in the feedback path.

## Feedback

Bipolar feedback level control. Negative values lower the pitch by an octave, and the timbre has a more 'hollow' character.

## Dry

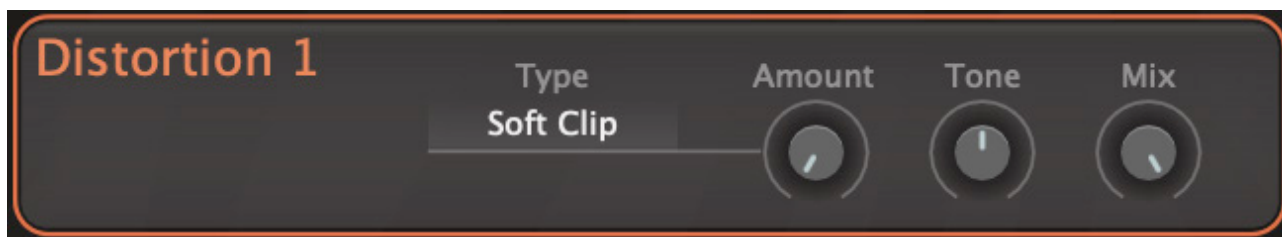
Blends the unprocessed input signal to the Comb output.

## Volume

Comb output level.

# Distortion

The Zebra 3 distortion unit is powerful but simple, requiring just a Type selector and 3 knobs.



Like any other module in the generator rack, this unit is *per voice*. If you need intermodulation between notes (i.e. guitar-style distortion), use the global version in the [effects](#) rack instead.

## Type

*Soft Clip* ..... Smoothly compresses peaks in the signal

*Hard Clip* ..... Simply chops off the top and bottom of the waveform

*Foldback* ..... Similar to soft clip except that increasing the gain doesn't slam more of the signal peaks against the limits, but reflects (folds) them back

*Corrode* ..... A combined sample rate and sample resolution control (a.k.a. bit crusher)  
The Amount and Tone controls (see below) are replaced by Rate and Crush

*Wedge* ..... A high-order waveshaper with foldback function controlled by the Amount knob (note: loud signals can become silent or even phase-inverted)

## Amount

Input gain control. This effectively sets a threshold above which distortion occurs (and therefore controls the perceived amount of distortion).

## Rate

Replaces the **Amount** knob when the *Corrode* type is selected. Sample rate reduction, degrading the audio quality. Low values introduce high-pitched grit, after which aliasing takes over i.e. you will hear more rough metallic tones than the original signal.

## Tone

Frequency tilt control to distort more bass (values below 50) or more treble (values above 50).

## Crush

Replaces the **Tone** knob when the *Corrode* type is selected. Sample resolution reduction—Waves get increasingly steppey until they become clicks or even silence, depending on the input signal.

## Mix

Dry/Wet balance. Turning Mix down from the usual maximum preserves more of the original character without affecting the distortion characteristics.



# Modal Resonator

The acoustic response of a physical object to being struck or scraped etc. reveal details about the object's material, size, shape, and energy of excitation.

## WARNING

The resonances can get very loud, especially when processing a steady input signal.

By adjusting parameters such as the strike position, absorption and modal dispersion, you can create a wide range of timbres from percussive metallic tones to softly resonant wooden bodies, making the Modal Resonator a powerful tool for 'physical modelling' sound design.



A **mode** is a single resonant element of the modelled object. Each mode is a damped resonator 'excited' by the input, with the summed responses of all modes producing the audible output.

Note: Although the word *mode* in this chapter has a very different meaning from its usage in e.g. *demo mode*, in modal synthesis it is the established term.

## Partials

The central graphic is a 3D representation of the frequencies, amplitudes and relative decay times of partials. Right-click to select *eco* (most CPU-friendly), *fast* or *glow* (most CPU-intensive).

## Tuning

---

### Pitch Source

Selects either simple Key Follow or one of the four [Pitch modules](#)..

### Tune

Pitch offset below / above standard. The range is -48 to +48 semitones.

### Detune

Spreads the tuning across the stereo field by up to 1 semitone in both directions, panned mostly to the left and right channels while keeping the 'impact' in the center

## Input (In)

---

### HPF

Sets the cutoff frequency of a **high-pass filter** applied to the input, reducing excessive low-end energy and thus preventing overly boomy results.

### Position

Where the resonator is hit, which affects the relative amplitudes of modes and therefore the overall timbre. A value of 0.00 represents the center while 100% is an extreme edge.

## Decay

---

### Decay

A simple envelope. With this parameter set to maximum and Absorb (see below) set to minimum, even resonances excited by a single click can continue indefinitely.

### Decay KF

'Decay Key Follow' modulates Decay time according to the MIDI note: Negative values make low notes longer and high notes shorter, positive values have the opposite (less natural) effect.

## Modes and Output

---

### Density

The number of partials ('modes') used, from 8 to 256. Reduce from the default (64) for glassy sounds. To save CPU, set higher values ONLY if this makes a significantly positive difference

### Profile A / B

Select modal profiles. A profile is a collection of resonant modes that characterizes a modeled object's vibrational response.

Each profile has a pair of selectors: Click on either to select a profile from the menu, and/or use the arrows to step through folders (upper) or profiles (lower).

### Blend A/B

Crossfades, interpolates or morphs between the two modal profiles. See Blend Type below.

## Blend Type

Three methods of blending

- Crossfade* .....The two profiles are simply mixed together. This option can result in highly complex tones, as there are likely to be more modes than with the other options...
- Interpolate* .....Profiles are matched between A and B (see below) such that their frequencies and amplitudes blend as smoothly as possible. Note: Modes that are not assigned a unique "nearest neighbour" will follow the closest ones that are.
- Morph* .....Smoothly changes the energy distribution of one spectrum to that of the other spectrum using the algorithm described in the following article: *"Real-time morphing of impact sounds"* by Sadjad Siddiq (Audio Engineering Society Convention 139 in 2015).

## Suppress Dry

Further reduces the presence of the dry signal when Dry is already set to minimum.

## Dry

Sets the output level of the unprocessed signal, directly routed from the Modal Resonator's input.

## Atomize

Separates modes in time. The options in the selector to the left of the knob are:

- Sweep* .....Modes are played descending (negative Atomize values) or ascending (positive)
- Scatter* .....Modes are played in random order, negative Atomize values are stereo

Note: Constant noise will not properly "atomize" because the input never changes.

## Absorb

Controls how quickly each resonant mode loses energy. Higher values increase **damping**, making the sound shorter and duller, while lower values let them ring longer and more brightly.

## Disperse

Positive values spread the frequencies of all modes, negative values compress them.

## Normalize

Controls the balance between low and high frequency modes.

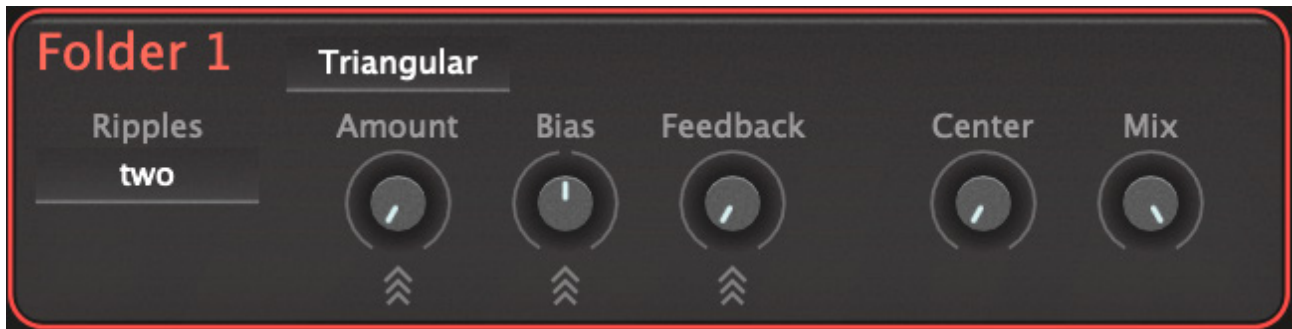
## Volume

Adjusts the output level of the processed signal.

# Wavefolder

A wavefolder is a kind of waveshaper which maps the input signal onto a sine or triangle, folding the wave back on itself. Like hardware wavefolders, Zebra's version often sounds best when applied to signals with relatively little high frequency content, such as a pure sine or triangle wave.

Note: Wavefolders appear as **Folder** in the grids and panels.



## Type (unlabelled switch)

Sets the ripple shape: Triangular or Sinusoidal.

## Ripples

The number of cycles: infinite, 1, 2, 4, 8, or 16. The Ripples value does not affect CPU-usage.

## Amount

Adjusts how much of the wavefolder curve is used—effectively an input volume control.

## Bias

Shifts the part of the wavefolder curve being used to the left (negative values) or right (positive values). You can clearly count the number of Ripples if you slowly turn Bias up to maximum while playing a note. This parameter is unused if Ripples is set to infinite.

## Feedback

Feeds the output signal back into its own input for even more complexity.

## Center

Central clipping: Widens all zero-crossings in the signal before it is folded.

## Mix

Simple dry/wet control, usually left at maximum. Turn this down to reintroduce some of the original, unprocessed signal.

# Ring Modulator

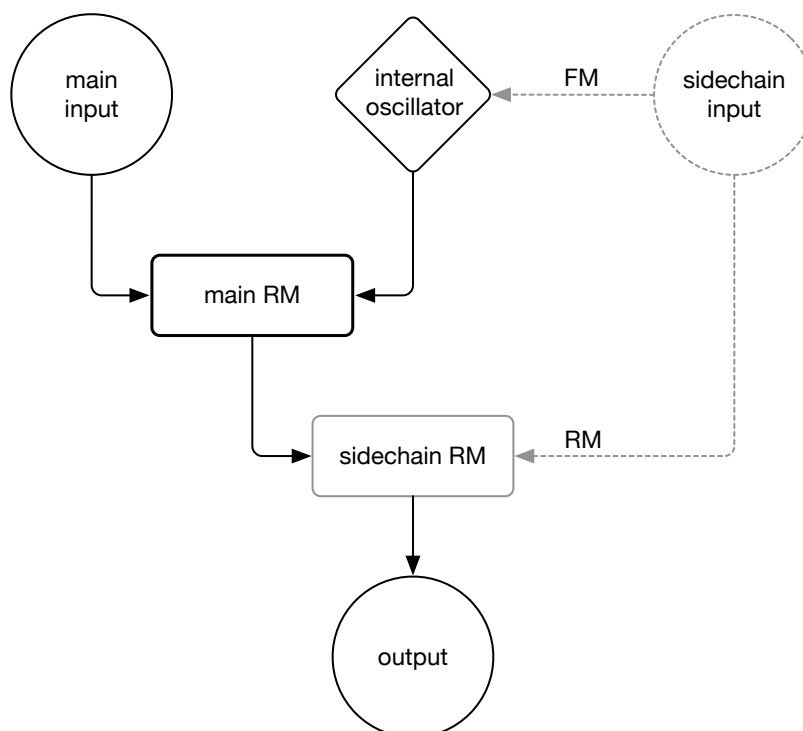
Ring modulation (RM) is a kind of amplitude modulation (AM) in which two signals are multiplied together. The input frequencies are suppressed while new frequencies—the sum and difference—are generated. The result is a complex, often inharmonic spectrum, making ring modulation well suited for bells or any kind of metallic timbres.

Of course the ring modulator in Zebra 3 offers a lot more than simple multiplication. The FMO has its own sine oscillator, optional sidechain FM, and even a Bode Frequency Shifter mode.



There are two stereo ring modulators at work here. The primary one multiplies the main input with the internal sine wave, while a secondary sidechain RM multiplies the main input with the sidechain signal. This is only the case if the switch bottom right is set to 'RM', otherwise the sidechain signal frequency-modulates (FM) the internal oscillator instead, and the sidechain RM is unused.

All this sounds more complicated than it actually is... a signal flow diagram might help here:



## Pitch Source

Selects either simple Key Follow or one of the [Pitch modules](#).

## Frequency

The frequency of the internal sine oscillator. Bipolar, with 0.00 Hz in the center.

## Track

Keyboard tracking for the internal sine oscillator. Only works if Frequency is non-zero.

## Spread

Detunes the internal sine oscillator: Left channel down, right channel up.

## Mode (unlabelled switch)

*Bode Shifter* .....frequency shifter

*Diode Ring* .....classic ring modulator

## Sideband

Only available in Bode Shift mode. Balance between the lower sideband (left channel) and the upper sideband (right channel).

## Drive

Only available in *Diode Ring* mode. The degree of non-linearities in the modelled circuit. Turn Drive up and explore the gnarly sounds!

## Internal

Balance between the raw signal from the main input and the processed signal.

## External

Level of the secondary (sidechain) signal.

## RM | FM

RM .....The sidechain signal is multiplied with (i.e. ring modulates) the main input

FM .....The sidechain signal frequency-modulates (FM) the internal sine

## Tips

For **traditional ring modulation**, feed the Ring Modulator two different signals, set External mode to RM and turn the External amount up to maximum. Turn the Internal amount down to minimum.

For very **pure ring modulation** like in Zebra2, use Bode Shifter mode and set the Frequency to 0.00.

For **stereo phasing**: Frequency = 0, Spread = 1, Mode = Bode, Sideband = 100, Internal = 50

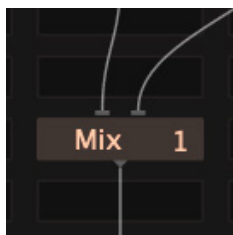
# Mixer

Before adding a mixer, please remember that oscillators, noise generators and excitors allow signals above them in the grid to **pass through**: they practically mix themselves. You will find plenty of examples of stacked oscillators in the factory presets.

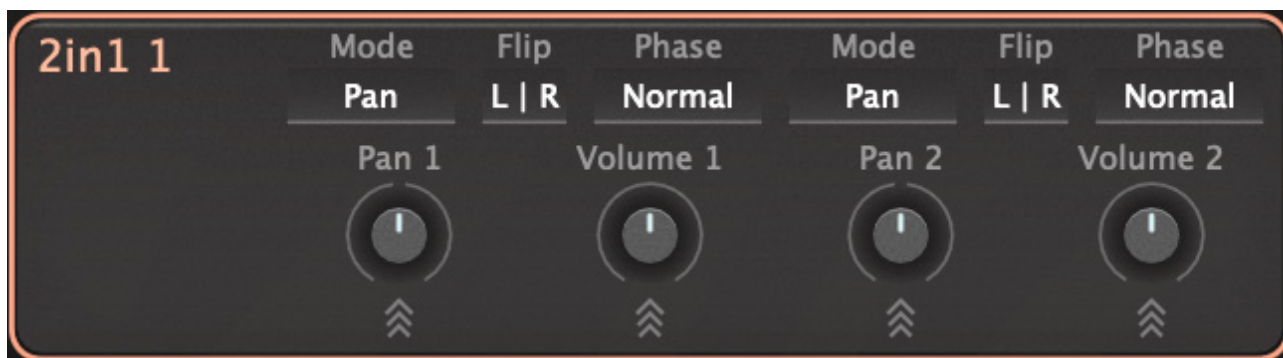
Zebra 3 has three different types of mixer module: **Mix** (aka 2in1), **4in1** and **4in4**...

## Mix (2in1)

A simple mixer with 2 stereo inputs and one stereo output.



After positioning a Mix module in the grid, right click on it to specify the two input lanes, for instance *In A: Same* and *In B: Lane 2*.



### Mode

Toggles between *pan* and *balance*. *Panning* to the left (for example) moves some of the right input channel over to the left output, while *balancing* to the left fades out the right input channel.

### Flip

The R | L option here swaps the left and right channels.

### Phase

Phase of the signal. *Inverted* can create interesting effects by effectively subtracting one waveform from another.

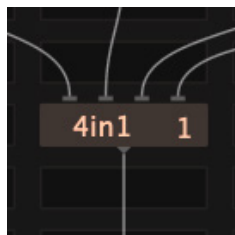
### Pan, Volume

Pan positions and output levels.



## 4in1

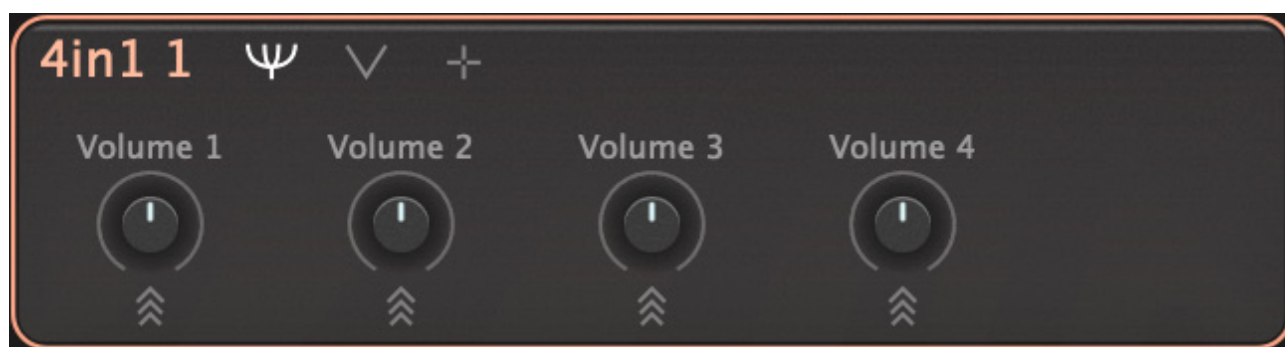
This mixer version has four fixed inputs, one from each lane of the main grid.



Use the **3 icons on the left** to select an operation mode—*Sum*, *Scan* or *Vector*...

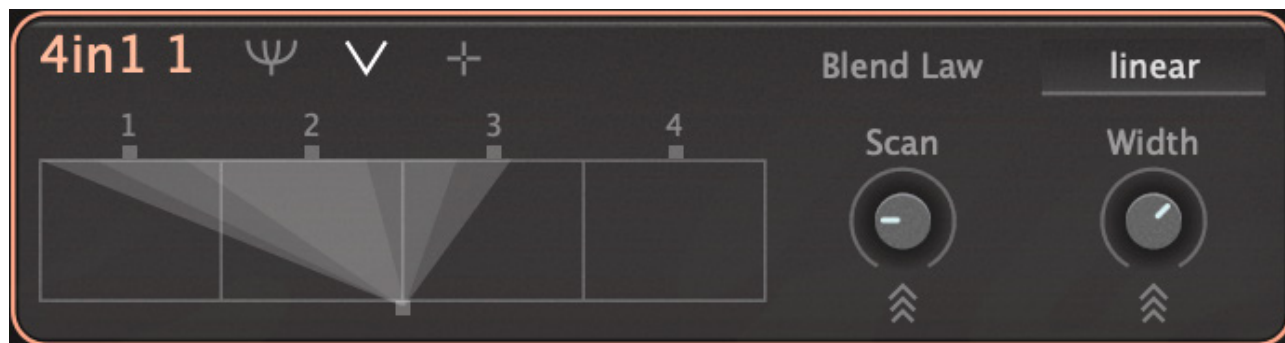
### Sum Mode

The four input signals are simply mixed together via Volume knobs. There is no pan control.



### Scan Mode

Blends the 4 inputs with variable amounts of adjacent inputs, as indicated by the graphic:



#### Blend Law

*Power*.....the signal levels are proportional to the square root of the distance from 1/2/3/4

*Linear*.....the input signals are cross-faded linearly

*Switched*.....the input signals are simply switched (note: Width **must** be non-zero)

#### Scan

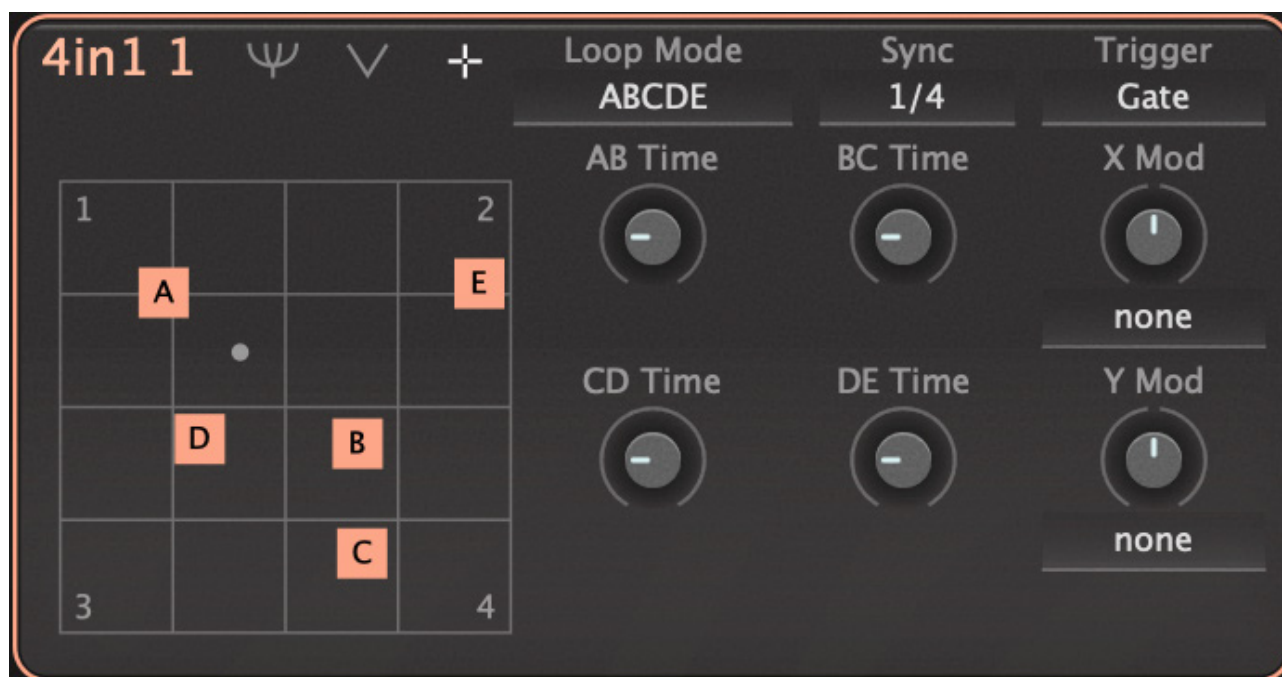
Sets the nominal (i.e. before modulation) mixture of signals.

#### Width

The width of the "window", the number of adjacent lanes included in the mix. Maximum 4.

## Vector Mode

A, B, C, D and E define 5 different **mixtures** of the 4 input signals: The closer the handle is to a corner, the more prominent that input will be. When triggered—by default each time a note is played—the mix moves through A → B → C → D → E at rates set by the four knobs.



## Loop Mode

- ✓ none
- ABCDE
- BCDE
- CDE
- DE
- ABCDEDCBA
- BCDEDCB
- CDEDC
- DED

Selects a range of transitions to be repeated. For example, CDE here means that, after the initial A→B→C→D→E, the transitions C→D→E will loop.

Note: Motion always starts with A→B→C→D→E, and all loop options include E.

If fewer than 5 points are required you can position some of them very close together and set the transition time(s) to 0.

## Sync

The basic rate of motion. Offers the same options as the [LFOs](#), but scaled by 4 knobs...

## Trigger

Motion is restarted by positive zero-crossings in the selected source.

## AB Time | BC Time | CD Time | DE Time

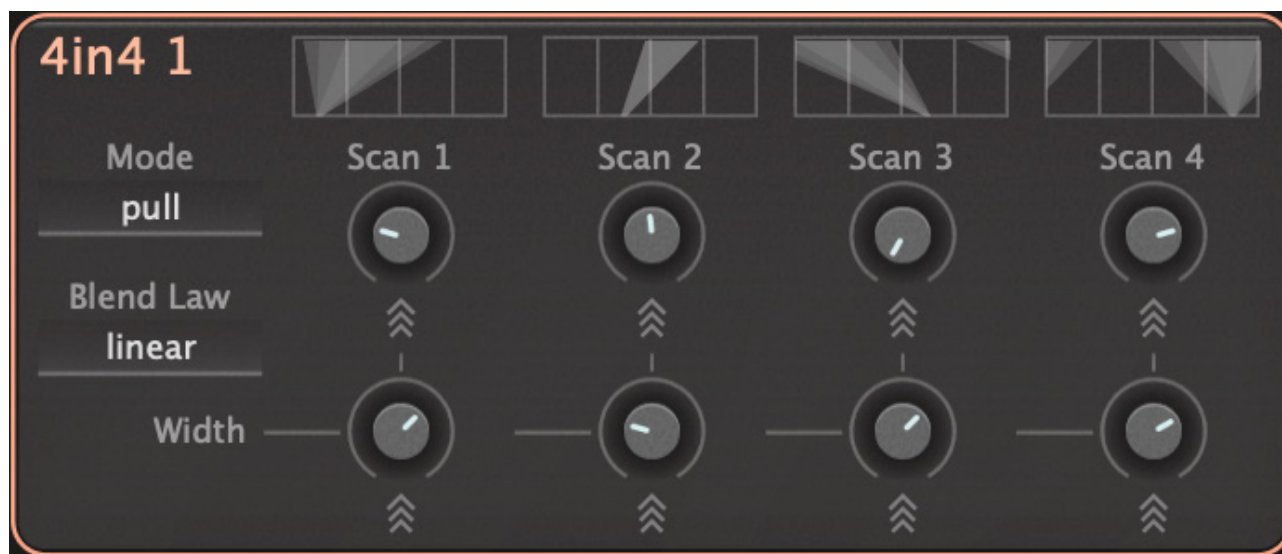
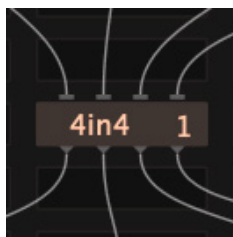
Multiplies the Sync time for each transition, from 0% to 500%. Double-click for the 100% default. Please note that it's often best to use the sample & hold feature in the matrix when modulating these parameters, as using a continuous source (e.g. mod wheel) will cause glitches.

## X Mod, Y Mod

The small dot indicating the current output mix can also be modulated in real time. These two knobs are **modulation depths**, and will only work after a source has been selected.

## 4in4

This scanning mixer has four fixed inputs and four fixed outputs, one for each lane of the grid. See also **4in1**, Scan mode.



### Mode

*Pull*.....the upper knobs scan through the **inputs**, the outputs are fixed

*Push*.....the upper knobs scan through the **outputs**, the inputs are fixed

### Blend Law

*Power*.....signal levels are proportional to the square root of the distance from 1/2/3/4

*Linear*.....input signals are cross-faded linearly

*Switched*.....input signals are simply switched (note: Width must be set to a non-zero value)

### Scan

The four upper knobs set the nominal mix of signals i.e. the mix position before any modulation.

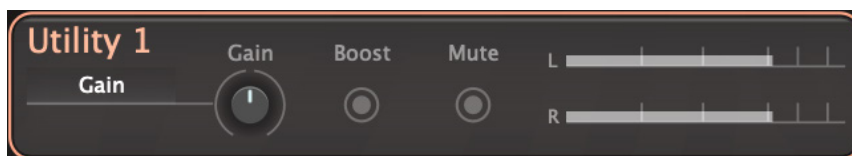
### Width (unlabelled)

The width of the 'window', the number of adjacent lanes included in the mix.

# Utility

Signal conditioner with metering. The six different **modes** are switched via the selector on the left.

## Gain



### Gain, Boost, Mute

**Gain** controls the level from silence to +6dB. **Boost** adds 12dB unless Gain is set to a very low value. **Mute** simply silences the input—the centre flashes as a reminder.

## Stereo



### Width, Pan

Stereo width and overall pan position (like in the oscillators).

### Stereo Mode (unlabelled switch)

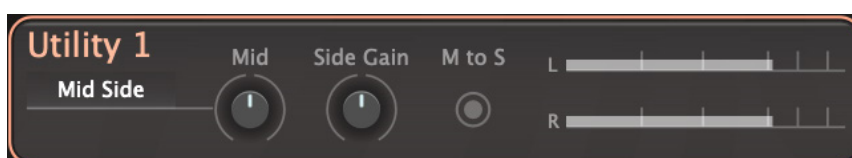
*L/R or R/L* .....Either normal stereo (L/R), or with the channels swapped (R/L)

*LR > MS*.....Converts stereo to 'mid-side': Signal components common to both channels (i.e. what you can hear in the center) are routed to the left channel, while those that differ are routed to the right channel (whereby the original right part is inverted).

*MS > LR*.....Converts mid-side to stereo

*MS Auto* .....The problem: A mono signal (Left = Right) in LR > MS mode would lose the right channel, as the Right output is L minus R. Solution: MS Auto treats a mono signal as stereo (LR), but applies LR > MS proportionally to differences between L and R

## Mid Side



### Mid Gain, Side Gain

**Mid Gain** controls the level of signal components that are identical in the left and right channels.

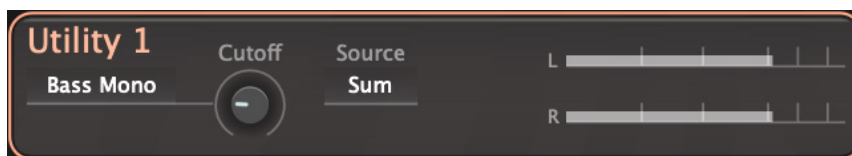
**Side Gain** controls the level of components that differ i.e. all the rest. Maximum boost is +6 dB.

### M to S

Exchanges Mid and Side, making it easy to add width to a mono signal. However, please be aware

that the result is **not mono-compatible** i.e. left and right channels can cancel each other out!

## Bass Mono



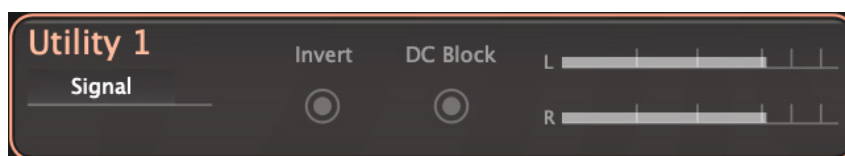
### Cutoff

A crossover filter isolates frequencies below the set Cutoff point and places them dead center, while frequencies above the Cutoff point retain their stereo width. The range is 20–500Hz.

### Mono Source (unlabelled selector)

In *Sum mode*, bass content in a stereo signal is summed to mono. In modes *L* or *R*, the bass is isolated from one channel only.

## Signal



### Invert

Flips the polarity of the input signal. Use this to fix or create (!) phase cancellation effects.

### DC Block

Removes 'Direct Current' (static offset components of a signal) as well as any extremely low frequencies.

## Meter



### Mode

**Peak** metering reacts very quickly—good for monitoring transients in order to avoiding clipping. **RMS** (Root Mean Squared) metering is usually best for monitoring the overall loudness.

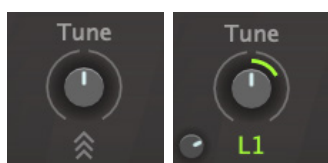
# Modulators

Note: The [Modulation Matrix](#) has its own chapter, which follows this one.

## Concept

In any synth, **modulation** means using a *source* signal to control the value of a *target* parameter, either *automatically* or in response to *performance* gestures (playing harder, pushing wheels, twisting knobs etc.). Zebra 3 offers two types of modulation routing: **direct** or **indirect**:

### Direct Modulation — in the panel

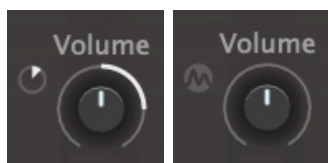


Key parameters offer high-resolution modulation directly in the panel. Click the chevron below the knob and choose a modulation source from the menu, then adjust the modulation depth with the small bipolar knob that appears at the **bottom left**: A coloured arc around the main knob provides visual feedback.

Note: Direct modulation is calculated faster than the more CPU-efficient indirect modulation...

### Indirect Modulation — via the matrix

For more details please refer to the [modulation matrix](#) chapter.

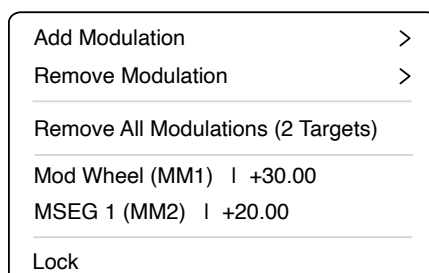


All visible controls (except the Master Output and performance controls) can be modulated *indirectly* via the matrix. A small bipolar knob appears **top left**, and the depth is also displayed as an arc while the control has the focus. When focus is lost, the small knob is replaced by a wave icon.

#### How to put a modulation source in focus so that you can adjust its modulation depth at the target

If you already know which source is used you can click on the appropriate [Modulation Assigner](#).

However, a right-click on the target knob/slider lets you select a modulation source from the menu:



In this example, simply select Mod Wheel or MSEG 1 and the modulation depth control will appear.

With a little practice you should find that populating the matrix via *Add Modulation* is considerably faster than either [drag & drop](#) or working exclusively within the modulation matrix panel. A similar menu is also available for modulation sources: See [Source Context Menu](#) a few pages down.

## Drag & Drop Assignment

The [modulation matrix](#) can also be populated remotely via **drag & drop**...

### Modulation Assigner Pips



Each [modulator panel](#), as well as the MSEG and Mapper tabs in the [Editor Bar](#), includes a modulation source "pip" symbol for creating assignments via **drag & drop**. All elements in the Modulation Assigner Bar (see below) work just the same.

If unused, the pip appears as **cross**. When used at least once, the pip appears as a **wave**.

Grab the pip—or anything in the Modulation Assigner Bar—and drag & drop it onto a modulation target: the assignment will appear in the [modulation matrix](#).

You can also drag & drop a source onto a [direct modulation](#) source selector instead of clicking there and selecting from the menu.

### Modulation Assigner Bar

The narrow strip along the bottom of the Zebra 3 window gives you access to most modulation sources for **drag & drop** assignments, which then appear in the [modulation matrix](#). Note that there are no source pips for **MSEGs** and **Mappers** here—you will find those in the [editor bar](#).

On the left are several single sources:



#### MIDI Sources

- PW** .....pitch wheel
- MW** .....modulation wheel (MIDI CC#01)
- PRS**.....pressure (channel aftertouch or polyphonic aftertouch)
- VEL** .....note velocity
- KEY** .....key follow (without pitch bend or glide)
- GAT**.....gate: maximum while a note is being played or sustained via hold pedal
- TRG**.....trigger: a short impulse at the start of each note
- HLD**.....hold pedal a.k.a. sustain pedal (MIDI CC#64)
- REL** .....release: maximum after a note is released (practically the opposite of GAT)

#### Internal Sources

- CON** .....constant: +100
- ALT**.....alternating between -100 and +100 per note
- RND** .....a random value anywhere between -100 and +100 per note
- NOI**.....mod noise (low frequency noise as modulation source)



## Multiple Sources

To the right of the single sources are the four [Pitch](#) modules (P), [envelopes](#) (E), [LFOs](#) (L), [Math](#) modules (MA), and performance [Control](#) knobs (• A • B • C • D):

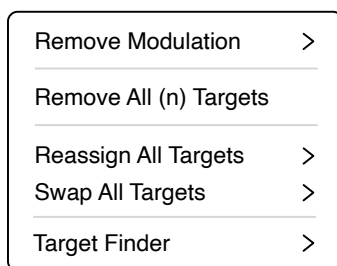


## Source Status

Modulation sources already in use anywhere appear in a frame, like Control B in the above image. LFO 1 appears in reverse colour to indicate that it has the focus.

## Source Context Menu

Like the context menu of the knobs, modulation sources ([Modulation Assigner Pips](#), [Editor Bar](#), [Modulation Assigner Bar](#)) also let you remotely edit the content of the matrix via right-click:



*mod source context menu*

*Remove Modulation* .....Lists all assigned targets so you can remove them individually

*Remove All* .....Remove all assigned targets

*Remove Inactive* .....Remove all inactive targets (this entry only appears if targets are in modules that have been removed)

*Reassign All Targets* .....Use a different source for all these targets

*Swap All Targets* .....Exchanges all targets with those assigned to a different source

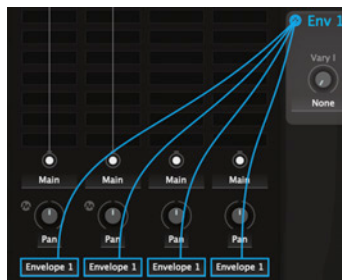
*Target Finder* .....Visual aid to find targets assigned to the clicked source:

*Highlights*      Assigned targets appear with a brighter border

*Lasers*          Source and target(s) are connected by straight lines

*Tentacles*      Source and target(s) are connected by curved lines

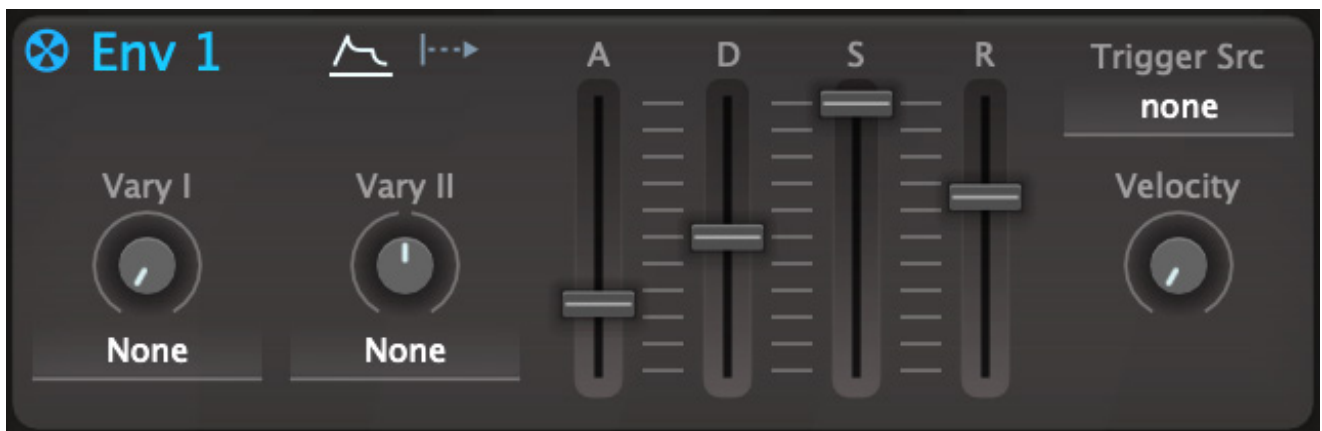
Note: Targets that are currently invisible, e.g. if the rack panel is scrolled out of view, assignment cannot be 'found' in this way.



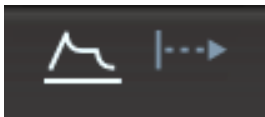
*Target Finder = tentacles*

## Envelope

A traditional ADSR with several extras: A one-shot option, retriggering via modulation sources, and two intriguing 'variation' knobs [**Vary I**] and [**Vary II**]...



### Trigger Mode



**Gate** (classic ADSR): When a note is released, the envelope will immediately jump from the current level to the Release stage.

**One Shot**: The envelope completes all stages, however long the note is held.

### A D S R

**Attack**, **Decay**, **Sustain** and **Release** faders: **Attack** is the time it takes for the envelope to rise from zero (or from the 'Init' value) to maximum. **Decay** is the time it takes to drop from maximum to the **Sustain** level, where it will remain until the note is released. **Release** is the time it takes to drop to zero after a note is no longer being held or sustained.

### Vary I: unipolar extras

**Delay** ..... Waits before the Attack stage starts (max. 5 seconds)

**Hold** ..... Extends the length of the peak before the Decay stage begins (max. 5 seconds)

**Init** ..... Raises the initial level at which the Attack stage begins \*

**Stack** ..... Simulates a desirable behaviour of certain classic mono synthesizers: The attack **levels** of quickly repeated notes **accumulate** up to a maximum set by Vary I. Note that the Attack time must be quite short

**Overshoot** ..... Raises the level of the Attack peak before the Decay stage begins

\* whenever you need **the fastest possible attack**, set Vary I to *Init* and turn it up to maximum.

### Vary II: bipolar extras

**Gain** ..... envelope output level (negative values invert the signal)

**Key Scale** ..... scales attack, decay and release times according to the MIDI note. At minimum or maximum the envelope times are halved / doubled for each octave

**Feedback** ..... self-modulation affects curvature (like the graphic for [Glide](#))

**Stretch** ..... scales all envelope times—turn up if you find the maximum decay too short

## Trigger Source

Unusual for a polyphonic synthesizer, the envelopes can be triggered by LFOs, MSEGs, Mappers, keyboard performance controls... even note Release!

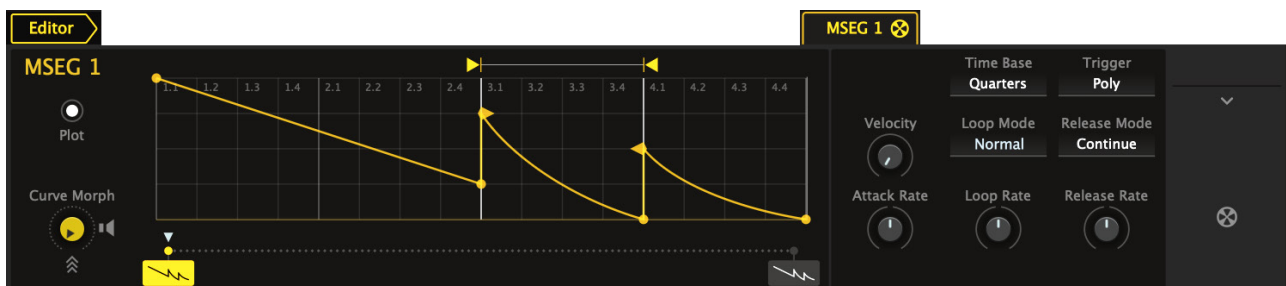
New triggers typically occur whenever the modulation source moves from zero to a positive value. For Mod Wheel, Pressure, MSEG, and Controls ABCD, the envelope is retriggered shortly above the modulation source's midpoint i.e. these sources are treated as if they were bipolar.

## Velocity

This controls how strongly Velocity data from e.g. a MIDI keyboard will affect the envelope's output level. Higher Velocity values mean that softer keystrokes will result in a lower output.

# MSEG

Multi-Stage Envelope Generators:



An MSEG consist of **up to 8 morphable curves**, each with its own **loop**. The MSEG can act as a rhythm generator or even morph smoothly between an ADSR-type envelope and a unipolar LFO.

## Differences between the MSEG and oscillator editors

The MSEG timeline allows 8 curves maximum (oscillator: 16 Curves)

The MSEG curve includes a loop

The MSEG curve has a defined length

The MSEG doesn't need the [Close Shape](#) tools

The MSEG toolbox doesn't need the [Harmonic Grid](#) option

## Easy Editor

Mostly the same as the [oscillator easy editor](#), but with a few extra functions to handle loops:

Set loop markers .....right-click on a point and select *Set Loop Start* or *Set Loop End*

Move loop markers .....click+drag: automatically **attach** to points

option (Mac) / ctrl (Win) click+drag: **detach** from points

## Editor

The button on the left opens the MSEG's [Main Editor](#) with its toolbox and extra options.

## MSEG label

Click to open the module preset menu.

## Plot

Minimize CPU usage by disabling realtime curve display. **'Plot disabled'** appears in the window.

## Curve Morph

Position along the [Timeline](#). Double-clicking a curve in the Timeline will also set Curve Morph.

The **Listen** button to the right of the Curve Morph knob freezes the selected Curve so you can check it without hearing any Curve Morph modulation. Reminder: Listen status is global and is not saved with the preset—remember to disable it afterwards!

## Time Base

Selects the unit that corresponds to integer steps in the Timeline. The *Sixteenth*, *Quarters*, and *Notes* (4 quarters) are synchronized to the song tempo, while *Seconds* are not.

## Trigger

Unlike the regular envelopes, MSEGs can only be triggered / gated by incoming MIDI notes:

*Poly* .....standard polyphonic, each played note triggers its own MSEG

*Single* .....only triggers after all previous notes have been released

## Velocity

How strongly MIDI velocity affects the MSEG's output level. Higher Velocity values cause softly played notes to reduce the modulation amount.

## Loop Mode

Selecting *Infinite* here causes the MSEG to continue looping after the note is released. Loop Mode is ignored if the MSEG is selected as amp envelope in the [Lane Mixer](#).

## Release Mode

On lifting a key...

*Immediate* .....jump to the end of the loop, start the Release phase

*Adaptive* .....like *Immediate*, but start the Release from the current value

*Continue* .....carry on through the curve—often the smoothest option

## Attack Rate

Scales the speed of the Attack stage i.e. everything to the left of the loop.

## Loop Rate

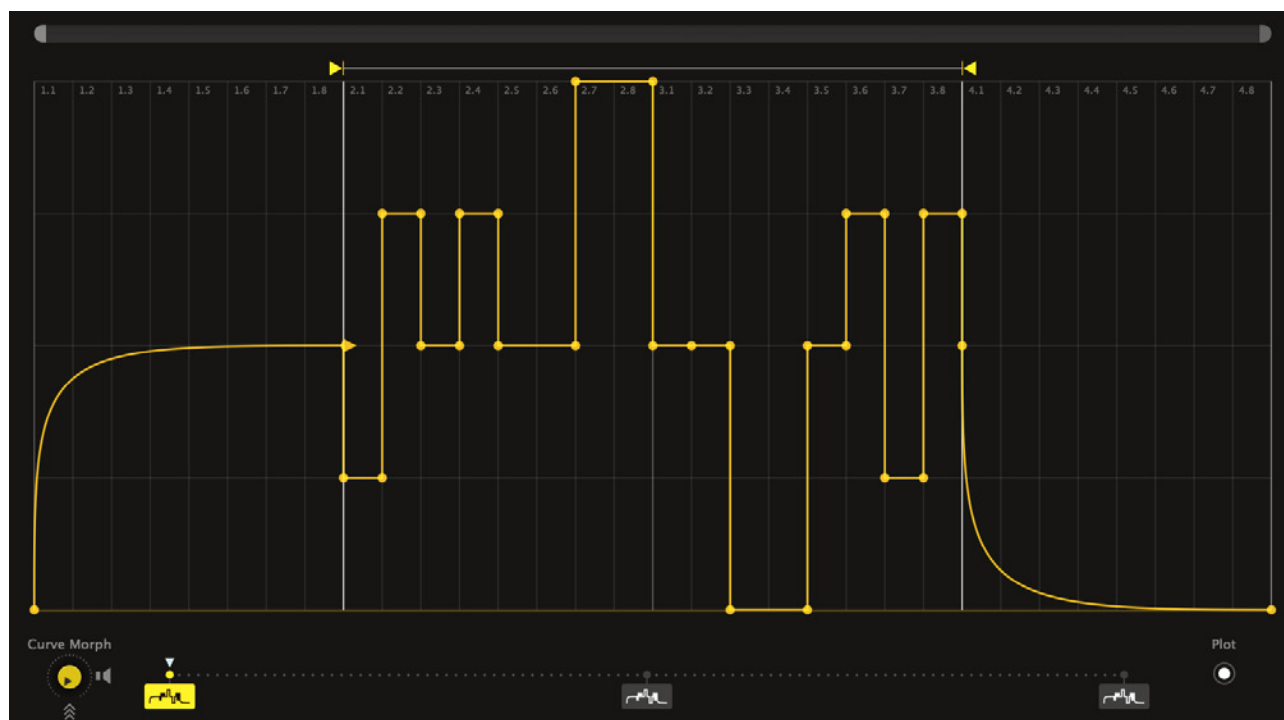
Scales the speed of the Loop. Note: When a note is released before reaching the loop, Loop Rate is ignored unless the Loop Mode (see above) is set to *Infinite*.

## Release Rate

Scales the speed of everything after the loop.

## Main Editor

Open an MSEG in the lower panel, then click on the **[Editor]** button in the editor bar:



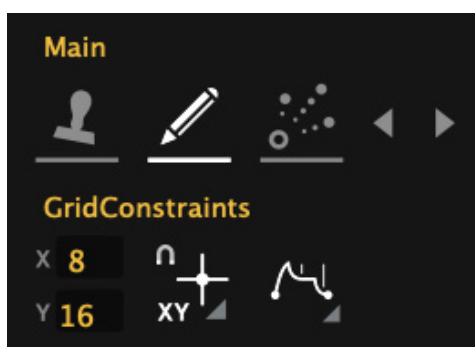
## Zoom Bar

The bar above the editor lets you zoom into parts of the MSEG whenever you need to work very precisely. Drag the left/right handles horizontally, then shift the view by either dragging it or rolling your mouse wheel. Double-click to toggle between the full view and the zoomed view.

Hovering over the edit window and rolling your mouse wheel will also zoom in/out.

## Toolbox

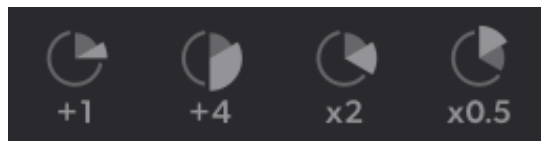
The MSEG toolbox looks very similar to the [oscillator toolbox](#), with only a few differences. Click on the Pencil icon to view the Drawing Tools...



*Upper two rows of the MSEG toolbox, with Shape Constraint set to Envelope Mode*

## MSEG Length

To change the length of the MSEG you can either drag the final point to the left or right or use these buttons near the bottom of the toolbox:



+ 1 .....adds 1 unit to the length of the window

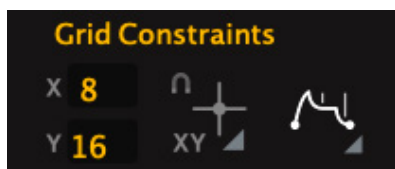
+ 4 .....adds 4 units to the length of the window

× 2 .....doubles MSEG length, stretching the curve accordingly (up to max. 128.4)

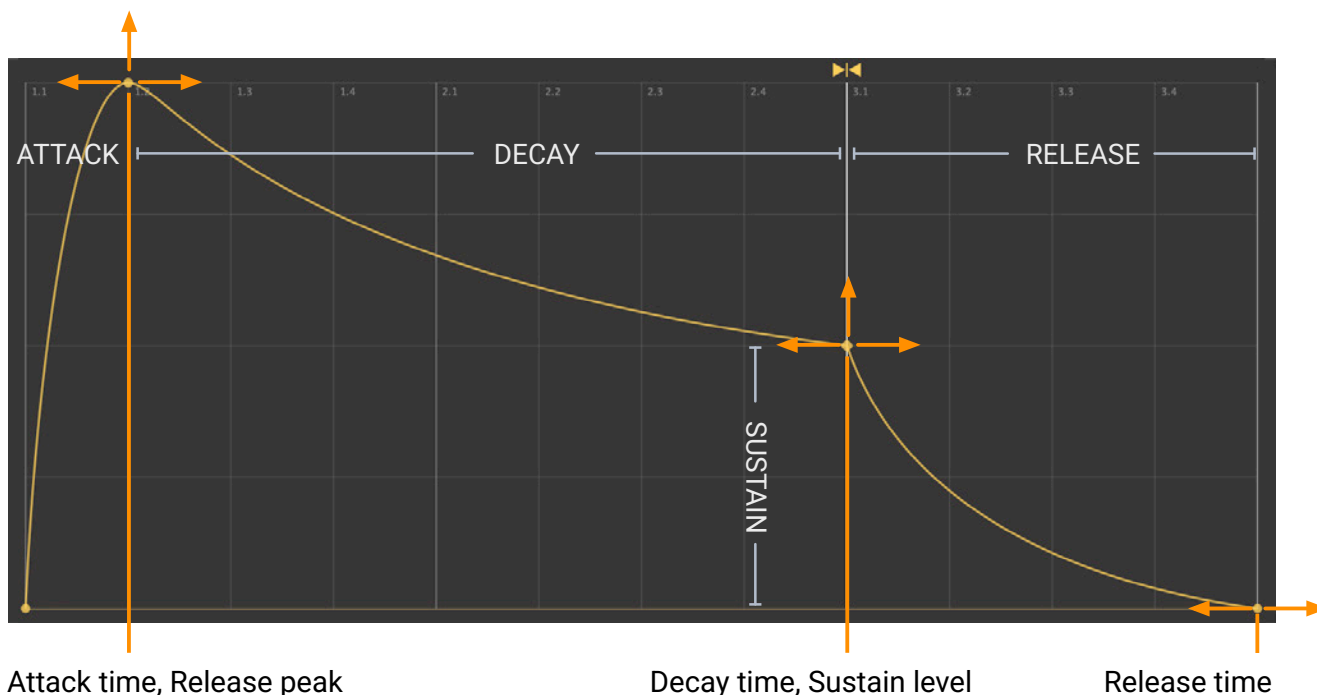
× 0.5 .....halves MSEG length

## Envelope Mode

See [Shape Constraints](#) in the oscillator toolbox...



Although useful in the oscillator editor, *Env Mode* comes into its own in the MSEG! Adjusting basic envelope values in this mode is as comfortable as any classic ADSR envelope.



Try it: [Initialize](#) the preset, and switch [Shape Constraints](#) to *Env Mode*.

In this example, moving the second point horizontally adjusts the attack time (note: decay and release times remain unchanged), while moving the second point vertically adjusts the peak level. Similarly, moving the loop point adjusts the decay time as well as the sustain level. Moving the final point horizontally adjusts the Release time.

Note: the Attack and Decay times in this example are both scaled by the Attack Rate parameter.

Tip: Using envelope mode doesn't mean you *always* have to emulate ADSR envelopes! It's worth experimenting with different MSEG shapes, complex loops etc. until you get the hang of it.

## LFO

Low frequency oscillators create cyclic motion. The Zebra 3 LFOs offer a classic set of waveforms, but can also be used to trigger envelopes and [Exciters](#), or even step through [Mappers](#).



### Waveform Select

Turn the dial or click on the icons. The following names appear in the data display:

*Sine*.....pure sine wave  
*Triangle*.....pure triangle wave  
*Saw Up* .....rising saw (a.k.a. ramp)  
*Saw Down*.....falling saw  
*Sqr Hi-Low* .....square wave, triggered at the higher level  
*Sqr Low-Hi* .....square wave, triggered at the lower level  
*Rand Hold* .....random steps  
*Rand Glide* .....random slopes

The button below the selector sets the LFO to *bipolar* (normal) or *unipolar* i.e. positive values only.

### Trigger

*Free*.....free-running per voice—similar to *Random*.  
*Sync*.....LFOs are synchronized across all voices, and to the host tempo if Time Base is set accordingly. The best option for emulating a simple, global LFO.  
*Reset*.....the LFO always starts at the same phase (see Spice/Phase on the next page).  
*Single*.....like *Reset* except that there is effectively only one LFO for all voices.  
*Random* .....the LFO triggers at a random phase each time a note is played.

### Time Base

0.1s, 1s, 10s, 1/64, 1/32...8/1

Absolute time in seconds (three ranges), or synced to song tempo including dotted and triplet times, maximum 8 bars. Scaled by the **Rate** knob.



## Spice

The selector offers 4 extra options to add 'interest' to the LFO shape:

- Phase*.....Sets the phase (i.e. the position within its cycle) at which the LFO will be restarted when a note is played. Meaningless if Trigger is set to *Free* or *Random*.
- Fade Curve* .....For use in combination with the Delay Time (see below) options *Fade* or *Dly+Fade*: Higher values cause the fade to start more slowly then accelerate.
- Wiggle*.....Like filter resonance for the Slew limiter (also essentially a filter). The ringing effect is most pronounced on the sharp edges of a saw or square LFO.
- Noise* .....Adds noise to the LFO waveform. At maximum, the result is mostly chaos i.e. very little of the original waveform remains. Note that the Slew parameter is only applied to the noise component, not to the basic curve.

## Delay Time

Traditionally, such a parameter was used to soften the onset of vibrato for each note played—a "delayed vibrato" helped melodies sound more natural. As LFO delay can still be useful for any kind of cyclic modulation, it is included here.

The unlabelled selector below the knob provides three LFO fade-in options:

- Delay*.....Simple delay before the LFO quickly appears
- Fade*.....Smooth fade in (see also Spice mode *Fade Curve*)
- Dly+Fade*.....Delay followed by a smooth fade in

## Amplitude

LFO output level.

## Rate

LFO rate relative to the selected Time Base. The range is from -5.00 to +5.00: Each integer step halves / doubles the speed.

## Slew

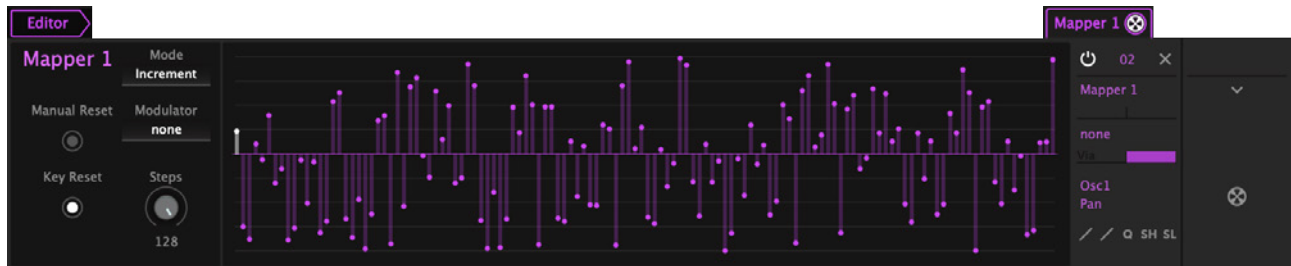
Smooths any sharp transitions in the waveform on a per-cycle basis. Unlike a conventional slew limiter or the **SL** modifier in the modulation matrix, this is applied to each individual cycle—so the LFO's shape stays the same at any Rate.

## Symmetry

For Sine, Triangle and Rand Glide the Symmetry parameter skews the waveform to the left or right, just like the [oscillator effect](#) of the same name. For Square or Rand Hold waveforms, Symmetry is a pulse width control—effectively a "swing". For Ramp and Saw it controls curvature: Negative values cause the ramp or saw to start more slowly, then speed up.

# Mapper

The Mappers are lists of up to 128 user-defined values. Mappers serve a wide range of purposes, such as 'wave-shaping' modulation sources, offsetting parameters per MIDI note, simulating the round-robin behaviour typical of analogue polysynths... or even sequencing note pitches.



## Mode

**Key** ..... 128 MIDI notes (although nobody owns a keyboard that long!)

**Map Smooth** ..... 128 modulator values, with smooth transitions. Requires a defined Source

**Map Quantize** ..... 128 modulator values, with steppy transitions. Requires a defined Source

**Increment** ..... If the Source (see below) is set to the default *none*, each played note moves to the next value in the map. Otherwise the Map index increments whenever the Source signal crosses zero in the positive direction.

Tip: The LFOs and MSEGs are especially interesting Sources here, as bringing the amplitude down to zero pauses the increment without disrupting the timing.

## Modulator

Disabled in *Key* mode. In *Map Smooth* or *Map Quantize* mode this parameter selects a modulation source that 'scans' through the map. In *Increment* mode, each positive transition from zero (e.g. from Pressure, LFO or MSEG) will step through the map.

## Steps

Choose the number of steps with the knob or the selector below it. Preset values are 2–12, 16, 24, 32, 48, 64, and 128. Hold Shift while dragging the knob to select any value from 2 to 128.

## Reset (increment mode only)

The **Manual Reset** button instantly sets the Mapper back to the very first step. Note that this button can be MIDI-learned, so you can even reset automatically during a song.

The **Key Reset** option sets the Mapper back to the first step whenever a note is played, regardless of the selected Source (except *none*). If the Source is *Gate* or *Trigger*, this option is ignored.

## Editing

The following functions are available if the **Draw** mode is set to *Freehand* in the editor's context menu (see the next page):

Draw in the window by clicking and dragging. Click on a point and drag up or down to move it vertically. For fine tuning, hold a SHIFT key beforehand.

To select parts of the map, hold down a SHIFT key while dragging. Note: The functions listed on the next page are applied to the current selection, if one exists.

To deselect, either click outside the current selection or right-click and choose *Deselect* from the Selection sub-menu (this entry will only appear if something is selected).

## Context menu

Right-click in the map to open this menu (note: the Mappers will eventually get their own toolbox):

<i>Copy / Paste</i> .....	Copies the map to the clipboard, or replaces the map with a previously copied one. Copy/paste can be used to transfer maps between different presets. Note: You can paste a previously copied MSEG into the Mapper!
<i>Shapes</i> .....	Draws a ramp, triangle, sine, cosine, root or quadric shape (spectralize is a special function that interprets the data as harmonics then replaces it with the corresponding waveform). If you create a shape with fewer than 128 steps, the pattern will be repeated to fill all 128 steps.
<i>Draw</i> .....	Direct drawing mode: <i>Freehand</i> , <i>Line</i> (straight lines), <i>Level</i> (horizontal lines) or <i>Halfsine</i> (sine segment)
<i>Alt/Cmd-Draw</i> .....	Drawing mode while holding <b>alt</b> (Win) / <b>command</b> (Mac): <i>Erase</i> (zero), <i>Scale</i> (multiply), <i>Shift</i> (2D move), <i>Warp</i> (2D bend) or <i>Fine</i> (sub-integer value shift).
<i>Selection</i> .....	Applies functions to the selection: <i>invert</i> , <i>shift left</i> , <i>shift right</i> , <i>every 2nd / 3rd / 4th</i> . If nothing is selected, only the 'every' options will appear in the menu.
<i>Reverse</i> .....	Flips the current selection horizontally
<i>Invert</i> .....	Flips the current selection vertically
<i>Randomize</i> .....	Adds random offsets to the selection
<i>Soften</i> .....	Interpolates between values
<i>Normalize</i> .....	Expands vertically to minimum / maximum
<i>Make Unipolar</i> .....	Shifts all values to positive, rescaling if necessary
<i>Straighten</i> .....	Draws a straight line for the selection / window
<i>Reset</i> .....	Set values to zero (same as backspace when <a href="#">Key Control</a> is active)
<i>Subdivisions</i> .....	The number of lines (2 to max. 24) above / below the center
<i>Soft Snap</i> .....	While drawing, values will tend to snap to the lines
<i>Hard Snap</i> .....	While drawing, values will snap to the lines
<i>Snap All / Selected</i> .....	Quantize values to the closest subdivisions

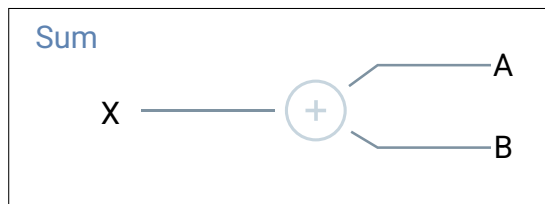
## Mapper Key Commands

These keyboard shortcuts only work while the map has [Key Control](#) focus:

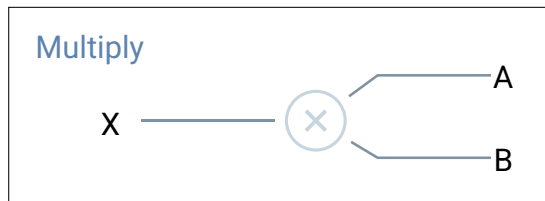
<i>?</i> .....	Randomize values
<i>i</i> .....	Invert values
<i>r</i> .....	Reverse
<i>backspace</i> .....	Set values to zero (same as context menu option <i>Reset</i> )
<i>alt/cmd c, v</i> .....	Copy, paste
<i>alt/cmd z</i> .....	Undo
<i>shift+alt/cmd z</i> .....	Redo
<i>alt/cmd a</i> .....	Select all
<i>alt/cmd 2,3,4</i> .....	Select every 2nd, 3rd, 4th
<i>alt/cmd i</i> .....	Invert selection status
<i>alt/cmd cursor</i> .....	Shift the selection L-R
<i>esc, or alt/cmd d</i> .....	Deselect all

## Math

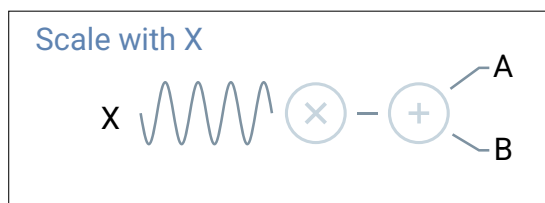
Various ways of combining two modulation sources and a variable (usually called 'X') controlled via a knob, plus a few other options. The output dynamically switches between unipolar and bipolar, depending on the inputs A and B. The wavy arrows in these graphics signify control paths:



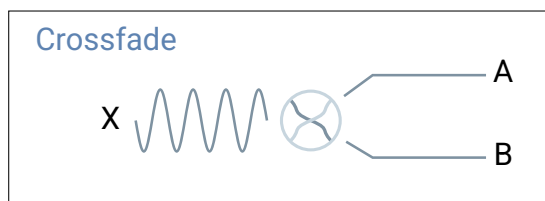
$$X + A + B$$



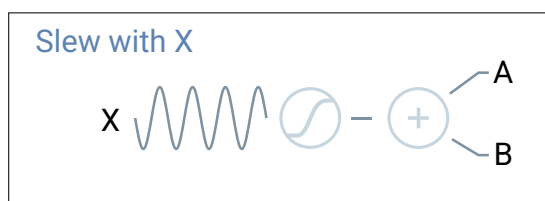
$$X * A * B$$



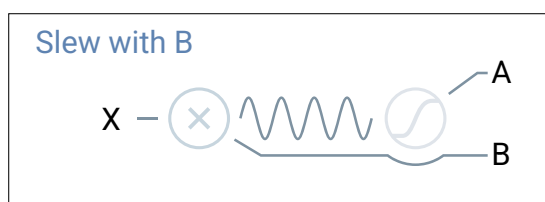
$$X * (A + B)$$



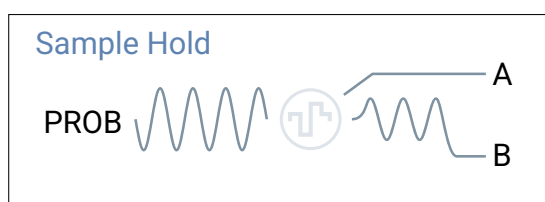
X blends between A and B



X slews (A + B)



(X \* B) slews A



Probability of (A sampled by B)

## Maximum is X



X sets the maximum for (A + B)

## Maximum is B



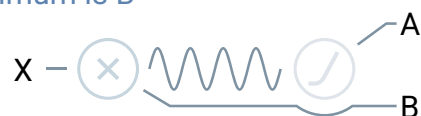
X \* B sets the maximum for A

## Minimum is X



X sets the minimum for (A + B)

## Minimum is B



X \* B sets the minimum for A

## Highpass



X sets high pass filter cutoff for (A + B)

## Delay



Time delays (A + B) by up to 1 second

## LFO



Frequency sets the rate of a sine wave LFO. Source A modulates output level. LFO phase is reset by positive zero crossings in source B: Math 1 is reset to 0°, Math 2 to 90°, Math 3 to 180°, Math 4 to 270°.

## Trigger Chance



X + A sets the probability of B (a trigger source) being output.

## More Modulation Sources

The editable modulation sources (LFO, MSEG, Envelope, Math, Mapper, Pitch) are described earlier in [this chapter](#). The other modulation sources don't need panels...

### MIDI Performance

#### Mod Wheel (MW)

MIDI CC #01, the wheel or joystick you will find on most MIDI keyboards.

#### Pitch Wheel (PW)

The wheel / joystick used to bend pitch. Unaffected by the bend range values in the [Pitch modules](#).

#### Pressure (PRS)

Aka 'Aftertouch'. Zebra 3 recognizes Polyphonic Key Pressure as well as regular Channel Pressure.

#### Velocity (VEL)

MIDI note on velocity.

#### Key Follow (KEY)

MIDI note number without pitch bend or glide. See Pitch below.

#### Gate (GAT)

Simple on/off, like an organ envelope.

#### Trigger (TRG)

A short but smooth impulse at the start of each note.

#### Hold Pedal (HLD)

A.k.a. sustain pedal, MIDI CC #64.

#### Release (REL)

A fixed (maximum) value when you release the note i.e. practically the opposite of Gate.

#### Control A, B, C, D (• A etc.)

The user-definable performance knobs (to the right of the keyboard in the [Perform](#) panel).

### Values

#### Constant (CON)

Permanent 100% value. Constant is useful for setting offsets that would otherwise not be possible (e.g. for hidden parameters) or would tie up a Utility module, for example.

#### Alternate (ALT)

Successive notes toggle between -100 and +100.

#### Random (RND)

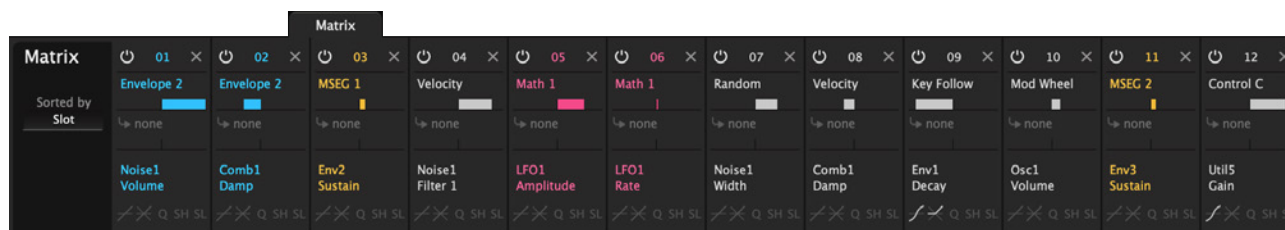
Successive notes create random values between -100 and +100.

#### Mod Noise (NOI)

Low frequency noise similar to LFO random glide at maximum rate, but preserves

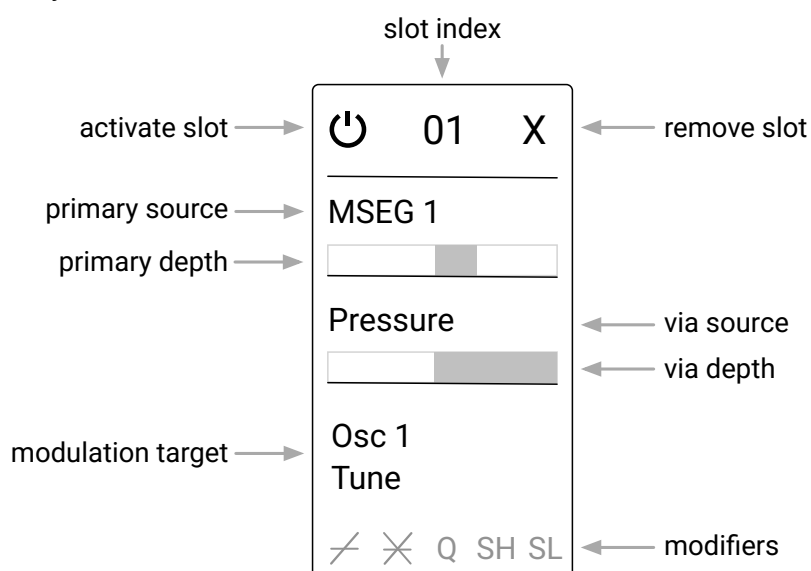
# Modulation Matrix

The 32-slot **modulation matrix** a.k.a. mod matrix or simply **matrix** is where **sources** (MIDI controls, envelopes, LFOs etc.) are assigned to modulation **targets** (frequencies, levels, rates etc.).



## Matrix Slots

In the example here, oscillator 1 pitch is being modulated by MSEG 1, the strength of which is itself being controlled by Pressure:



### Activate Slot, Remove Slot

The button top left to activates the modulation slot—click to temporarily deactivate. The **X** on the right deletes the modulation slot (use UNDO to restore it immediately).

### Primary Source & Depth

The upper selector specifies the basic modulation source. Click and choose from the menu, or drag & drop from the pips in the modulator panels, [editor bar](#) or [modulation assigner bar](#). The primary **Depth** slider sets the overall modulation amount, negative (left) or positive (right).

### Via Source & Depth

An optional secondary 'via' modulation source determines how strongly the secondary source affects the amount of modulation from the primary source. Set negative values here if you want to reduce the modulation amount instead of increasing it.

Note: Swapping primary and secondary sources makes no difference: LFO via modulation wheel is effectively the same as modulation wheel via LFO. The [slot modifiers](#) act on the final result.



## Modulation Target (unlabelled)

A right click here opens the menu containing all possible target parameters of currently used modules, as well as the permanent Pitches and Mixer parameters. However, the fastest way to select a target is via drag & drop from the modulation target field.

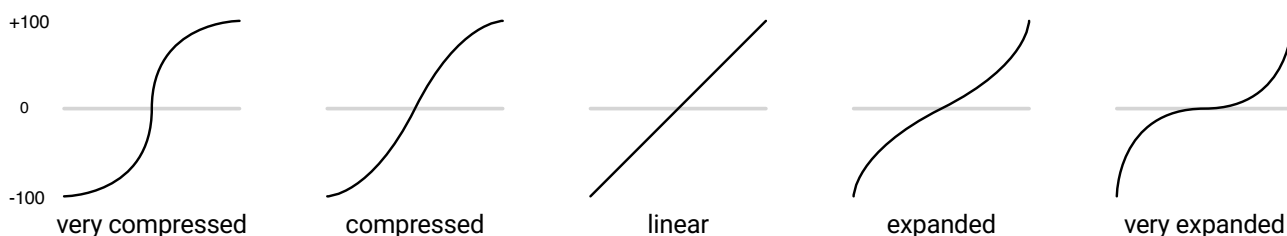
At the top of the target menu is an option to remove ("Unassign") the target parameter.

## Slot Modifiers

The row of buttons on the right can be used to modify the shape of the modulation signal. They are processed in order from top to bottom: *Curve*, *Quantize*, *Rectify*, *Sample & Hold*, *Slew...*

### Curve

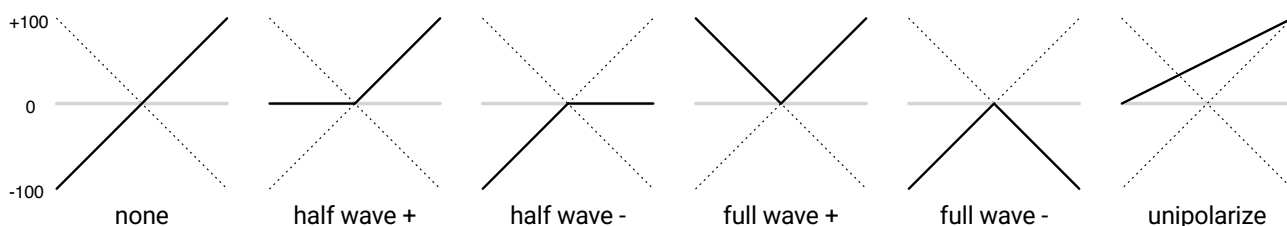
Maps the source onto a curve, like a waveshaper for modulation signals. The grey line in the image below depicts zero i.e. anything below that is modulation in the negative direction. A bipolar ramp, for instance from a rising sawtooth LFO or from the pitch bend control, would be transformed directly into one of these curves:



Unipolar modulation sources (envelopes, modulation wheel, MSEGs etc.) only use the upper half of the curve. For example, if you want the modulation wheel to have a very subtle effect when only pushed a little, but still deliver the full effect when pushed all the way, choose *very expanded* here.

### Rectify

Half-wave or full-wave rectification (in positive as well as negative versions), or make unipolar. The symbols depict how a bipolar ramp wave would appear after rectification.



*none*.....no rectification

*half wave +* .....removes negative values

*half wave -* .....removes positive values

*full wave +* .....folds negative values up into the positive

*full wave -* .....folds positive values down into the negative

*unipolarize*.....shifts the signal to positive-only by adding a constant 50%

Note: halves the amplitude of bipolar sources

To transform the pitch wheel so that pulling also sends positive values, select *full wave +* here.

## Quantize (Q)

After applying a curve, the modulation signal can be forced to adopt certain discrete values. The integer setting makes the modulation typically “steppy”, while the steps of 12 setting transforms bipolar sources into maximum 5 values (unipolar = maximum 3) including zero.

All other options quantize the output to certain scales:

*overtone series* .....harmonic overtones  
*minor / major scale* .....natural minor, regular major  
*minor / major chord*.....chord tones (root, third fifth)  
*minor / major series* .....third intervals (repeats after two octaves)  
*fifths and octaves* .....well, it's fifths and octaves only!

Note: As quantization is applied to the signal after the Depth control, lower Depth values mean fewer steps, not narrower steps. For instance if you quantize an LFO to steps of 12, you will hear no modulation at all unless you turn Depth up to at least 25.

## Sample & Hold (SH)

Whenever the signal selected here crosses zero in the positive direction, the main modulation source will be sampled and held i.e. stepped. There are fewer entries than in the primary and secondary ('via') source menus: Those that make little or no sense for SH (the envelopes, Velocity, Alternate, Constant, Random) have been removed.

As Sample & Hold is applied per voice, sampled values are not retained between successive notes.

Gate is a particularly useful SH option as it converts the signal from the main modulation source, for instance mod wheel or LFO, into discrete steps at the onset of each note.

Note: The **Random** modulation source not only retriggers when a new note is played, but also whenever the option selected here crosses zero in the positive direction.

## Slew Limiter (SL)

Similar to the Glide processor in the [Pitches](#) modules, the Slew Limiter in the matrix can be used to soften transients in any modulation source e.g. LFO square wave. There is no continuous control here, but only a selector offering *off*, *fast*, *smooth* or *slow*. To develop a feel for the options, try modulating oscillator pitch from a square wave LFO with Slew Limiter set to slow.

# Effects

Click on the **[FX/Out]** tab in the editor bar to open this view. You can read about routing from the main grid to the effects grid in the [Lane Mixer](#) section.

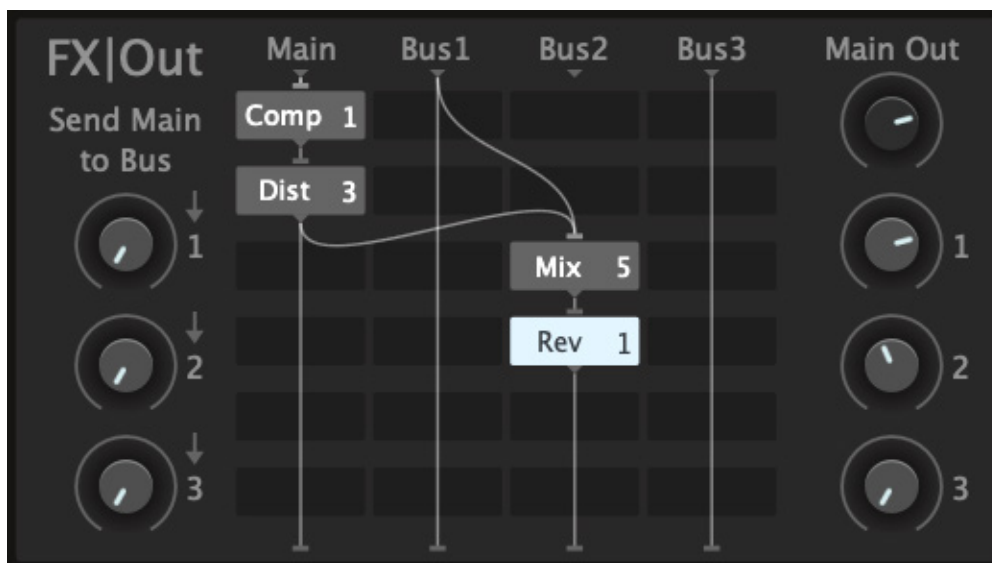


Click on the button to the left of the FX|Out tab in the editor bar to **enable / disable all effects**.

## The Effects Grid

This works just like the [main grid](#) except that it routes global effects rather than per-voice modules. Effects that are the same as modules in the main grid are not described again here—please refer to the [Filter](#), [EQ](#), [Mixer](#), [Utility](#) descriptions in their respective chapters.

Effect panels appear to the right of the grid (as in the above image). Individual effects or chains of effects indicate their position in the grid by means of a line to the left of each panel/chain.



Click on the FX|Out label to the left of the grid to load/save **all effects** and all their settings (including any direct modulation) as a module preset. The menu also includes simple copy/paste.

## Send 1 | 2 | 3

The three knobs to the left route the Main [M] input to the other 3 busses. Note that the sends are actually **per-voice**—they can be modulated by 'poly' sources. For instance, you can give high notes in your polyphonic patch more reverb than low notes by modulating Send with Key Follow.

## Main Out 1 | 2 | 3

The four knobs to the right of the FX grid set the gain for each bus.

# Reverb

A relatively simple but surprisingly flexible reverb unit.



## Algorithm (unlabelled selector)

*CLASSIC* .....plate reverb with pre-delay

*LUSH* .....spacey, experimental

## Pre

A single delay before the actual reverb starts. Especially useful for retaining the presence of the original signal while using plenty of reverb, but can also create a colourful slap-back delay. If you need 'early reflections', add a [Delay](#) above the Reverb.

## Size

Room dimensions, from "sardine can" to infinity and beyond. Balance this with Decay...

## Decay

Controls reflectivity of the room, affecting how long it takes for the reverb tail to fade out.

## Damp

Causes higher frequencies to fade out more quickly than low frequencies, imitating the 'warming' effect of carpets, curtains etc. in a room, or the audience in a concert hall. Effectively the opposite of Decay (see above).

## Diffusion

Density of reflections: Turn up to maximum for a very dense reverb.

## Mod

The depth and rate of **modulation** of delay times by an complex internal LFO.

## Tone

Strong 'tilt' equalizer. Use this in combination with Damp to colour the reverb

## Dry/Wet

Balance between the original and effect signals.

## Texture

Granular processing followed by reverb.



A short section of the incoming audio is stored in a **ring buffer**, from which 'grains' are continuously spawned. This buffer can be frozen manually or via a modulation source, allowing a static snapshot of the input signal to be retained for further processing.

The pitch, readout position, and stereo panorama are optionally 'jittered' to introduce some controlled movement and minimize repetitive artifacts.

### ❄ Freeze

Manually freeze the input signal so that grains are spawned from the same segment of audio until the Freeze button is disabled.

### Freeze Trigger

Freeze is triggered by positive zero-crossings in the selected modulation source.

### Grain Trigger

A Grain is spawned by a positive zero-crossing in the selected modulation source.

### Size

Adjusts the length of individual grains. Balance this parameter with Shape...

### Shape

Envelope of each individual grain, from falling saw via smooth bump to rising saw.

### Position

Sets the nominal position in the buffer from which grains are spawned.

### Speed

How quickly grains are read out.

### Fine

Fine tuning for Speed.

## Stereo

Distributes grains randomly in the stereo field. The higher the value, the wider the range.

## Feedback

The processed audio is fed back into the input.

## Scatter

Randomly shift the buffer Position (see above) per Grain.

## Dir

The probability of grains being read out in the forward **direction**. The default 100% means all grains are read out forward, lower values allow some to be read out backwards. 0.00 means **all** grains will be read out backwards.

## Jitter

Subtle deviation of readout speed with respect to the value set by Speed (see the previous page). Makes the sound more organic, wilder.

## Density

The number of simultaneously audible grains.

RND values .....grains are spawned in a random pattern

LIN values .....grains are spawned in a regular (linear) pattern

## Reverb Parameters

### Size

Room dimensions, from 'sardine can' to infinity and beyond. Balance this with Decay...

### Amount

Reverb mix. Values up to 50 fade in the reverb, higher values fade out the granular processed signal.

### Decay

Controls reflectivity of the room, affecting how long it takes for the reverb tail to fade out.

### Dry/Wet

Balance between the unprocessed and processed signal.

## Delay

A stereo delay featuring individual tap positions per channel, colouration options, tape-style wow and iffusion that can almost take the Delay into reverb territory:



### Tempo

Selects either an absolute time (0.1 seconds or 1 second) or a value synchronized to song tempo (from a 1/64th note up to 7 bars). This serves as the basis for the Taps and Ratio knob—see below.

### Routing

*Stereo* .....Stereo delay with no interaction between left and right channels  
*Cross* .....The left delay is routed into the right delay and vice versa  
*Summed* .....Like *Cross* but using a mono sum of the input signal

### Colour

*Digital*.....All-purpose, cleanest delays, low CPU  
*Surge* .....Soft, strong resonance, strong saturation/degradation  
*Haze*.....Dark, mild resonance, mild saturation/degradation

### Tap L / R

Scales the Tempo (see above) per channel, from "rather fast" (0.00) to the nominal Tempo (100.00). For typical ping-pong delay, set one of the Taps to 50% and leave the other at 100%.

### Ratio

Scales the overall Tempo from half speed to double speed. Note that the Ratio control works in the opposite direction to Tap L/R.

### Feedback

Regeneration level. Fairly safe from build-up, but can repeat almost indefinitely at 100.00.

### Invert

Flip the phase of repeats.

### Panic!

Click this momentary button to immediately stop all feedback.



## Modulation

Slow random waver for a Chorus-like effect.

## LP / HP

Cutoff frequencies of simple lowpass and highpass filters applied to the delay signal overall. Double-click to set the default values (no filtering: LP = 100.00 and HP = 0.00).

## Diffusion

Smears all delays for a 'wash' effect. Tip: For room ambience effects set Diffusion to maximum, use very short delays (Colour = Digital) and plenty of Feedback.

## Width

Stereo spread.

## Dry/Wet

The balance between unprocessed and processed signal levels, expressed as a percentage ratio.

## Hidden Parameters

The following two parameters are only available as targets in the [modulation matrix](#). To apply a fixed offset, use **Constant** as modulation source.

## Noise Floor

Noise level in *Surge* or *Haze* Colour mode (see the previous page), ranging from silent to excessively noisy.

## Mod Rate

The speed of modulation.

## 8-Tap Delay

A 'digital' delay with eight separate lines capable of delivering complex, polyrhythmic patterns. Each line has its own delay time or sync setting, Ratio, Gain, Pan, and activation switch.



## 🔌 Tap Enable

Click the numbers to switch taps on or off (taps that are switched off are simply skipped).

## Arrows

Swap between the controls for two sets of four taps. This keeps the panel uncluttered—and four taps or fewer are often more than enough.

## Routing

*Parallel* .....The delay lines are independent, each with its own feedback

*Series* .....The delay lines are chained: 1→2→3...→8, with feedback from 8→1

*FourFour* .....The delay lines are paired: 1→2, 3→4, 5→6 and 7→8, with feedback 2→1, 4→3 etc.

## Tempo

Selects an absolute time (0.1 seconds or 1 second), or a value synchronized to song tempo (from a 1/64th note up to 7 bars) per tap. This serves as the starting point for the four Ratio (R) knobs.

## LP, HP

Cutoff frequencies of simple lowpass and highpass filters applied to the delay signal overall. Double-click to set the default values (no filtering: LP = 100.00 and HP = 0.00).

## Ratio (R)

Scales the Tempo, from half to double the speed per tap.

## Gain (G)

Output level of the tap.

## Pan (P)

Pan position of the tap.

## Panic!

Click to immediately stop all feedback.

## Feedback

Regeneration level. Safe from build-up: doesn't repeat indefinitely when set to maximum

## Width

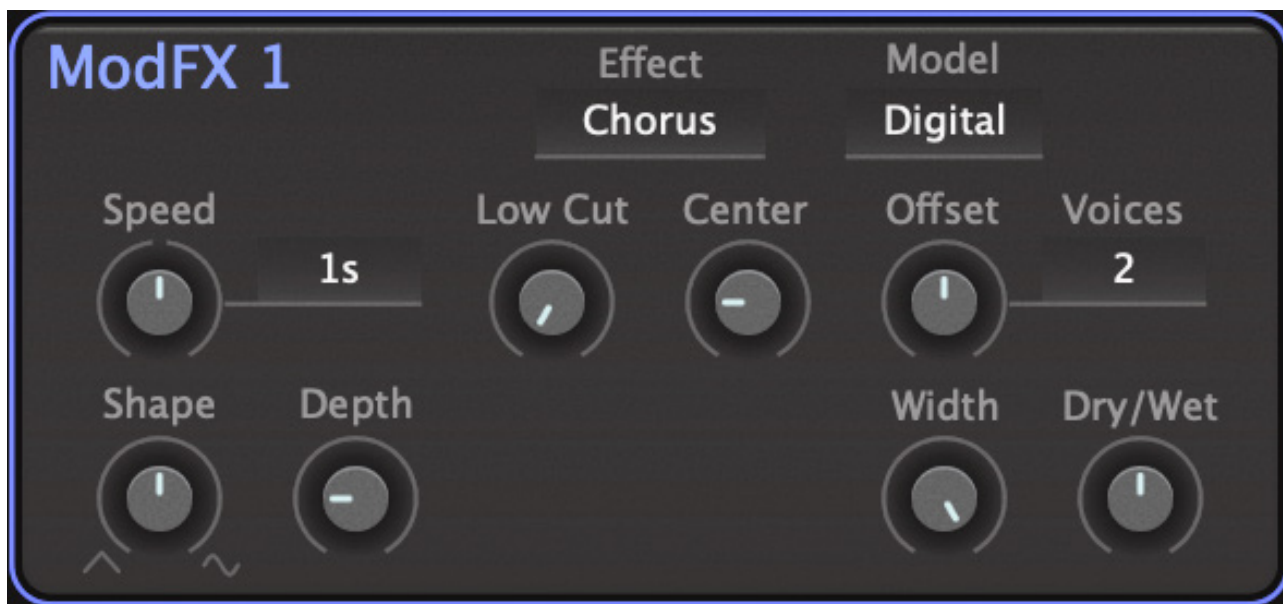
Stereo spread.

## Dry/Wet

Balance between unprocessed and processed signal.

## ModFX

**Modulation Effects** with a choice of three flavours: Chorus, Flanger or Phaser.



Several of the parameters are common to all three...

### LFO

An integrated triangle/sine LFO modulates all delay times.

### Speed

The rate of modulation from 'too slow' to 'too fast'. Note that the perceived Depth (see below) increases with speed—these two parameters usually need to be carefully balanced.

### Time Base (unlabelled)

Selects the unit scaled by Speed: Absolute times *0.1s* or *1s* (seconds when Speed is set to 0.00) or synched to the song tempo: *1/4*, *1/1*, *1/4 D* (dotted) or *1/4 T* (triplets).

### Shape

Crossfade between triangle (0.00) and sine (100.00) for the LFO.

### Depth

Depth of modulation. Balance carefully with the Speed (see above).

### Offset

Phase difference between the LFOs for the left and right channels. The range is 0° (at 0.00) to 144° (at 100.00). Tip: For 90°, set it to precisely 62.50.

### Noise Floor (hidden parameter!)

Active only in the Chorus or Flanger when Mode is set to Analog (A). Controls the simulated circuit noise, ranging from silent to excessively noisy. To cut or boost, modulate Noise Floor in the matrix using Constant as the source.

## Effect = Chorus

A typical Chorus effect using multiple, very short delay lines.

### Low Cut

Removes low frequencies from the processed signal.

### Center

Nominal delay. Tip: Set Center to maximum (and Voices to 2) for a slapback effect.

### Width

Stereo width of the processed signal.

### Model

**Analog** mode simulates 'bucket brigade' circuitry with its warm saturation and noise floor, while **Digital** is clean. Note: The hidden parameter 'Noise Floor' (only available in the mod matrix) lets you adjust the noise level while retaining all other characteristics of analog (A) mode.

### Voices

The number of delays (2 to 16) used. Higher values make the sound richer, more complex.

### Dry/Wet

Balance between the original and effect signals. The default is 50.00, as this usually delivers the strongest Chorus.

## Effect = Flanger

Emulation of classic tape flanging using just a few very short delay lines.

### Feedback

Processed signal is sent back into the input, causing resonance.

### Center

Nominal delay time. Tip: Set Center to maximum for a slapback effect.

### Invert

Flips the phase of the feedback signal, resulting in a different tonal quality.

### Width

Stereo width.

### Model

**Analog** simulates 'bucket brigade' circuitry with its typical warm saturation and noise floor, while **Digital** is relatively clean. Note: The hidden modulation target 'Noise Floor' lets you modulate the noise down to silence or even make it extra loud.

### Dry/Wet

Balance between the original and effect signals.

## Effect = Phaser

Although the effect is similar to chorus and flanging, the classic Phaser uses a number (the 'Order') of cascaded allpass filters instead of delay lines.

### Feedback

Practically the same as filter resonance. A feedback loop emphasizes the cutoff frequency.

### Frequency

Practically the same as filter cutoff, but with several peaks...

### Order

The number of allpass filters used.

### Width

Stereo width of the effect signal.

### Dry/Wet

Balance between the original and effect signals.

# Compressor

The Zebra 3 Compressor has two basic operation modes, **Compressor** or **Limiter**, switched by clicking on the selector in the middle...

## Compressor Mode

A typical stereo compressor:



## Routing

**Feedforward** detection looks at the main input signal and adjusts the output gain accordingly.

**Feedback** detection is practically the opposite—the gain circuitry at the input reacts to a control signal derived from the output signal. Which of the two modes works best depends on the audio material—let your ears decide.

**Sidechain** detection is like FF but analyses the side chain instead of the main input (right-click on the module in the FX grid and select a different Lane).

## Input

Peak and RMS compression differ primarily in what the detector “listens to” when deciding how much gain reduction to apply. Select PEAK here if you want to focus on fast transients e.g. catch spikes that could otherwise cause clipping. Conversely, switch to RMS (root-mean-square) if you mainly want to even out differences in loudness over a longer time than a few milliseconds.

## Threshold

Sets the level at which gain reduction starts to happen. At low values the compressor already responds to quiet signals, while at high values it will only respond to the loudest of signals.

The bargraph meter indicates how much the signal level is being reduced whenever compression kicks in. For maximum effect, make sure there is plenty of movement here.

## Ratio

How much compression is applied when the input signal level exceeds the threshold. At 1:1 there is no compression at all, while the maximum 40:1 is practically 'brickwall' limiting.

## Attack (A)

As an instantaneous jump above the threshold would lead to unwanted distortion, compression is usually applied within a 'time window', smoothing out any abrupt changes. Fast Attack will still catch sudden transient peaks, while slow Attack can give you more natural, smooth results.

## Release (R)

The time it takes to recover to its idle state once the signal level falls below the threshold. Like fast Attack, fast Release allows more rapid fluctuation while risking distortion or modulation artifacts.

The latter can become problematic if the release is shorter than the fundamental wavelength of the input signal, so it is best to set RELEASE no shorter than absolutely necessary. On the other hand, if RELEASE is set too long the entire process becomes ineffective, as the compressor never has a chance to recover.

## Cutoff

A highpass filter before the detection circuit, 0 Hz to 2.5 kHz. Mainly to reduce pumping.

## Output

Adjust this control to compensate for changes in volume caused by the compression process.

## Limiter Mode

A simplified version of the compressor, set up as a limiter:



## Input

Selects either the main **input** or a **sidechain** as audio source for the detection process.

## Input

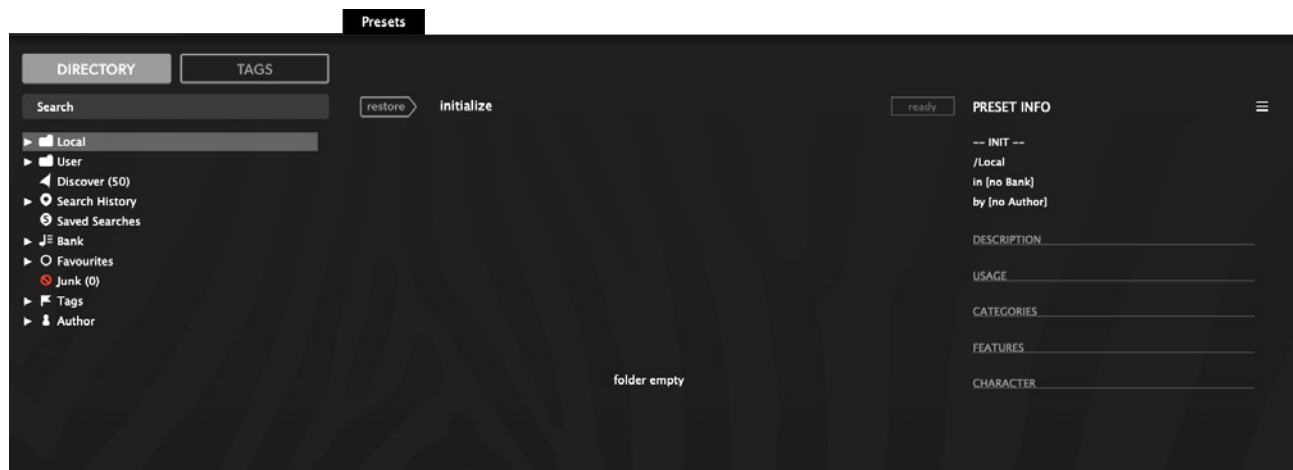
Input gain, +/- 24 dB. Replaces the Ratio knob.



# Presets

## Overview

To open Zebra 3's preset browser, click on the **[Presets]** button top left.



Folders appear on the left, presets in the center and any information about the currently active preset appears on the right. If you can't see any presets at all, click on the 'Showcase' or 'Local' folder below the Search field.

If you can't see the PRESET INFO panel on the right, click on the hamburger [**≡**] button in the top right corner of the browser and select *Show Preset Info*.

After selecting a preset from the central panel you can step through all the others using your computer's cursor keys.

That's all you really need to know. For those who want to dig deeper, the browser offers many powerful features, including a clever search engine. For details, read the rest of this chapter.

## Default preset

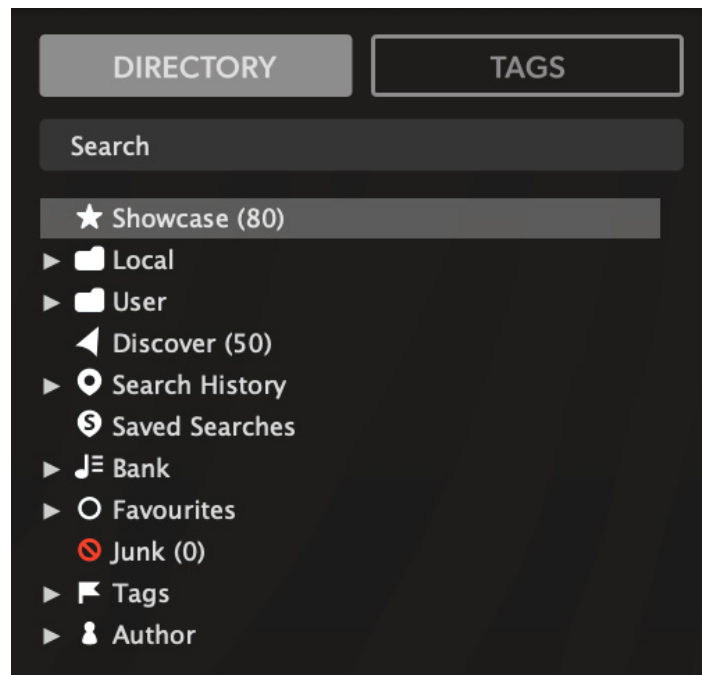
When a new instance of Zebra 3 starts it checks whether the 'Local' root directory contains a preset called 'default', which is then loaded instead of the standard one. The default path also switches from Showcase to Local.

If you want to change the default preset, make sure that the Local folder is selected then **[Save]** your preset under the name 'default'. Note that *default.h2p* will not appear in the Zebra's browser.

If a fresh instance of Zebra 3 is not loading your new default preset, it probably landed in the 'User' folder instead of 'Local' – check the status of the [preference](#) *Save Presets To*.

# Directory Panel

Click on the DIRECTORY tab to see this panel:



## Showcase

The *Showcase* [smart folder](#) references a fixed selection of factory presets in the *Local* folders...

## Local

Zebra 3's factory presets are sorted into subfolders within 'Local'. Tip: It is best not to mess with the 'Local' folder, but to put your own creations and other presets in the [User](#) folder.

For details about the **MIDI Programs** folder, see the [MIDI Specialities](#) chapter.

## User

The best address for your own creations as well as presets from other sources. You can either select 'User' immediately before saving, or set a global preference ensuring that it will always be saved in User (or a sub-folder thereof): See the [preference](#) *Save Presets To*.

Tip: It's worth finding out where the 'User' folder resides on your computer. Right-click on 'User' and select *Open in Finder / Explorer*.

## Smart Folders

The 'Showcase' folder as well as all folders below 'User' don't contain real files, but list the results of querying a database. The content is dynamic—it will change with the underlying data.

You can drop smart folder content onto e.g. 'User' or the desktop to create folders containing real copies of those presets. See [Drag & Drop](#) a few pages down.

You can hide any of these smart folders – see *Hidden Folders* in the Directory's context menu.

## Search History

Click on this folder to display the results of past searches (maximum 10). If you want the search results to be more permanent, right-click and select *Save Search...* To remove all searches from the list, right-click on the 'Search History' folder and select *Clear*.

## Saved Searches

This folder contains any search results that were saved via right-click in the Search History list. To remove individual saved searches, right-click on the entry and select *Delete*.

## Banks

These smart folders reference metadata about the version of the factory or third party library with which the preset was installed. See 'Preset Info' below..

You can create your own banks: Drag & drop one or more presets onto the main 'Bank' folder than enter a suitable name into the dialogue box.

To remove Bank attributes from selected presets, either drag & drop them onto the '[no Bank]' folder, or right-click on the Bank and select *Remove Presets from Bank*. Empty Banks will be automatically deleted.

## Favourites

8 colour-coded smart folders. Presets dropped onto a 'Favourite' folder will be marked as such. Favourites can be imported / exported - see [External Drag & Drop](#) a few pages down.

You can clear the Favourite status from all presets of one particular colour / index at once by right-clicking on the 'Favourite' folder and selecting *Remove All Favourite (n) Marks*.

Note: As presets are referenced by name as well as relative location they will not retain their Favourite (or Junk) status if moved using Finder / Windows functions.

## Junk

Smart folder pointing to all 'junked' presets – see the [presets context menu](#). Presets dropped here will disappear from the browser unless made visible via *Show Junk* in the Presets context menu.

Note: this smart folder will not appear until at least one preset has been junked.

Like *Favourites*, Junk can be exported/imported (as *Junk.uhe-fav*) – see [External Drag & Drop](#).

## Tags

Smart folders for each Category/Subcategory, Features and Character tag. Presets dropped onto these folders will adopt the corresponding tag. Presets dropped onto the '[no Tags]' folder will have all Category/Subcategory, Features and Character tags removed.

## Author

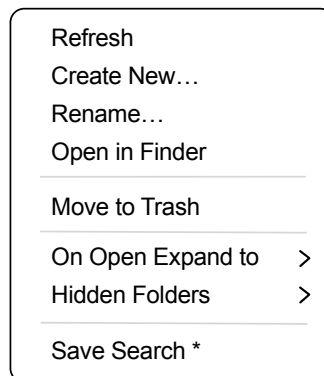
Smart folders for each preset author. Tip: Instead of signing each one of your creations individually you could sign just one of them, then select and drag & drop any others onto your new author smart folder. As the process cannot be undone, please use this feature with caution!

## Duplicate Names

A smart folder containing presets that share the exact same name. This smart folder is hidden by default - see *Hidden Folders* in the Directory context menu.

## Directory Context Menu

Right-clicking on any folder within Local or User will open this menu:



### Refresh

This function forces the Zebra 3 browser contents to be updated. Although it will also work on a Mac, Refresh is mainly aimed at Windows users: It is necessary after any files or folders have been moved, added, removed or renamed using Explorer.

### Create New...

Insert an empty subdirectory.

### Rename...

Edit the folder name.

### Open in Finder / Explorer

Opens a system window for the currently selected folder. If you hold down the option key (Mac) or ctrl key (Windows), this entry will change to 'Show in Finder / Explorer' and the folder will be highlighted instead of opened.

### Move to Trash / Recycle Bin

Moves the selected folder to the system trash. If you right click on the Junk folder, this entry will be replaced by 'Remove All Junk Marks'. If you right click on a Bank smart folder, it will be replaced by 'Remove Presets from Bank' (see Smart Folders above).

### On Open Expand to

These options determine how deeply the browser will open subdirectories whenever the GUI is opened or the refresh function is called. The none option collapses all folders, while the all levels option reveals all nested folders.

### Hidden Folders

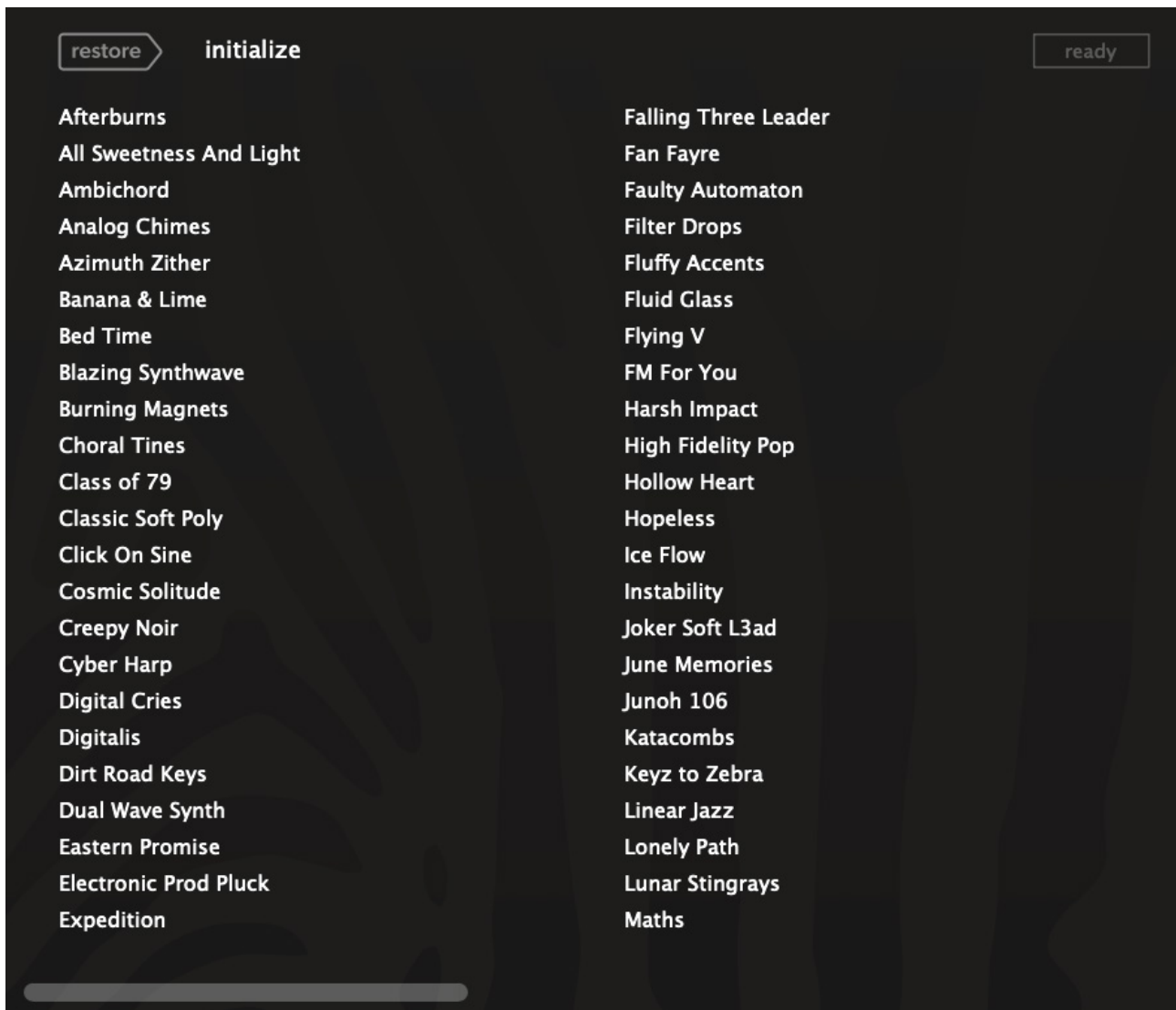
Select any smart folders you don't want to appear in the directory.

### Save Search

This function only appears if you right-click on a search result in the [Search History](#). Saves the current search so that it can be repeated later.

## Presets Panel

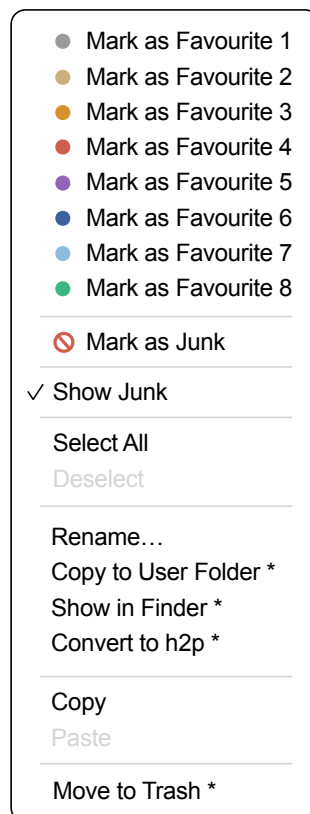
The central area of the browser displays all presets in the current folder. Click to load a preset. Double-click to load the preset and open the [Synthesis](#) view.



If there are more presets than will fit in the window, a scrollbar will appear at the bottom. Alternatively, you can hover anywhere, hold Shift and roll your mouse wheel.

## Presets context menu

Right-click to open a menu containing functions which can be applied to individual presets.



### Mark as Favourite

Tick one of 8 'favourites'. The selected entry will be replaced with 'Unmark as Favourite'.

### Mark as Junk / Show Junk

Instead of deleting unloved presets, mark them as 'junk' so that they disappear from the browser. Activate Show Junk to display junked files instead, and mark them with a STOP symbol.

### Select All, Deselect

See 'Multiple selection' on the next page.

### Rename...

You can change the names of presets using this function. Note that only the most recently selected preset can be renamed i.e. you can't rename multiple files at once.

### Copy to User Folder / Duplicate

The entry here depends on the status of the Save Presets To preference as well as on the location of the source preset(s) i.e. whether they are in the Local or the User folder. Selected presets are copied with a number appended to the name, which increments (just like the 'Auto Versioning' option) so that no preset can be overwritten by mistake.

### Show in Finder / Explorer

Opens a system window for the right-clicked file. In smart folders only, holding down an **option** key (Mac) or **control** key (Windows) replaces this entry with Show in Browser, which highlights the selected file in its original location within Zebra 3's browser.

## Convert to native / h2p / h2p extended

Converts selected preset(s) into the format previously specified via right-click on **[Save]**.

## Copy / Paste

Clipboard functions. Individual or multiple presets can be copied / pasted, even between Zebra 3's browser and system windows (Finder, Explorer).

## Move to Trash / Recycle Bin

Moves selected presets to the system 'trash'.

## Extra Functions

### Restore

At the top left of the Presets panel is a button labelled **[RESTORE]**. This lets you audition presets to your heart's content without losing track of the one that was loaded before you opened the browser. Clicking on **[RESTORE]** navigates to that preset and reloads it.

### Scan / Ready

In the top right of the presets panel is a dark rectangle normally labelled 'ready'. Whenever you use the Refresh function (see the Directory context menu on the previous page), this turns into a progress indicator showing the preset database being refreshed. The process should only take a few seconds, even for a large preset library.

### Multiple selection

A block of adjacent presets can be selected via shift+click, and presets added to the selection via cmd-click (macOS) or alt+click (Windows). Presets can be moved to another folder via drag & drop. To deselect, click on any unselected preset or choose Deselect from the context menu.

## Drag & Drop

### Internal

You can drag and drop single or multiple files from the preset panel onto any folders in the directory panel. Files dragged onto regular folders will be moved unless you hold down option (Mac) or ctrl (Windows), in which case they will be copied instead. Files dropped onto smart folders will adopt the attribute of that folder: For instance, you can set e.g. the Author or Favourite status of several presets at once.

### External

To manage your preset library externally you can drag presets and folders between Zebra 3's browser and your desktop (or any system window). On the Mac, most Finder operations will automatically update the browser. Updating might not be immediate when using multiple formats or multiple host applications, but all it usually takes is a click on the GUI or in the directory tree (sets focus to the clicked instance of Zebra 3).

On Windows, a manual Refresh (see Directory Context Menu) will be required before changes to the contents of the browser appear.

Another little helper: If you drag a Zebra 3 preset from e.g. your desktop and drop it onto the Data Display, that preset will be loaded (but not automatically saved).



## Exporting smart folders

Drag any smart folder onto the desktop to create a new folder containing those presets. Drag an entry from your Search History, or the Category 'Duo', or one of the Authors...

## Exporting favourite status

You can export Favourites, either all at once or individually: Shift+click and drag the 'Favourites' folder or one of its sub-folders onto the desktop to create a file called *Favourite (n).uhe-fav*. Such files can then be imported into Zebra 3's browser on a different computer (for instance), via drag & drop onto the Favourites folder or anywhere within Favourites.

Note: Importing *.uhe-fav* files from another computer will only work 100% correctly if all preset names and locations are identical on both computers!

### Note for MS Windows users

According to Microsoft, drag & drop will only work between applications with the same rights (i.e. both admin or both normal) – for security reasons. If the host was started using the "Run as Admin" option, drag & drop functionality will be limited: You can still drag objects between plug-ins, or from the plug-in into system windows e.g. your desktop. However, attempts to drag & drop anything into the plug-in from outside the host will fail. This applies to presets, folders, favourites, *.uhe-soundset* files or indeed anything that can be dropped onto the plug-in GUI.

## Preset Info

The panel to the right displays information about the selected preset. If you can't see this panel, click on the 'hamburger' [≡] button in the top right corner and tick *Show Preset Info*:

- ✓ Show Preset Info
- ✓ Show Tags in Preset Info

Below the preset name you should see its path (from /Local or /User), the Bank and the Author (which also appear as smart folders).

DESCRIPTION and USAGE text is entered immediately before saving a preset. CATEGORIES, FEATURES and CHARACTER are the tags for the selected preset (see [Preset Tagging](#)). You can remove or add tags directly here (see [Tagging via PRESET INFO](#)).

If you prefer to see less information, hide the tags only or the entire PRESET INFO panel.

## Installing Soundsets

Any soundsets we distribute ourselves will (eventually) be available in *.uhe-soundset* format and include a text file detailing the install options.

Folders containing Zebra 3 presets can be manually copied or moved into the 'User' folder. You might have to refresh the browser (see [Directory context menu](#)) before they actually appear.

## Preset Tagging

Tags are elements of metadata, information added to presets so you can find them more easily.

### IMPORTANT

Tags are updated automatically – clicking on the **[SAVE]** button isn't required! The main advantage is that presets don't have to be saved every time you edit a tag. The main caveat is that you should only edit tags after saving your preset.

For instance, if you decide to edit tags while creating a 2nd version of an existing preset, please remember that you are actually changing the tags in the original preset!

## The Tagging Window

Right-click on the **[SAVE]** button and select Tag this Patch:

CATEGORY		FEATURES		CHARACTER		×
Bass	Bells	Mono	Soft Attack	Bright	—	Dark
Pads	Big Drums	Poly	Slow Release	Constant	—	Moving
Leads	Clicks	Duo	Glide	Clean	—	Dirty
Keys	Claps	Chord	MPE	Soft	—	Aggressive
FX	Cymbals	BPM		Phat	—	Thin
Drums	Dist+LoFi	Comb		Natural	—	Synthetic
Seq+Arp	Hi-Hats	Additive				
Other	Kicks	Osc Sync				
	Metal	Modal				
	Percussion	FM				
	Snares	Ring Mod				
	Synth	Modulated				
	Toms	Dry				
	Wood	Percussive				

CATEGORY describes a preset by analogy to instrument types or typical usage, and each one has an appropriate set of subcategories. FEATURES are technical classifications, and CHARACTER tags are pairs of opposites from which you can choose only one.

## Tagging via PRESET INFO

In the PRESET INFO panel, right-click on the Category, Features or Character and select or unselect tags from the menu. Note that this method only works for individual presets. If you right-click on an existing tag, the first option in the menu becomes *Remove Tag '(tag name)'*.

The function *Create Search from Tags* finds all presets with exactly the same set of Category, Features and Character tags.

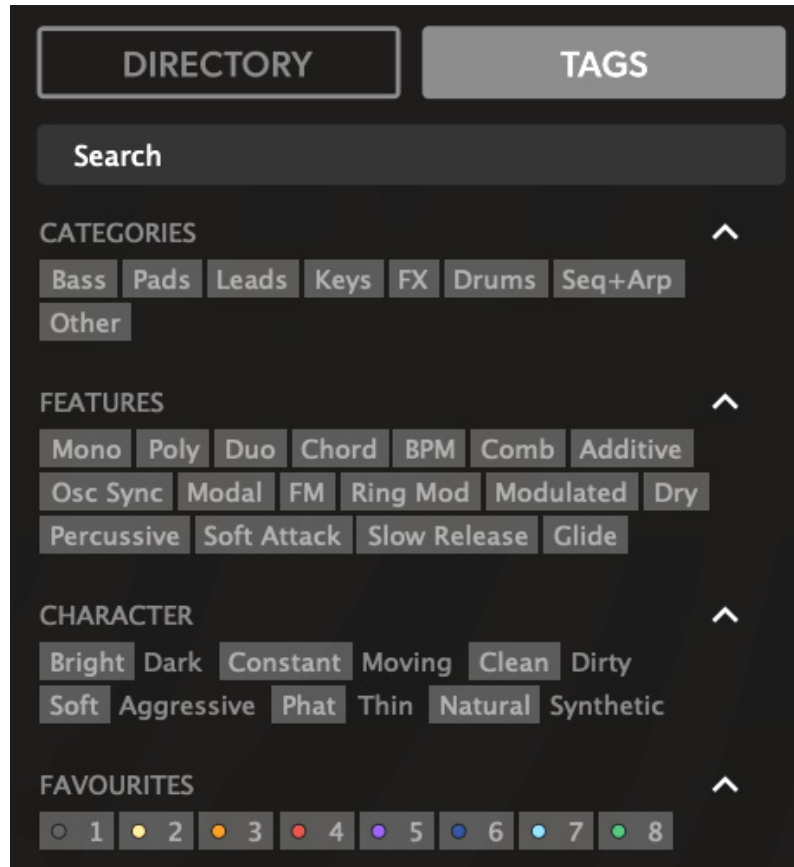
## Tagging via smart folder

You can tag presets by dropping (“drag & drop”) any number of presets onto one of the 'Tags' smart folders. To remove all tags, drag them onto the '[no Tags]' smart folder.

# Search Functions

## Search by Tags

Click on the [TAGS] tab to open this view. The buttons here let you set up search criteria according to existing tags with just a few mouse clicks:



Below the Search field are four sets of buttons (CATEGORIES, FEATURES, CHARACTER and FAVOURITES). The first three correspond to the tags in the tagging window (see the previous page), while the bottom row lets you find any presets you have tagged as Favourites.

Clicking on the [^] icon to the right of each heading hides the options for that set of tags.

## Categories and Subcategories

Each Category has its own set of subcategories which appear below the main categories. Click on **[Leads]** and see them appear. Not selecting a subcategory here means “show me presets tagged with any subcategory”. Selecting the top-left subcategory (which has the same name as the category) means “show me presets tagged without any subcategory”. You should not find any of these in the factory presets!

You can select multiple categories without specifying subcategories if you hold command (Mac) or alt (Windows) while clicking on the category button. Try that with the **[Keys]** button.

Complete category-plus-subcategory tags appear below the subcategories as buttons with ‘off’ switches [X] so that you can add other main categories by simply clicking on them.

## Features, Character and Favourites

Unlike multiple Category tags which expand the search, these types restrict it—often much more useful! As a practical example let's find all "thin" and "moving" presets with a slow release...

Click on the TAGS tab. If any Categories are highlighted, click on them. Select [Slow Release] feature, then the [Thin] and [Moving] characters. You should now see about 10 hits in the presets panel – which is generally a good number to aim for while searching.

## Summary

In the DIRECTORY panel, specify a search path via double-click. In the TAGS panel, select category tags. Add others if required to extend the search, but remember to hold down command (Mac) or alt (Windows) if you want to retain category tags that don't specify a subcategory. Select Features, Character and/or Favourites tags to refine the search.

## Search by Text

The Search Field lets you find presets according to a text string. An example: If you remember that the preset you want has the word "clock" in its name or description, simply enter clock into the Search field and hit Return...

This basic search normally looks into the preset name, author, the DESCRIPTION and USAGE (see the PRESET INFO panel). Searches are not case-sensitive, and quotes are not required unless you need to include spaces.

To restrict the search to a particular path, double click the desired folder. This path will appear immediately below the Search field instead of the preset folders, and you will only see folders within the specified path (if any exist) plus the usual bunch of smart folders.

A **Search Path** appears below the Search Field: The [^] button to the left moves the search path up one level. Alternatively, you can navigate directly to any higher level by right-clicking on the path. The [X] button to the right expands the path to include all Zebra 3 presets (in 'Local' as well as in 'User'), and all the regular preset folders will reappear.

Try a text search: Enter three or four letters then hit Return. For instance, star would find all files containing the text string star (e.g. mustard or starters). Entering "star wars" with the quotation marks would find e.g. Battlestar Warsaw.

## Syntax

You can limit the scope of the search to just the preset name or specific parts of PRESET INFO by using name (preset name), author, desc (description) or use (usage) followed by a colon. For instance, *author:the* finds all presets by sound designers whose author names contain 'the'. Similarly, *desc:space* will find all presets with the word space in the description.

## Logical Operators

The following logical operators can only be used between text elements.

AND requires that presets contain both words. It can be written explicitly if you prefer, but is not necessary. For example, *star AND wars* (or simply *star wars*) will find presets that contain both *star* and *wars*.

OR means that presets can contain just one of the words or both. For example, *star OR ship* will find presets that contain *star* as well as presets that contain *ship*.

NOT excludes presets containing the word. To find all presets that contain *star* but don't contain *ship*, enter *star NOT ship*.

## Including Tags

Tags must appear after any text items.

Regular tags can also be entered into the search field if preceded with a '#'. For example, `name:"chord" #keys:*` will find all presets with "chord" in the name that are tagged as *Keys* with any or no subcategory. The colon separates category and subcategory, while the star (\*) means "any subcategory, even none".

Note: Between multiple tags of the same type is an implicit *OR*, while between different types is an implicit *AND*.

## Example Searches

You could copy/paste these into Zebra 3's search field and see what they find. Note that valid tags entered into the search field will appear as active tag buttons (click on TAGS to check).

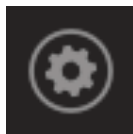
`author:urs` = presets by Urs

`desc:fm` = presets with "FM" in the the DESCRIPTION field

`use:"pw ="` presets with pitch wheel control mentioned in USAGE field

`tasm OR urs #keys:piano` = piano type presets by either Tasmodia or Urs

# Configuration



The cogwheel at the top right gives you access to global configuration pages where you can adjust preferences and connect Zebra 3 parameters to MIDI continuous controllers.



The 4 buttons are MIDI Learn **[L]**, MIDI Table **[=]**, Preferences **[tools]** and Close **[X]**. Right-click and select *Set as Default View* to specify which will open whenever you click on the cogwheel.

## MIDI Learn

The MIDI Learn page is where you can connect MIDI CC to most parameters. But before connecting knobs and sliders on your master keyboard to Zebra 3 parameters it's best to know what a 'MIDI CC' is...

**MIDI CC** (control change) is a multi-purpose message format used for performing as well as editing presets. Note that CC isn't the only kind of MIDI performance data available; there are also messages for note on/off (including velocity), pitch bend and two kinds of pressure (aftertouch).

Thankfully, [The MIDI Association](#) left most of the CC numbers undefined, but two of them have meanings also recognized by Zebra 3: CC#01 = modulation wheel, CC#64 = sustain pedal.

Click on the configuration button, then select the 'L' MIDI icon, which resembles a 5-pin DIN socket:



The window is a translucent overlay, with all MIDI-learnable elements appearing as selectable outlines. Already connected controls are filled (like LFO1 Amplitude and Rate in the above image), and the outline of the currently active control is highlighted in white (like FMO 1 FM Index here).

Try it: Click on any knob and send Zebra 3 some MIDI CC data (wiggle a knob or slider on your MIDI controller). To remove the new CC connection, double-click on the same knob.

Note: Controls in currently invisible panels will not be immediately available i.e. they cannot be switched over from within the MIDI Learn page. To access them, exit the configuration pages, select e.g. KEYS, then navigate back to the MIDI Learn panel.

All assigned controls will appear as a list in the **MIDI Table** page...

## MIDI Table

Click on the configuration button (cogwheel) and select the MIDI icon labeled 'T'. Once a few parameters have been added, you will see a list:

	Parameter	Channel	Controller	Mode	Type	
1	LFO 1:Rate	1	4	normal	Continuous7bit	×
2	LFO 1:Amplitude	1	5	normal	Continuous7bit	×
3	-not assigned-	1	1	normal	Continuous7bit	×

### Parameter

Zebra's many parameters, sorted into sub-menus. Click on the **[Add]** button at the bottom and experiment! Afterwards, delete the line by clicking on the **[X]** to the right.

Another experimental feature: Select *Last Clicked Control* from the bottom of the Parameter menu, enter any controller number then exit the configuration pages. Any MIDI controllable knob or switch in Zebra 3 will now respond to that controller – you just have to click on it first! The final option, *Last Clicked Control Fine*, is similar but with a significantly reduced range.

### Channel / Controller

The next two fields are for MIDI channel and CC number.

### Mode

Specifies the range / resolution of values. The last two options are for adjusting oscillator pitch.

*normal* .....full range, continuous

*integer* .....full range, whole numbers only

*fine*.....0.01 steps between the two integers closest to the current value

*octaves* .....max. 5 discrete values

*semitone* .....+/- 6 semitones, continuous



## Type

Specifies the kind of hardware. By far the most common is *Continuous 7-bit*.

*Encoder 127* ..... 'relative mode' endless rotary controls which repeatedly send the CC value 1 when turned up, or 127 (interpreted as -1) when turned down

*Encoder 64* ..... 'relative mode' endless rotary controls which repeatedly send the CC value 65 when turned up, or 63 when turned down

*Continuous 7-bit* ..... 7-bit MIDI CC (normal resolution, common)

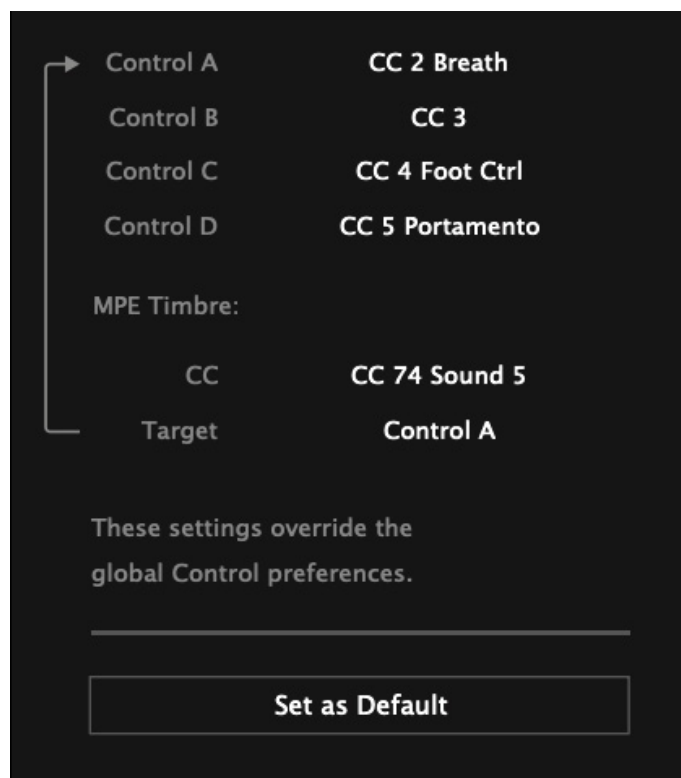
*Continuous 14-bit* ..... 14-bit MIDI CC (high resolution, rare)

## Remove

To remove individual assignments, click on the **[x]** to the right of each line. To remove them all at once, click on the **[Delete All]** button at the bottom of the window.

## Per Instance Control

Local versions of the Control A / B / C / D as well as MPE 'Timbre' options. These settings override the corresponding global defaults (see [Preferences](#) on the next page).



The **[Set as Default]** button copies all 6 settings to the global Preferences...

# Preferences

Click on the 'tools' icon to access the global options...

## MOUSE

Hide Mouse On Drag	on
Mouse Wheel Focus	adaptive (scroll & adjust)
Mouse Wheel Mode	vertical only
Mouse Wheel Raster	on
Natural Scrolling	scrollbar & value changes
Scroll Horizontal	standard

## APPEARANCE

Animations	Smooth
Default Size	140%
Graph Mode	glow
Mod Target Finder	Tentacles
Show Raw Parameter Values	scaled & raw
Text Antialiasing	on

## PRESETS

Auto Versioning	off
Save Presets To	selected folder
Scan On Startup	on

## AUDIO & MIDI

Automatic Reset on Playback	on
* Base Latency	16 samples
Control A Default	CC 2 Breath
Control B Default	CC 3
Control C Default	CC 4 Foot Ctrl
Control D Default	CC 5 Portamento
MIDI Control Slew	fast
MPE Timbre Default	CC 74 Sound 5
MPE Timbre Target Default	Control A

## RACK PANELS

Generator Order	grid row first
MSEGs & Mappers	show
Modulator Order	fixed

## MOUSE

---

### Hide Mouse on Drag

On: The mouse pointer will disappear while you are adjusting a parameter, and will reappear in the same position as soon as you stop.

### Mouse Wheel Focus

Determines how the mouse wheel is used for scrolling and parameter adjustment.

- adaptive* ..... Automatically switches between scrolling and value adjustment, depending on where the mouse is 'hovering'. This option lets you scroll panels without having to hover over the scrollbar.
- scroll only* ..... The mouse wheel will only scroll, it will not adjust parameter values.
- controls & scrollbars* ..... Only active when hovering over a control or a scrollbar. This option prevents accidental parameter changes while scrolling.

### Mouse Wheel Mode

Determines how mouse wheels and touchpads interact with horizontally oriented controls such as scroll bars or horizontal sliders.

- auto detect* ..... Automatically selects *vertical only* or *vertical & horizontal*, depending on the type of input device.
- vertical only* ..... Horizontal motion is ignored, only vertical motion is recognized.
- vertical & horizontal* ..... Vertical scroll for vertical controls, horizontal scroll for horizontal controls.

**Tips:** To enable horizontal scrolling with a standard wheel, choose *vertical & horizontal*, then hold **control** (Windows/Linux) or **command** (Mac) while scrolling.

### Mouse Wheel Raster

If you can feel your mouse wheel feels slightly bumpy as you roll the wheel, set this option to 'on'.

### Natural Scrolling

Defines how inverted/reverse mouse wheel scrolling (called 'Natural Scrolling' in macOS) affect scrollbars and controls. Note: This setting might also apply to your touchpad.

#### macOS

- scrollbar only* ..... Inverts the mouse wheel scrolling direction for scrollbars only. The default.
- scrollbar & values* ..... Inverts the direction for all controls (scrollbars, knobs, sliders).

#### Windows

- off* ..... Uses the scroll direction provided by the operating system or hardware device for scrollbars and for knobs/sliders. The default.
- on* ..... inverts the scroll direction for scrollbars, but not for knobs or sliders.

### Scroll Horizontal

Sets the direction of horizontal scrolling using vertical motion of the mouse wheel / touchpad.

- standard* ..... Upward motion translates to rightward motion.
- inverted* ..... Upward motion translates to leftward motion.
- invert sliders only* ..... Like *inverted*, but only applies to sliders. The default.

## APPEARANCE

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### Animations

Sets the speed of all animated elements except the plot (see Graph Mode below). *Eco* is the most CPU-friendly setting here, *Smooth* the most CPU-intensive.

### Default Size

GUI size for each new instance. You can temporarily change the size without having to open the Preferences page by right-clicking anywhere in the background (but most reliably on 'Zebra' in the control bar).

### Graph Mode

A choice of visual effects for the plot – *eco*, *fast* or *glow*. Save CPU by setting *eco* here.

### Mod Target Finder

Default setting for the visual aid to find targets assigned to sources:

*Highlights* .....Assigned targets appear with a brighter border  
*Lasers* .....Source and target(s) are connected by straight lines  
*Tentacles* .....Source and target(s) are connected by curved lines

### Show Parameter Values

Specifies how values will appear in the data display.

### Text Antialiasing

Smoothing of labels and values. Normally left on – only in rare special cases will switching this off improve readability.

## PRESETS

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### Auto Versioning

If switched on, an index is appended to the preset name and automatically incremented each time you save it. For instance, saving 'Space' three times in a row would give you three files: 'Space', 'Space 2' and 'Space 3'.

### Save Presets To

The user folder option prevents Zebra 3 from saving presets into the Local folder. Instead, they will land in the User folder (or a subfolder if selected).

### Scan On Startup

Whether the preset library should be scanned and the database recreated when the first instance of Zebra 3 is started, e.g. when you reopen a project.

## AUDIO + MIDI

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### Automatic Reset on Playback

Whenever playback is started in the DAW / sequencer, all notes still playing are ended, all reverb and delay memory is cleared, and all controllers are reset back to their default positions.

### Base Latency

If you are certain that your audio system – hardware as well as software – uses buffers that are a multiple of 16 samples in size (please refer to the appropriate documentation), you can safely disable Zebra's base latency. Otherwise it is usually best to leave it set to the default 16 samples to avoid crackles. See the text box on the next page.

Note: Base Latency setting will only be updated when the host allows – on playback, after switching the sample rate or upon reloading Zebra 3.

#### ABOUT THOSE BUFFERS

Internally, Zebra 3 processes audio in chunks of  $n \times 16$  samples. This 'block processing' significantly reduces the CPU load and memory usage of all our plug-ins.

If the number of samples to be processed is 41, Zebra 3 processes the first 32 and keeps the remaining 9 in a small buffer (16 samples is enough). Those 9 samples are then processed at the start of the next call... and so on.

The extra buffer is only necessary if the host or audio driver processes 'unusual' buffer sizes. In host apps that process buffers of e.g. 64, 128, 256 or 512 samples (multiples of 16), try switching it off so that Zebra 3 can process latency-free.

### Control A / B / C / D Default

Four user-definable performance controls (alongside pitch wheel and modulation wheel). Set these to match the MIDI CC values your hardware controller sends, for instance CC 14 to CC 17.

### MIDI Control Slew

The degree of parameter smoothing for the pitch wheel, mod wheel, Control A / B / C / D, and Pressure (aftertouch). When *off*, Zebra 3 responds very quickly to e.g. mod wheel data, but the performance can sound too grainy. The *fast* option is a good compromise.

### MPE Timbre Default

The MIDI CC number for MPE 'Timbre', which would normally be [CC 74 Sound 5](#).

### MPE Timbre Target Default

Specifies which of the four Controls (ABCD) will react to MPE 'Timbre' control. The default is *Control A*. See [MPE](#) in the MIDI Specialities chapter.

## RACK PANELS

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### Generator Order

Determines the order in which **generator** panels appear in the [Generator Rack](#) with reference to their arrangement in the main grid:

*grid row first* ..... Across the first row (Lanes 1 to 4), then across the next row etc.

*grid column first* ..... Down Lane 1, then down Lane 2 etc.

*selected on top* ..... The most recently selected module appears at the top

### MSEGs & Mappers

*show* ..... MSEGs and Mappers will appear in the [Modulator Rack](#).

*hide* ..... MSEGs and Mappers will **not** appear in the Modulator Rack

### Modulator Order

Determines the order in which **modulator** panels appear in the [Modulator Rack](#).

*fixed* ..... Standard order (Envelope → LFO → MSEG → Mapper → Math)

*selected on top* ..... The most recently selected\* modulator appears at the top

\*selected e.g. by modulation assignment, by clicking in the editor bar / modulation source bar.

# MIDI Specialities

## MIDI Programs

The very first Zebra 3 instance loads up to 128 presets from the Local / MIDI Programs folder into memory for selection via MIDI Program Change messages. Presets are addressed alphabetically, so for a predictable order it is best to use numeric prefixes 000 to 127 for the file names.

You can also create up to 127 subfolders, each folder holding up to 128 presets. Select a bank via Bank Select (CC#0) before the Program Change message. The MIDI Programs folder is bank 0, subfolders in alphabetical order are banks 1–127.

On Program Change, Zebra 3 shows *bank:program* (e.g. 0:0). Some hosts label the first bank/preset as 1 instead of 0. Please ensure the folder contains no “junk” presets, as all files are addressed.

MIDI Programs cannot be added, removed or otherwise edited while the host is running—changes only apply after the host has been restarted.

## Polyphonic Expression (PE)

Most MIDI keyboards provide left-hand performance controls that affect all notes equally: the modulation wheel, pitch bender, and Channel Pressure (aftertouch) normally cause all played notes to respond in parallel. Over the years, several solutions have been developed to enable more or less independent articulation of individual voices. Zebra 3 can handle the following:

**MPE** (Multidimensional Polyphonic Expression)

**Multichannel MIDI** (similar to MIDI mode 4 but less restrictive)

**Note Expressions** (CLAP method)

**Poly Pressure** (a.k.a. polyphonic aftertouch)

## MPE

**Multidimensional Polyphonic Expression**, now part of the MIDI 2.0 spec (see [MIDI Association](#) website). You will need an MPE-capable controller and your host app must allow multiple MIDI channels to be routed to a single instance of a plug-in—see the relevant documentation.

## From MIDI to MPE

MPE defaults to an extended MIDI Mode 3 (Poly Mode), with MIDI channel 1 acting as a Manager Channel for up to 15 Member Channels. Each note is assigned its own MIDI channel with its own performance data, so notes in a chord can be bent individually e.g. pedal-steel style, or otherwise shaped independently e.g. like a vocal quartet. It's up to the receiving instrument to interpret MPE appropriately, and up to the sound designer to use these data in a musically meaningful way.

MPE was designed to control either a single polyphonic synth, or several monophonic synths running in parallel. In Zebra 3, set Voicing to *Poly* and enable MPE to use the first approach—the only one supported by most controllers and audio plug-in host software.

For reliable results, your MPE controller should transmit sensible initial values for all per-note dimensions before each Note On. If you hear glitches, please verify that your controller is sending the appropriate Pressure and Timbre values (see About CC#74 below). If the data looks wrong or is inconsistent, contact the controller manufacturer.



## Member channels

To keep the MIDI stream manageable, MPE only sends notes, pitch bend, channel pressure and CC#74 (see below) over member channels: All other CC data including mod wheel (CC#01) and hold pedal (CC#64) are sent on channel 1 and therefore remain global i.e. they apply to all voices.

General note: The idea behind MPE was to capture performances, not to micromanage note data on your computer. Editing MPE in current DAWs is not for the faint-hearted!

## About CC#74

Alongside pitch wheel and pressure, MPE specifies a third dimension of per-note control called 'Timbre', which uses CC#74 by default. For best MPE compatibility, set MPE Timbre Default in the [Preferences](#) to *MIDI CC 74 Sound 5*.

## Using MPE in Zebra 3

Activate the MPE button in the Perform panel. MPE Pitch Bend and MPE Pressure should work immediately. MPE Timbre is set to CC74 and routed to Control A by default, but the CC and 'Ctrl' target can be changed in the Per Instance Control panel (see [MIDI Table](#)) and adopted as global defaults by clicking [Set As Default] there. See the [Audio & MIDI](#) section of the Preferences panel.

Note: 'MPE' is a *Feature* tagging option—see [Preset Tagging](#).

## Multichannel MIDI

A u-he method based on MIDI Mode 4, predating MPE and a lot simpler. Messages arriving from multiple MIDI channels are interpreted by a single instance of Zebra 3 such that the notes respond to the following performance controls **per channel**—which means that you can group certain notes together by sending them on the same channel, if you like:

*Pitch wheel*

*Pressure (aftertouch)*

*Modulation Wheel (MIDI CC #01)*

*Control A, B, C, D (user-definable MIDI CC sources)*

Multichannel MIDI does not require activation, but your host app must allow a single instance of a plug-in to process MIDI data from multiple channels.

## Note Expressions

In the CLAP plug-in format, hosts can provide per-note expression data as part of the note/event stream. Note Expressions do not require enabling in Zebra 3.

Note Expression Volume and Pan data are sent directly to the lane mixer's Gain and Pan controls.

## Poly Pressure

Alongside standard *Channel Pressure*, Zebra 3 recognises *Poly Pressure* (a.k.a. poly AT, polyphonic aftertouch). Both types are combined in the 'Pressure' modulation source.

# Tips & Tricks

This chapter will be greatly expanded in the future versions. In the meantime you should also try the tips at the end of the Zebralette 3 user guide!

## Less is More

### Efficient use of Modules

When designing presets, using fewer modules often yields cleaner, more reliable results. A lean signal path is easier to balance, less prone to unintended gain-staging issues, and typically reduces the chances of phase layering or “mystery modulation”.

Fewer modules also improves editability: you can return months later and more easily understand the patch, making small changes without unraveling a delicate web of dependencies.

Finally, fewer modules means less CPU and more predictable performance—especially valuable when you are stacking voices, running high-quality modes or using multiple instances in a project.

### Other CPU Saving Tips

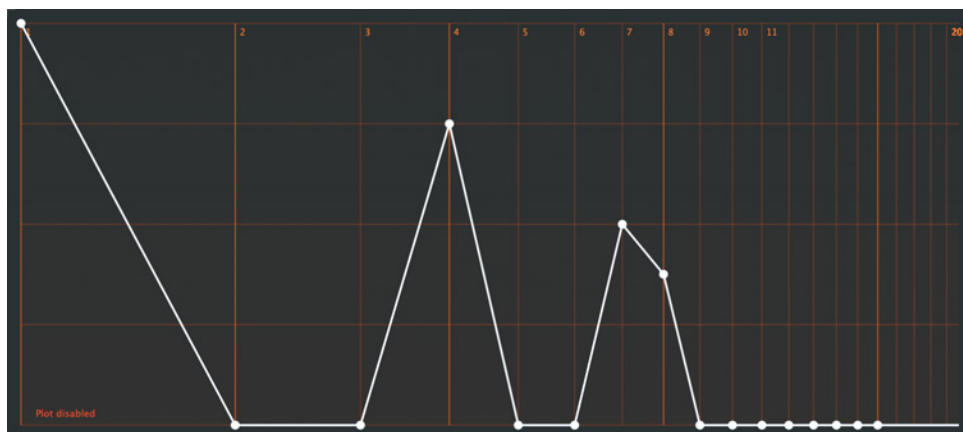
For simple sine or triangle waves, using the Additive Renderer can reduce CPU usage: Set the Harmonics to 16, Resolution to 200 Hz, and Curve Math to *Fast* or *Rough*—unless those settings audibly compromise sound quality.

## Oscillator

### Additive Synthesis

In the current version, editing individual harmonics is a bit fiddly—the plan is to improve usability in future versions. For now, try this little experiment...

1. Load the preset 'Adder' you will find in the **Templates** folder
2. In the toolbox for oscillator 1, switch to the [Harmonic Grid](#) and set [Move XY](#) to Y only
2. Adjust the width of the view so you can only see the first 16 to 20 harmonics
3. Raise the points of the harmonics you want, make sure points remain horizontally aligned.
4. In the oscillator panel, set Spectral Modifier to *Curve*
4. Right-click in the editor widow and select *Copy Curve*
5. In the toolbox, click on the first [Guide](#), right-click in the editor window and *Paste Curve*
6. Turn **Spectral Dist** up to maximum, move some of the Guide peaks up and down — detuning!



*Example: a mixture of 1st, 4th, 7th and 8th harmonics*

harmonics	interval	semitones	cents
1, 2, 4, 8, 16, 32	prime	0	0
9, 18	major 2nd	2	+4
5, 10, 20	major 3rd	4	-14
11, 22	tritone	6	-49
3, 6, 12, 24	5th	7	+2
13, 26	minor 6th	8	+41
7, 14, 28	minor 7th	10	-31
15, 30	major 7th	11	-12

## FX Combi 1: Spectral Decay + Sparse

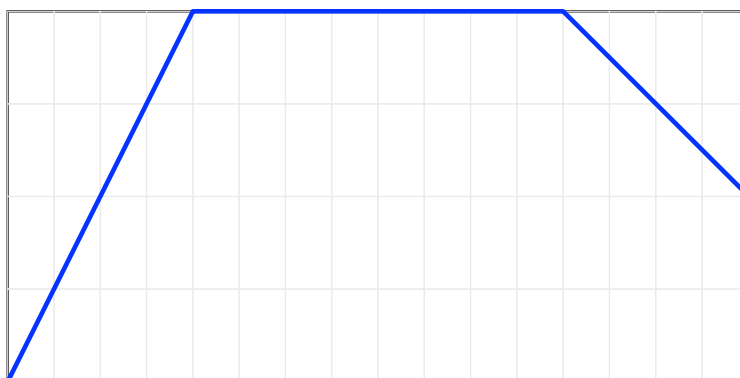
Good for quick and easy electric piano sounds. Load *init*, set these two as your FX1 and FX2, turn Spectral Decay *Depth* up to maximum and play with Sparse *Depth*: Around 65 gives you a good "tine". Then adjust the envelope 1 Decay and Sustain for a more piano-like response.

Further useful refinements: Edit the 3 Guides (used by Spectral Decay), and modulate the FX1 Morph parameter via an envelope and/or velocity.

## FX Combi 2: Sync + Window

Initialize the preset, set OSC1 FX1 to *Sync* with Center at 50.00. Set FX2 to *Window* and ensure that its Polarity is *Bipolar*. Play a low note and listen to the raw sync sweep by turning FX1 *Depth* up and down (you could select Mod Wheel as modulation source there if you prefer).

Turn FX2 *Depth* up to maximum and listen again. Fast sync sweeps are a bit smoother, bass is preserved, but the sound has lost a lot of its edge. Make FX2 polarity *Unipolar* and draw this shape in Guide 1—a compromise between smooth and edgy while preserving the fundamental:



Now play with other window shapes and polarity. You will find a preset called **Windowed Sync** in the Templates folder, which has Guide 2 set to the standard falling saw, and Guide 3 as an inverted triangle to demonstrate how different windows can affect the sync sound.

## Single oscillator chords

Zebralette 3 includes a few presets (e.g. *Majorette*) which create chord intervals by combining Unison = 2 with a high Detune setting. A similar effect can also be achieved by fitting multiple instances of the same waveform into a single cycle. For an example, see the very first Tips & Tricks page in the **Zebralette 3 user guide**.

## FMO

### Maps to FMO Ratios

Having 25.00 as the maximum Ratio makes it easier to hit the musically pleasing .50 increments when modulating by e.g. a Mapper. To determine a Mapper value, multiply the desired ratio by 4. For example, ratio 0.50 corresponds to Mapper value 2.00, ratio 3.50 corresponds to Mapper value 14.00, and so on.

## Noise

### Lo-Fi oscillator

The *Digital* type can be used as a lo-fi oscillator: Turn down HP, and modulate LP with e.g. Pitch 1.

## Envelope

### Faster attacks

Although setting the attack to zero can still create clicks, it is not extremely fast by default. For the minimum attack time possible in Zebra 3, set **Vary I** to *init* and turn the knob up to maximum.

### Decalibrate times

To simulate differences between the envelope circuits in classic analogue polysynths, try modulating Vary II *Stretch* by a Mapper with a reduced number of steps e.g. 8.

## Mapper

### Copy an oscillator curve

Whenever you need a map shape that would be easier to create using the oscillator editing tools, add a temporary oscillator Curve, create your shape, then copy/paste into a Mapper.

### Fewer values required?

If you are mapping a performance control and want to keep it simple, the *Map Smooth* mode seems like the obvious choice. However, there are two drawbacks:

- Complexity can only be added by increasing the number of steps
- There is a plateau after the final step has been reached.

## Matrix

### Uses of Constant

Smoothly adjusting pitch by a certain number of semitones via the mod matrix isn't always precise. E.g. for 5 semitones the modulation depth would be  $100 / 48 \times 5 = 10.416666666$ .

You can circumvent the problem by using Constant set to -48 as 'via' source and multiplying the number of semitones you want by 4 for the modulation depth. 5 semitones = 20.

### Even more performance control

Pitch wheel, modulation wheel, pressure and Controls A–D already provide plenty of real-time MIDI control from your keyboard or hardware controller. However, if you really need more you should consider re-purposing Math 3 and 4—very few of the current factory presets use more than two of the Math modules. Here's how:

- Drag Math 3 onto e.g. Lane 4 Pan to make its panel appear in the modulator rack
- [MIDI-learn](#) the Math 3 'X' knob
- Repeat with Math 4
- Use Math 3 and Math 4 just like you would use Controls A–D

You now effectively have Control E and F modulation sources, albeit without virtual knobs.

## Pitches

### Duophony

For classic ARP™ Odyssey-style duophony try the following:

- In the [Perform](#) panel, set Voicing to either *legato* or *mono*
- in the [Pitches](#) page, set Pitch 1 Source Key to *lowest* and Pitch 2 Source Key to *highest*
- use *Pitch 1* and *Pitch 2* as the Pitch Sources for two oscillators (or two sets of oscillators).

You will find a simple example patch called *Duophony* in the Templates folder.

## Effects

### Delay as room reverb

Load the Delay module preset *Lively Room* and adjust the Ratio and Feedback to taste.