



# Zebra<sup>3</sup>

## USER GUIDE



Public Beta 2, WIP!

20. January 2026

# Table Of Contents

<b>Introduction</b>	<b>6</b>
About Zebra 3.....	6
The Interface .....	7
Rack View .....	7
Knobs and Switches .....	8
Direct Modulation .....	8
Parameter Locking .....	8
Load / Save Modules .....	8
Control Bar .....	9
Generators Rack .....	12
Main Grid .....	12
Lane Mixer.....	15
Modulators Rack.....	15
Editor Bar and Lower Panel.....	16
Perform.....	16
Matrix.....	17
FX / Out.....	18
Oscillators.....	19
MSEG .....	19
Mapper.....	19
Modulation Source Bar .....	19
<b>Pitches</b>	<b>20</b>
Concept .....	20
Tuning .....	21
Intonation .....	22
Pitch Bend .....	22
Glide.....	22
Vibrato .....	23
Modulation .....	23
Quantize.....	24
<b>Oscillator</b>	<b>25</b>
Overview of Panels .....	25
Rack Panel.....	26
Curve Morph .....	26
Render.....	27
Spectral Modifier .....	28
Spectral Distortion .....	29
Easy Editor .....	30
Timeline .....	30
Graphic Editing .....	31
Oscillator Context Menu .....	31

<b>Oscillator FX</b>	<b>33</b>
Spectral Effects.....	34
Warping Effects .....	35
Windowing Effects.....	36
Animation Effects .....	37
<b>Oscillator Editor</b>	<b>38</b>
Toolboxes.....	39
Shapes Toolbox.....	40
Drawing Toolbox .....	41
Morph Control Toolbox .....	44
Transferring Curves .....	46
Guides.....	47
<b>FM Oscillator</b>	<b>49</b>
<b>Noise</b>	<b>51</b>
<b>Exciter</b>	<b>53</b>
<b>Filter</b>	<b>54</b>
Filter Parameters .....	54
Filter Palette .....	55
Slopes .....	55
Models .....	56
<b>EQ</b>	<b>57</b>
<b>Comb</b>	<b>59</b>
<b>Distortion</b>	<b>61</b>
<b>Modal Resonator</b>	<b>62</b>
<b>Ring Modulator</b>	<b>65</b>
<b>Folder</b>	<b>67</b>
<b>Mixer</b>	<b>68</b>
Mix (2in1) .....	68
4in1 .....	69
Sum Mode .....	69
Scan Mode.....	69
Vector Mode .....	70
4in4.....	71
<b>Utility</b>	<b>72</b>

<b>Modulators</b>	<b>74</b>
Concept .....	74
Direct Modulation — in the panel .....	74
Indirect Modulation — via the matrix .....	74
Drag & Drop Assignment .....	75
Modulation Source Pips .....	75
Modulation Source Bar .....	75
Source Context Menu .....	76
Envelope .....	77
MSEG .....	78
LFO .....	82
Mapper .....	84
Mod Math .....	86
MIDI Sources .....	88
Other Sources .....	88
<b>Matrix</b>	<b>89</b>
Quick Tutorial .....	89
Matrix Slots .....	90
Slot Modifiers .....	91
<b>Effects</b>	<b>93</b>
The Effects Grid .....	93
SEND .....	93
OUT .....	93
Compressor .....	94
Compressor Mode .....	94
Limiter Mode .....	95
ModFX .....	96
Chorus Mode .....	97
Flanger Mode .....	98
Phaser Mode .....	99
Delay .....	100
8-Tap Delay .....	101
Reverb .....	103
Texture .....	104
Burn .....	105
<b>Presets</b>	<b>106</b>
Overview .....	106
Directory Panel .....	107
Showcase .....	107
Local .....	107
User .....	108

Smart Folders.....	108
Directory Context Menu.....	109
<b>Presets Panel.....</b>	<b>110</b>
Presets context menu.....	111
Extra Functions .....	112
Drag & Drop .....	112
<b>Preset Info.....</b>	<b>113</b>
<b>Installing Soundsets.....</b>	<b>113</b>
<b>Preset Tagging.....</b>	<b>114</b>
<b>Search Functions.....</b>	<b>115</b>
Search by Tags.....	115
Search by Text.....	116
<b>Configuration.....</b>	<b>118</b>
MIDI Learn.....	118
MIDI Table .....	119
Preferences.....	121
MOUSE.....	122
APPEARANCE .....	123
PRESETS.....	123
AUDIO + MIDI .....	124
RACK PANELS.....	125
<b>Tips &amp; Tricks.....</b>	<b>126</b>
Less is More .....	126
Oscillators .....	126
FMO .....	126
Noise.....	127
Envelope .....	127
LFO.....	127
Mapper .....	127
Matrix.....	127
Pitches.....	128

# 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 of presets, click on the **Discover** smart folder.

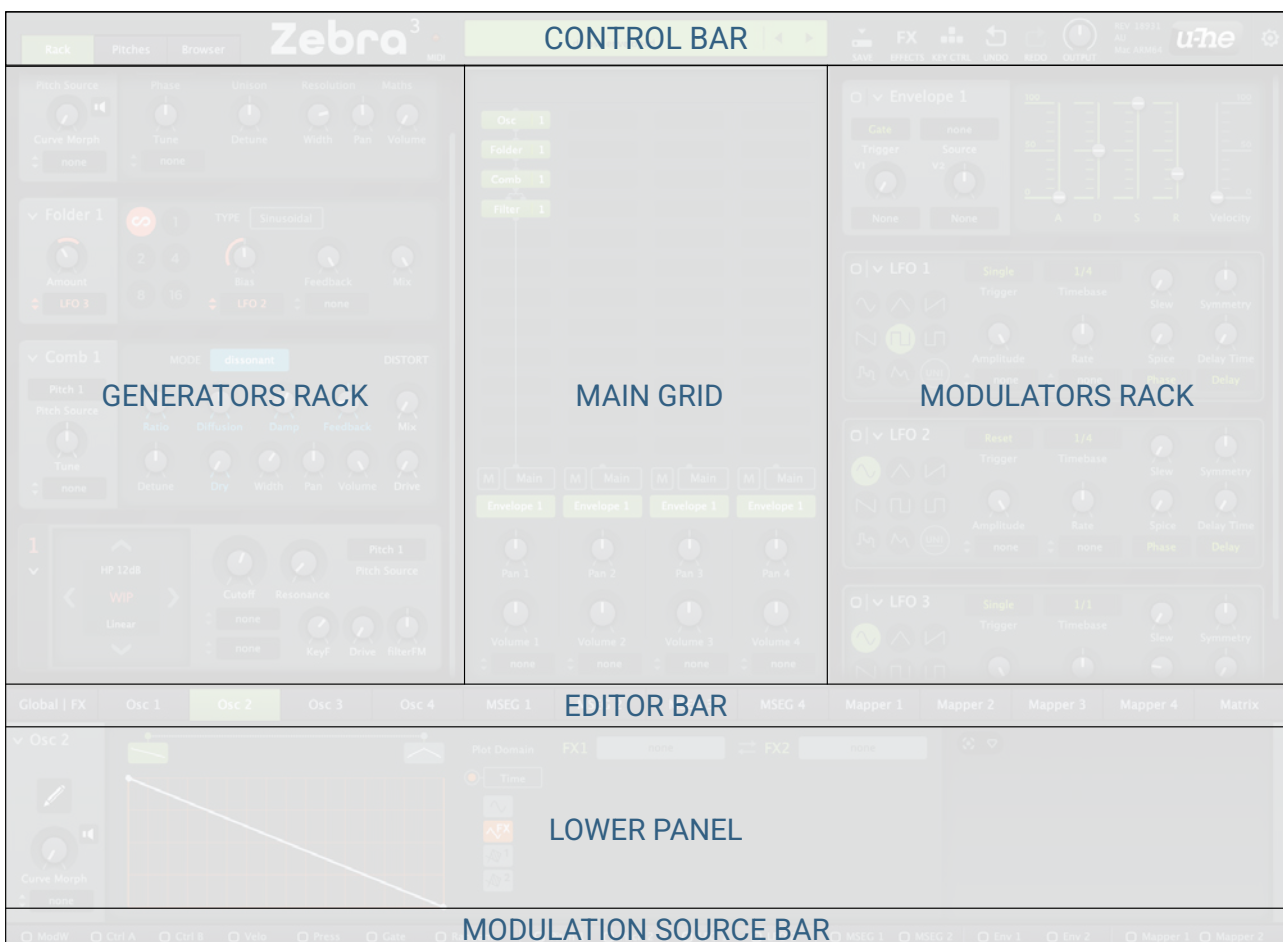
## Team 2025 (Q4)

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 Hübner (media); David Schornsheim (framework, CLAP); Kay Knoke (hardware development); Tim Fröhlich (code); Sadjad Siddiq (DSP); Petros Karagkounidis (web development); Simon Schrape (web development); Henry Lau (accounting, customer support); Mine Hahn (DSP); Vadim Zavalishin (filter design, DSP), Yoel Kumbolu (sound design assistant)...

## The Interface

### Rack 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 **Rack** 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](#).

## Footnote Navigation

The row of links in the **footnote area** help you navigate this user guide. The current section appears darker than the rest. Some entries reveal **extra links** at the bottom (e.g. selecting '**intro**' reveals *control bar, generators rack, main grid, lane mixer, modulators rack, perform, effects grid*).

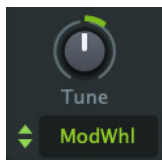
Links to the details about the editable modulation sources (envelope, LFO, Mapper, MSEG, and Mod Math) only appear at the bottom of [mods](#) pages: For example, if you want to read about the **MSEG**, click on [mods](#) first, then on [mseg](#) below it.

## 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 on any valid modulation target to *Add Modulation* assignments to the [matrix](#) remotely. These can be removed again via *Remove Modulation*. At the bottom of this same menu is the 'Lock' option (see Parameter Locking below).

## Direct Modulation



Some adjustable parameters allow direct modulation assignment within the panel. Modulation depth is adjusted by the slider—the double triangle to the left of the source selector—which is also a valid modulation target. Note that direct modulation is calculated faster than in the modulation matrix. For details, see [Modulators](#).

## Parameter Locking



Right-clicking on any control and selecting *Lock* prevents values from changing when you switch presets. Note that locking does not stop you adjusting those values.

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

## Load / Save Modules



In the top left corner of most panels you will see a downward-pointing arrow. This opens a dynamic menu where you can copy/paste, save or load complete modules i.e. all settings including the selection and depth of modulation sources.

Use **Copy/Paste** to transfer settings between modules of the same type, even across different instances of Zebra 3. Note: The context menu for modules in the grid also includes Copy/Paste.

**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.

**Show in Finder / Explorer** displays the module presets in a system window. Tip: You can create folders in this location to hold module presets you don't want to appear permanently in the menu.

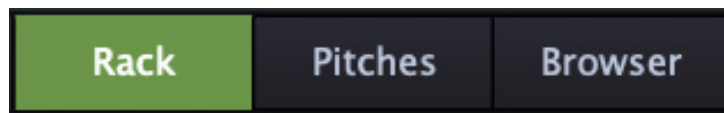


## Control Bar



The control bar along the top hosts several global parameters plus a few utility functions:

### Rack | Pitches | Presets



These 3 "radio buttons" select what will be shown in the main area...

**[Rack]** .....The two racks, the main grid and lane mixer

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

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

Right-click and select *Set as Default View* to specify which view will open whenever you load a new instance of Zebra 3.

### MIDI

This small indicator to the left of the data display lights up whenever MIDI data is being received.

### Data Display



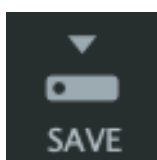
Apart from showing the preset name, the central text display has several other duties...

**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



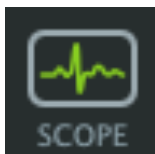
Clicking on **[Save]** opens a window where you can give your sound a name, enter your name (as author) and other details. Hit Return to confirm (for line breaks in the editable fields, use SHIFT+Return). The preset will be saved in the User folder by default (see [Preferences](#)).

Shortcut: cmd + **[Save]** (Mac) / alt + **[Save]** (Win) saves immediately, skipping the dialog box.

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

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

## SCOPE



Opens the oscilloscope in a floating window. The default view is stereo audio. To zoom horizontally, adjust the scrollbar handles at the bottom (hold SHIFT for finer resolution). Double-click the scrollbar to maximize again.

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 have some control over the vertical order, drag & drop a modulation source onto one of the four fields at the bottom of the window, or click and select from the menu. To remove a signal from the Scope, click on its field and select the first entry, none.

The **[Freeze]** button takes a motionless snapshot of the signal. Click again to 'thaw'. To view 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. As always, hold SHIFT for fine control.

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

## KEY CTRL



Note: Key Control is still 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.

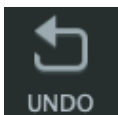
Once you have highlighted an element, type a number and press Return to confirm. You should see that value appear in the data display. To enter negative values, include a minus sign (–) at any point before confirming (but after the first numeral).

Like double-click, the **backspace** key resets the highlighted parameter to its default value. Use '+' and '-' keys to increment or decrement integer values. Hold Shift for fine adjustments. Hold option (Mac) or ctrl (Win) 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.

## OUTPUT



Final volume, 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 up to 200% if necessary.

## Version Info

The revision number, the plug-in format and computer platform. If you hover with the mouse pointer over the revision number, it will appear briefly in the data display.

## 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 all modules in your preset.

## 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](#).

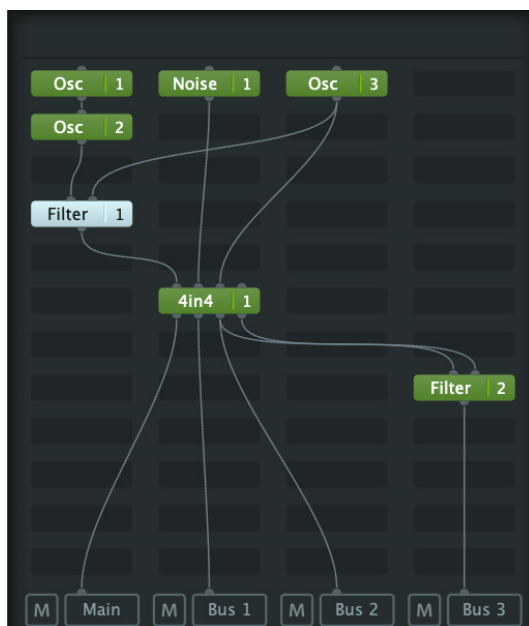
## Generators Rack

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 scroll bar will appear.



## Main Grid

In the middle of the RACK view is a large grid consisting of four vertical **lanes**, which is used for patching generator modules together. Signal flow is generally from top to bottom, although inputs can be re-routed. Certain mixer modules even have multiple outputs, like in this example:

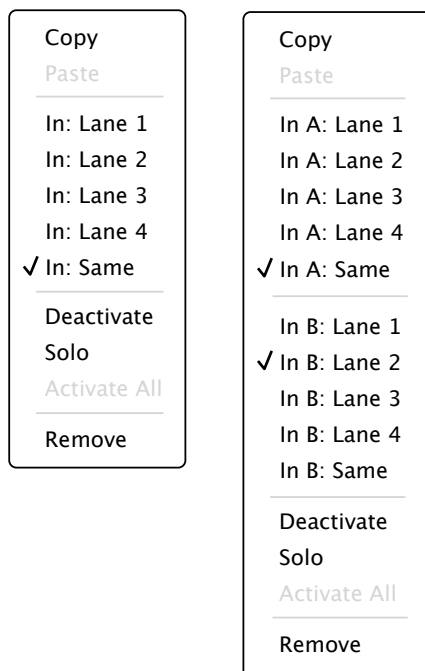


To add a module, either left-click on an **empty cell** and select from the palette which appears on the right, or right-click and select from the menu. Clicking on a module in the grid will highlight the corresponding control panel in the generators rack, automatically scrolling if necessary.

**IMPORTANT:** As oscillators, noise generators and Exciters do not process audio, they simply allow signals above them to pass through. In the example on the previous page, oscillators 1 and 2 are both routed into filter 1: The two signals are effectively mixed together.

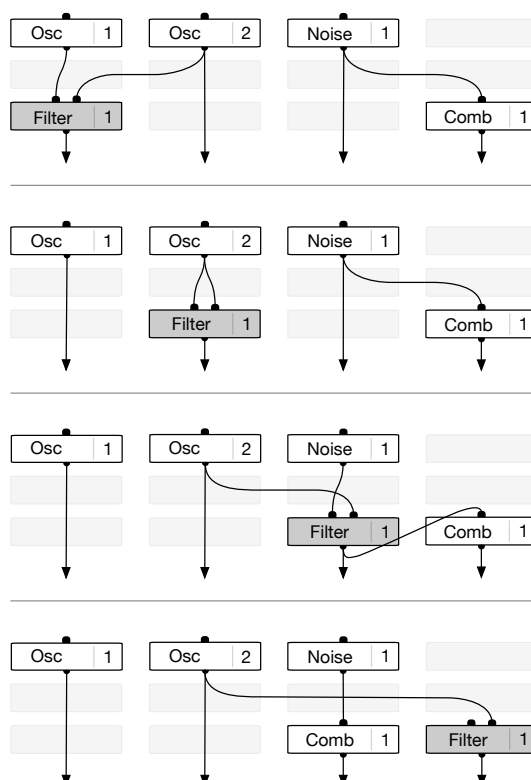
## Routing

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 the routing is **automatically** adjusted as the filter is moved to the right:



## Module Groups

Since the generators rack can fill up rather quickly you can choose to view only modules **selected** in the grid (minimum 2). This feature lets you focus on specific parts of your patch.

To select multiple modules you can use the standard Finder (Mac) and Explorer (PC) shortcuts (assuming your DAW settings pass these keystrokes on to plugins): Shift + click selects a range of modules, Ctrl (PC) / command (Mac) + click adds or removes individual modules.

Whenever more than one module is selected, a [+] symbol appears above the grid. Click on the [+] to create a **new group**, which can be renamed via double-click. To recall a group, click on its name. You can create up to four module groups, and these are saved with the preset.

After modifying a module group, right-click on the group name and *Update To Selection*.

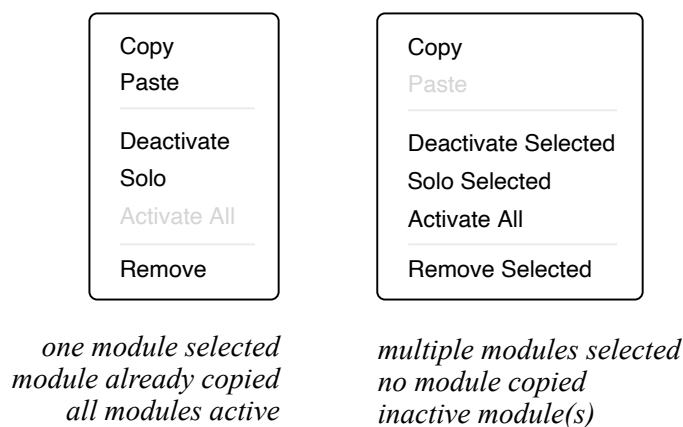
## Copy / Paste Grid Modules

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 [Load / Save Modules](#).

## 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:



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) / Ctrl (Win) + double-click.

## Lane Mixer

Below the main grid is 4-channel mixer used for setting the mute status [M], routing to the [FX grid](#), the amp envelope, stereo position and mode (*Pan* or *Balance \**), and Volume for each lane.



\* **Balancing** to the left, for example, fades out the right-hand channel, while **panning** to the left moves the right-hand channel towards the left.

## Modulators Rack

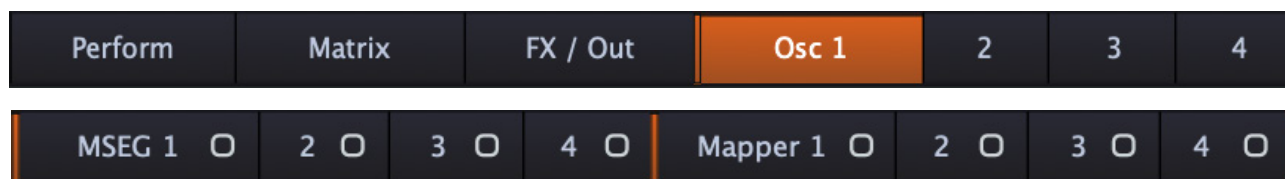
The area to the right of the grid is dedicated to [envelopes](#), [LFOs](#), [MSEGs](#) (multi-segment envelope generators), [Mappers](#) and [Mod Math](#) panels. Unlike generators, **modulators** are not defined in the grid but will automatically appear as soon as they are used.





## Editor Bar and Lower Panel

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



Note: The MSEG and Mapper tabs include drag & drop [modulation source pips](#), but unlike the performance controls (PB, MW, A/B/C/D) they do not also appear in the [Modulation Source Bar](#).

## Perform

Global voice options and performance controls:



### Voicing Mode (unlabelled)

Poly.....polyphonic

Mono .....monophonic, each new note triggers the envelopes

Legato .....monophonic, the envelopes are only retriggered after spaces between notes

For classic ARP™ Odyssey-style **duophony** try the following:

- set the voicing mode to *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 pitch sources for two oscillators (or two sets of oscillators).

You will find a simple patch called *Duophony* in the Templates folder.

### Overlap Mono

Only available if the [Voicing Mode](#) is set to *Legato* or *Mono*. Adds a characterful ringing effect by allowing a voice to release fully instead of being 'stolen' by the next note played.

Tip: Switch Reallocate off and set the envelope release time to 40 or higher.

### Reallocate

When enabled, this option gives the envelopes a classic analogue character—repeated notes reuse the same voice (unless you wait a while), and the new Attack continues from the envelope's current level rather than always restarting from zero.

This option is also useful in *legato* and *mono* modes, as it prevents the new envelope from truncating the release of the previous one.

Note: If oscillator Reset or any form of instantaneous modulation (for example, Velocity) is in use, Reallocation can result in clicky attacks. This is expected behaviour.



## Voices (polyphony)

To prevent glitches while running CPU-intensive presets you can reduce the **maximum** number of notes Zebra 3 is allowed to play simultaneously (1 to 16).

## PB | MW

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

## Transpose, Pitch Bend

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

## Microtune

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.

Put all your *.tun* files in the following folder:

**Win** C:\Users\YOU\Documents\u-he\Zebra3.data\Tunefiles\ (local for Zebra 3 only)

**Mac** Macintosh HD/Library/Application Support/u-he/Tunefiles/ (global for all u-he plugins)

Clicking on the selector opens a floating browser—you might have to refresh the list via right-click first. After selecting a microtuning file, remember to switch it on using the button to the right!

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*.

## Discharging

"Discharging" essentially means putting a voice into a stable condition before the next note starts, with the practical goal of reducing clicks and other transient artifacts when notes are played in quick succession. In Zebra 3, voices are always assigned 'round robin'—even if the Voicing Mode is set to *Mono*—which can lead to clicky attacks. The **Discharging** switch can mitigate this problem by delaying each new note while the previous one discharges, reducing the likelihood of clicks.

Set *Instant* here if you need the fastest response while accepting the occasional click, and *Fast* or even *Smooth* whenever you need to reduce the risk of clicks at the cost of a slower response.

See also [Overlap Mono](#).

## Keyboard

Playable on-screen keyboard. A double-click latches the note on: single-click any key to unlatch.

## Control A | B | C | D

User-definable (MIDI CC) performance controls. Not saved with the preset. See the [Audio & MIDI](#) preferences and [Per Instance Control](#).

## Matrix

Opens the **modulation matrix** where you can connect modulation sources to target parameters. For details, please refer to the dedicated [Modulation Matrix](#) chapter.

## FX / Out

### Effects Grid

The principle of the FX grid is the same as the main grid except that it is not per-voice, but global. Note: Use the [FX Bus Selector](#) to route signals from the main grid 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 the input. For details about each effect see the [Effects](#) chapter.

### Effect presets and bypass



Click on the downward-pointing arrow to copy, load or save complete effects setups. To bypass all effects, click on the [FX] button.

### SEND

The 3 knobs route the input of the Master (M) lane directly into the other three lanes. In the above example the Reverb unit is receiving 100% signal from the Master lane (without EQ or Delay), as well as anything routed into bus 1 from the [main grid](#). Tip: Modulating the signal level sent to the reverb often sounds more natural than modulating the Dry/Wet mix.

### OUT (lane outputs M, 1, 2, 3)

The 4 knobs to the right of the FX grid set the output levels for each lane.

### Effects panels

The panels for active effects appear to the right of the FX grid. The lane in which each effect sits is indicated by a line attached to the left of its panel.

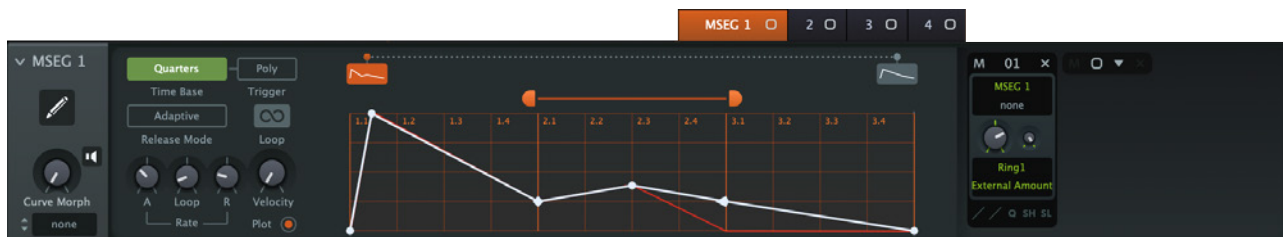


## Oscillators



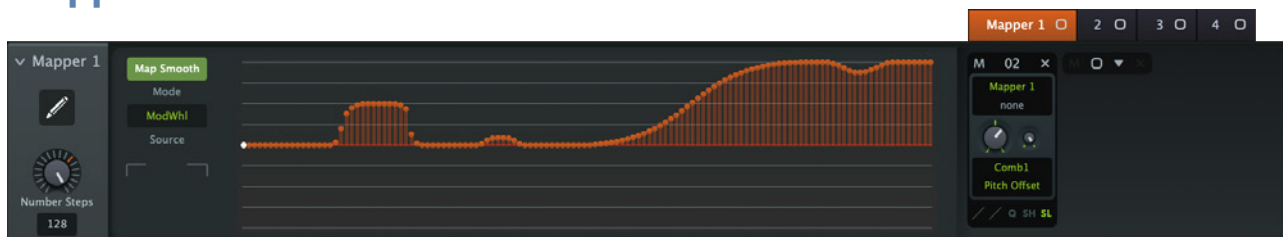
These buttons open the **Easy Editor** panels for each oscillator, which in turn can access the Main Editor with its toolbox and many options. For details, go to the [Oscillator](#) chapter.

## MSEG



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

## Mapper



These buttons open the [Mapper Easy Editor](#) panel for each Mapper. If a Mapper is used as a modulation source, a simplified version of its Rack Editor will appear in the Modulators 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 Source Bar



The narrow strip along the bottom of the window gives you access to most modulation sources for [Drag & Drop Assignment](#). Source pips for the **MSEGs** and **Mappers** are in the [Editor Bar](#).

Abbreviations (MW etc.) are noted in the [MIDI Sources](#) section of this user guide. For more details about these features, see the section on [Drag & Drop Assignment](#).

# 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 pitch bend 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.

## 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

If Type is set to *Key*. The range is -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.

## Intonation

### 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

Set pitch bend up/down ranges independently. The options are 0 to 24 semitones, then 36 or 48.

Tip: As there's no menu here it's probably easiest to set these by rolling your mouse wheel.

Mirrored in the [Perform](#) panel.

## Glide

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

### Amount

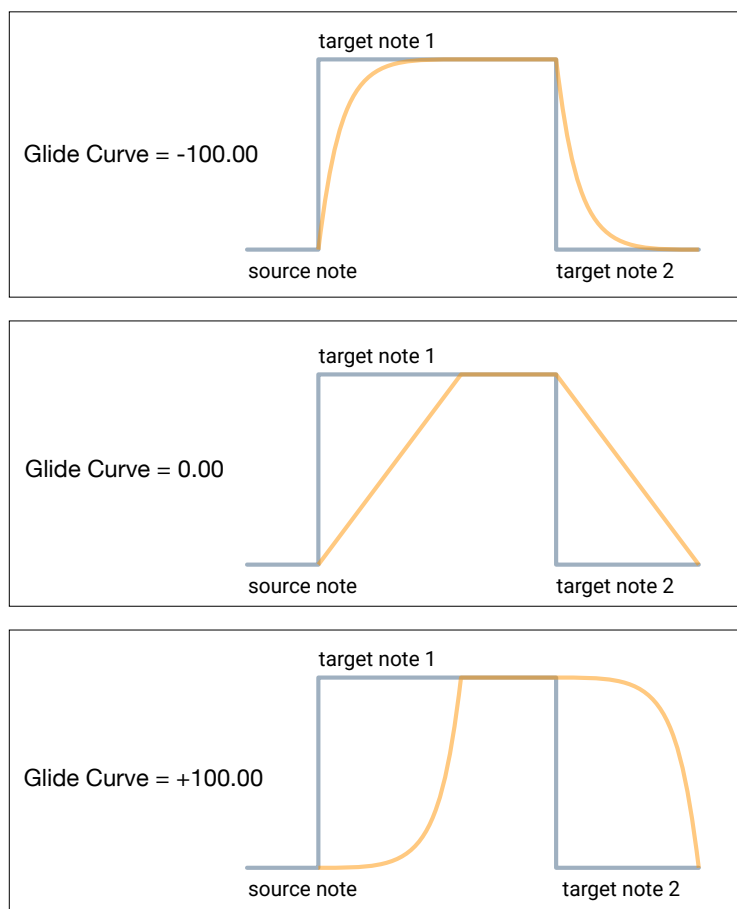
Glide strength. See Mode below.

### 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 more subtle without affecting the time taken!

## 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 / Down** ..... "autobend" up or down, 2 octaves maximum (via Amount).

## 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

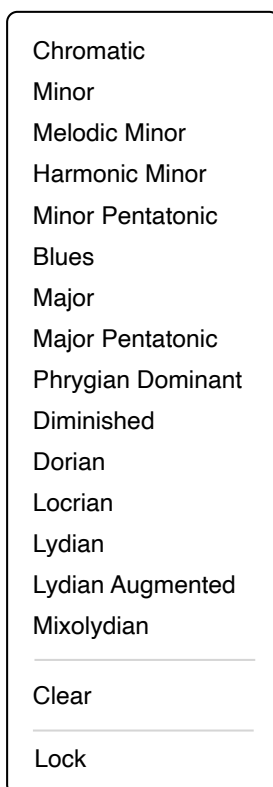
### Note Selector

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. There is also a handy *Clear* function at the bottom of the menu so you will never have to deselect all dots individually.



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



# Oscillator

## Overview of Panels

The oscillator **rack panel**:



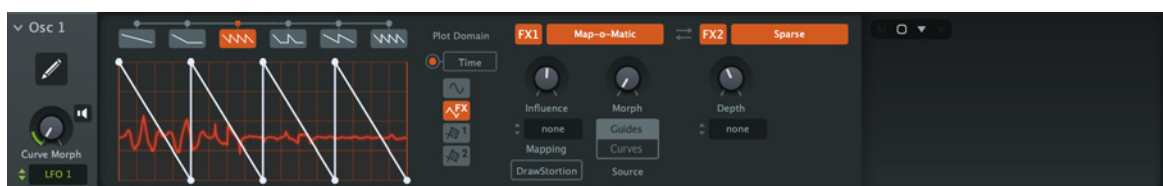
Clicking on an oscillator module in the grid or an **[Osc]** tab in the editor bar reveals the oscillator's **lower panel** with its [Easy Editor](#), [oscillator FX](#), and any relevant parts of the modulation matrix:



Clicking on the **pencil** icon at the top left of the lower panel not only reveals the [Main Editor](#)...



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



## Rack Panel

In the rack panel, oscillators appear in one of two forms, depending on the selected [RENDERER](#):



### Pitch Source

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

### 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](#).

### PreListen (loudspeaker icon)

For checking the sound of individual Curves while the oscillator's editor is open. When 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: PreListen is purely a helper option for sound design—its status is not saved with the preset.

## Source

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

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

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

Tip: Be careful with the midrange! A simple triangle or sine curve can produce very loud results if it is describing the spectrum.

There's a short guide to additive synthesis in the [Tips & Tricks](#).

## Render

How the final waveform is rendered, either in the form of a classic wavetable, or additive with up to 1024 sine oscillators. The set of controls in the Additive sub-panel will change dynamically according to the selected Modifier.

*Wave Render* ..... Renders the waveform like a classic wavetable synthesizer, updating at the rate set by the [Resolution](#) parameter.

*Additive Render* ..... Reproduces the spectrum of the waveform using a number of partials (sine waves) determined by the [Harmonics](#) parameter. As these are free running and independently tunable, they can easily create inharmonic sounds.

Note 1: The phases of the harmonics will gradually drift apart over time. This is intentional — numerical precision is traded for faster computation.

Note 2: Oscillator effects that rely on altering the phase of harmonics (such as *Dissociate*) often have little effect in Additive mode. However, their effect can become noticeable when processed further by e.g. *Wrap & Zap*.

Setting Additive rendering opens a sub-panel, whose parameters change dynamically according to the chosen Spectral Modifier...

## Phase

*Random* ..... When the Renderer (see above) is set to *Wavetable*, the oscillator phase is reset to a random value each time a note is played. If the Renderer is set to *Additive*, the phase of each harmonic is randomized independently.

*Reset* ..... Ensures that each note starts at the same phase. If the Renderer is set to *Additive*, the phases of individual harmonics remain unaltered.

## Unison

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

## Resolution

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

## Maths

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

*Precise* .....the cleanest but most CPU-intensive option

*Fast*.....a good compromise, usually sounds identical to *Precise*

*Eco*.....minimum CPU usage at the expense of some precision

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

## Tune

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

## Detune

The function of this knob depends on the **Unison** setting: With Unison at 1 it fine tunes +/- 50 cent, while for all other values it spreads the tuning of the unison 'voices'. Of course you can always fine tune the overall pitch via Shift+Tune, whatever the Unison setting.

## Width

Stereo width if **Unison** is greater than 1, otherwise unused.

## Pan (panorama)

Shifts the stereo image to the left or right.

## Volume

Oscillator output level.

## Phase Offset (hidden parameter)

Bipolar phase shift, -180° to +180°. Only works if the RENDERER is switched to **Wavetable**.

Modulate in the matrix using e.g. a Math module or full-wave rectified Alt as source!

## Spectral Modifier

If the Renderer is Additive, Unison is replaced by **Harmonics**, Detune is replaced by **Spectral Dist**, and Width is replaced by **Noise**. The following options will also appear below the basic panel:

*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 keeping the relative tuning. Tip: Unwanted beating effects created by Spectral Distortion can often be remedied by adjusting **Noise**.

*Log Clusters* ..... Similar to Harmonic Clusters, but instead of clusters being spaced evenly across the spectrum, they are distributed to ensure 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 in the spectrum.

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

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

*Ordered*: The frequency of each harmonic is juggled 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 repeats.

## Harmonics

The number of sine waves used for the **Additive** render, from minimum 16 to maximum 1024. As the Harmonics parameter affects CPU usage, the default 256 is the recommended maximum unless you can hear a significant improvement at higher values. Very low values are useful for glassy sounds, while higher values are closer to the sound of the *Wavetable [Renderer](#)*.

## Spectral Distortion

If the Renderer is Additive, the strength of [spectral modification](#).

## Noise

Adds random fluctuations to the amplitudes of all partials.

## Easy Editor

Whenever an oscillator is selected, the lower panel shows a small graphic editor, the two oscillator effects FX1 / FX2, and any relevant bits of the [modulation matrix](#) to the right.



### Expand (pencil icon)



Opens / closes the [Main Editor](#) for the oscillator.

### PreListen (loudspeaker icon)

In the oscillator editors, PreListen is especially useful for checking the effects of [Morph editing](#). When 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: PreListen is purely a helper option for sound design—its status is not saved with the preset.

### Curve Morph

Position within the oscillator's timeline...

## Timeline

Representation of the Curve Set containing 2 to 16 moveable thumbnails. Click to select a Curve for editing. Double-clicking a thumbnail sets the [Curve Morph](#) parameter to that position.

To reposition a Curve within the Timeline, click and drag on (or close to) its anchor (the green dot). To reposition the already highlighted curve, click and drag anywhere within the timeline. To remove a curve, select it and hit Backspace or right-click and select *Delete Curve*.

### Timeline Context Menu

Add Empty Curve

Add Morphed Curve

Duplicate Selected

Paste From Clipboard

---

Distribute Evenly

Reverse Order

Right-clicking on the Timeline i.e. the dotted line along the top opens this menu:

*Add Empty Curve* ..... inserts a falling sawtooth at the clicked position  
*Add Morphed Curve* ..... inserts an interpolated Curve ("frozen morph")  
*Duplicate Selected* ..... inserts a copy of the currently highlighted Curve  
*Paste From Clipboard* ..... inserts whatever has been copied via Copy / CopySVG (see below)  
*Distribute Evenly* ..... all Curves on the timeline are equally spaced between 0 and 100  
*Reverse Order* ..... reverses the positions of all Curves (100 minus original position)

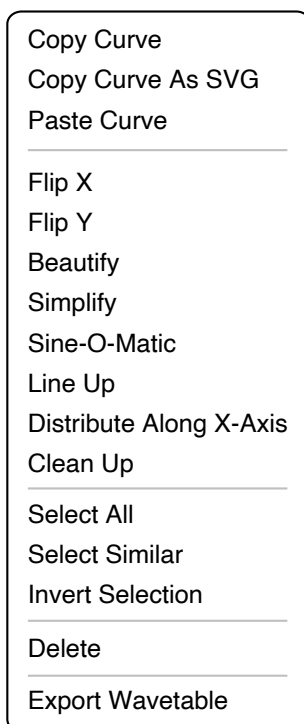


## Graphic Editing

Add points .....double-click in the background or option+click (Mac) / ctrl+click (Win)  
 Merge points .....drag one point on top of another and 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)

## Oscillator Context Menu

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



Copy / Paste (various) .....Clipboard: Copy Curve has a high resolution and uses our 'UHM' scripting format. 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.

<i>Flip X / Flip Y</i> .....	Inverts the Curve or selection horizontally (X) or vertically (Y).
<i>Beautify</i> .....	Smooths the Curve or selection (Note: <i>Beautify</i> doesn't affect steps).
<i>Simplify</i> .....	Removes any points that have little or no impact on the shape of the Curve or selection, altering curvatures wherever necessary.
<i>Sine-O-Matic</i> .....	Similar to <i>Beautify</i> , but approximates sine arcs. Can transform a triangle wave into an almost perfect sine.
<i>Line Up</i> .....	Vertically realigns selected points so that they form a straight line between the first and last points. Try the keyboard shortcut 'L'.
<i>Distribute On X-Axis</i> .....	Evenly distributes all points in the Curve or selection horizontally.
<i>Clean Up</i> .....	Removes points that have little or no impact on the shape.
<i>Select All</i> .....	Selects the entire Curve.
<i>Select Similar</i> .....	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.
<i>Invert Selection</i> .....	Selects all unselected points instead. This function will only appear in the menu if at least one point is already selected.
<i>Export Wavetable</i> .....	Saves the entire Curve Set, including all morphed intermediates, as a 101-frame wavetable file in .WAV format. See <a href="#">Transferring Curves</a> .





## Plot Domain

The plot line can represent either the realtime waveform like on an oscilloscope (*Time*), or the amplitudes of frequencies across the audio spectrum like a spectrum analyzer (*Frequency*).

Attached to the selector is a round button: Switch this off to save a good deal of CPU and simplify the view ('Plot disabled' will appear in the bottom left of the editor).

## 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

This section is so powerful that it deserves a separate chapter. For a demonstration of just how dramatically these can affect an oscillator's sound, check out the Zebra 3 factory library.



## 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 the 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](#). 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 increase CPU usage considerably, as these Curves are also calculated at the audio rate set by the [Resolution](#) parameter).

## Mute FX1 | FX2

Click on the FX1 or FX2 label to mute / unmute the 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 also swapped.

## Source

Several of the FX—*Curve Filter*, *Formant*, *Map-o-Matic*, *Dual Wave*, *Window*, and *Spectral Decay*—use curves sourced from the [Guides](#) or from [Curves along the timeline](#). The **Morph** knob crossfades between the 3 *Guides*, or morphs between Curves along the timeline if the Source is set to *Curves*.

See the section on [Guides](#) for a detailed explanation of their other, more typical uses.

## FX1 | FX2 selectors

The two large selectors offer the following:

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

## Spectral Effects

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

### 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. The **Frequency** knob shifts that curve for the full range of about 20 Hz to 20 kHz. The Curve Filter effect 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 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

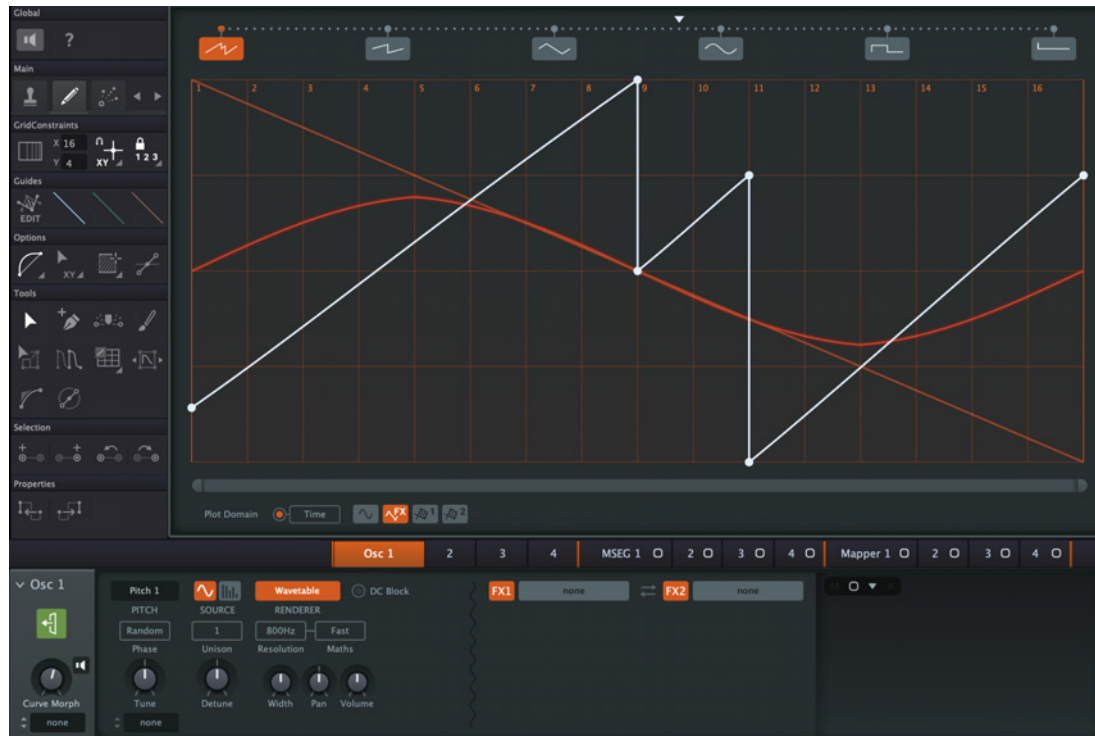
Random overtones. The Trigger Source 'pings' an overtone each time it leaves zero in the positive direction. Tip: Try an LFO first, then an MSEG with several points set to zero. The Depth knob controls how slowly the overtones decay: Low values generate short clicks.

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 and click on the large pencil icon in the lower panel. Note: This editor is also used for 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...

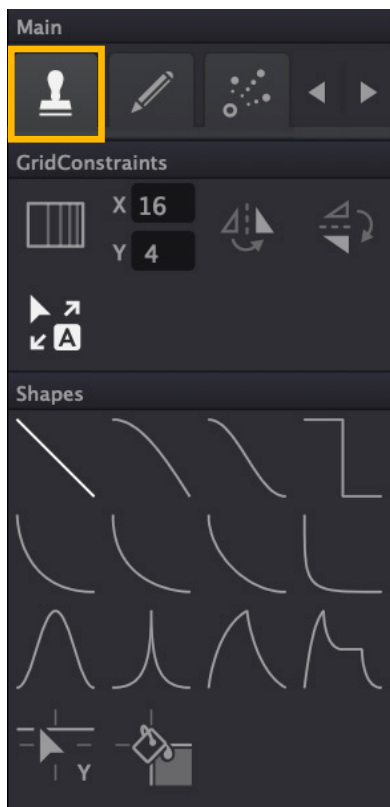
## Graphic Editing

- Add points .....double-click in the background or option+click (Mac) / ctrl+click (Win)
- Merge points .....drag one point on top of another and 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)

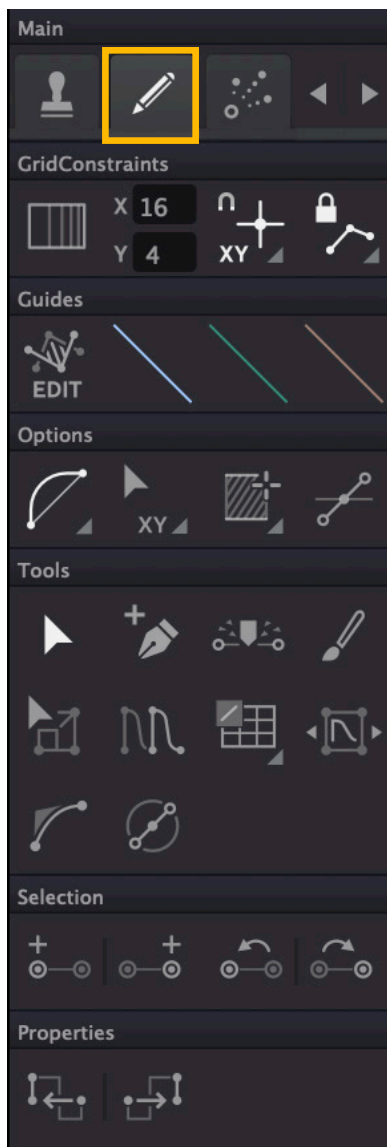
## Toolboxes

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:

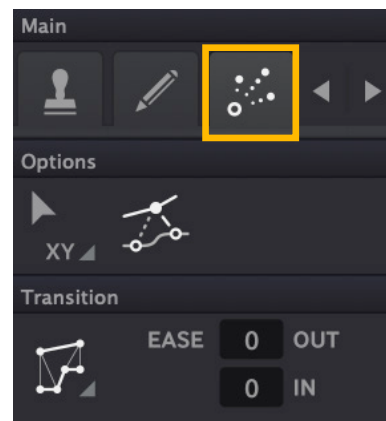
### Shape Tools



### 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 (yellow here) is an alternative to right-clicking the tool: Either action opens a small context menu containing 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. 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



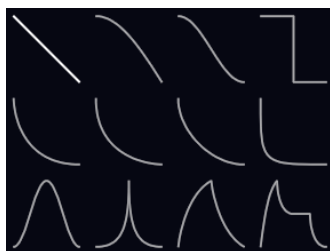
Vertically flip all shapes in the toolbox (see *12 Shapes* below).

### 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 Constraint



*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 *L* 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 circumstances the new point can become independent. Just try it!

## Morph Control Toolbox



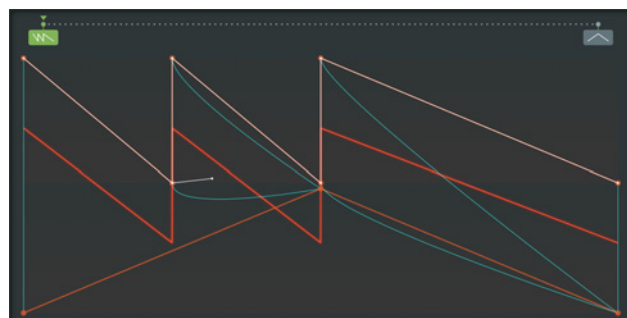
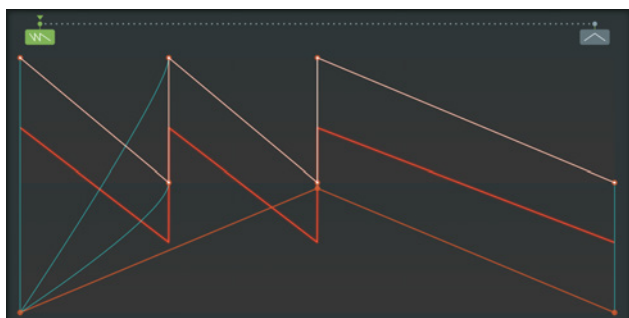
Opens a small set of tools used to specify how each Curve morphs to the next. The selected Curve appears above the one to its right in the timeline, with blue **transition paths** showing how points morph between the two Curves. To check the morph manually, activate [PreListen](#) then click anywhere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

### Morph Vectors



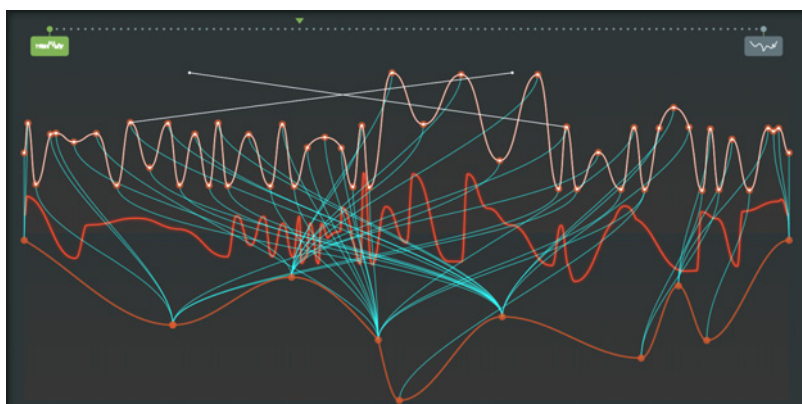
Note: This only works with the two *Closest* [morph types](#). Clicking and dragging any point (except the first or last one) makes that point 'pretend' to be elsewhere as far as the morph calculation is concerned. To remove a morph vector again, simply click on its handle.

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. Mysteiously, 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. There are only two morph vectors at work here—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

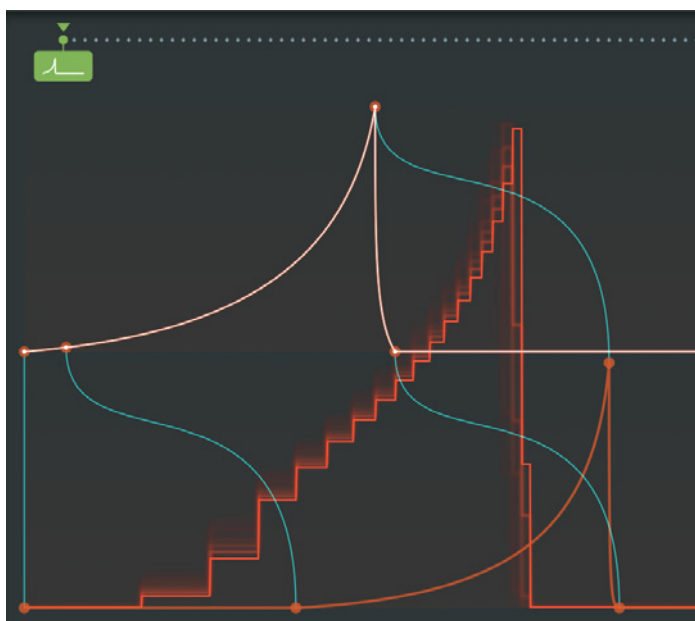
Note how the various values (0 to 100) affect the curvature of the connecting lines...

### Demonstration

Load the preset 'Ploppsies', 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.



pink	= source curve
orange	= target curve
red	= frequency plot
blue-green	= transition path

## 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.

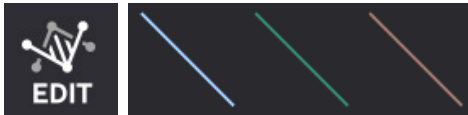
The import routine detects pitch then slices the sample into individual cycles, noting which ones represent the most significant differences. This is repeated whenever you click on **[UPDATE]**.

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 [Oscillator 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

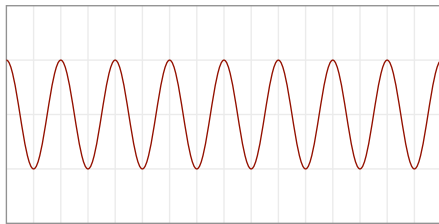
\* Points are created / deleted wherever necessary.

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.

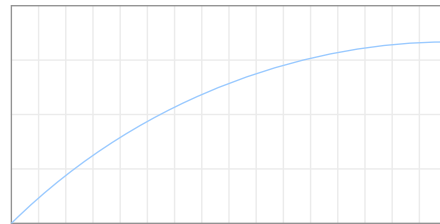


## Guide Function Examples

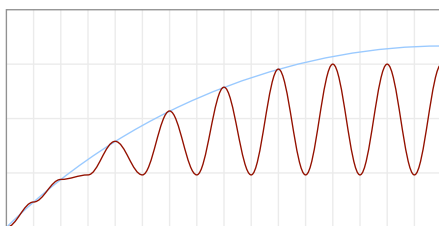
Activate EDIT in the Guides section of the toolbox:



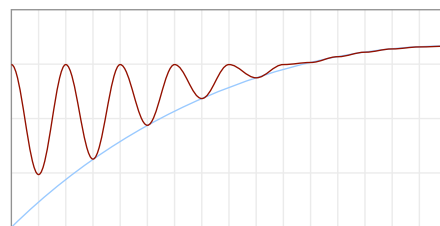
*Curve*



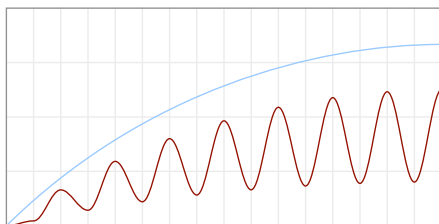
*Guide*



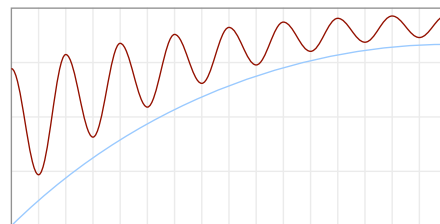
*Move Points Down To Guide*



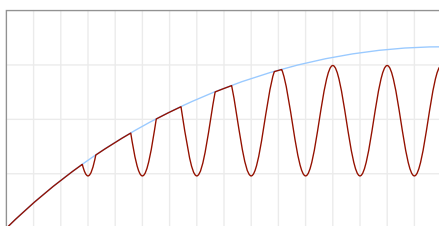
*Move Points Up To Guide*



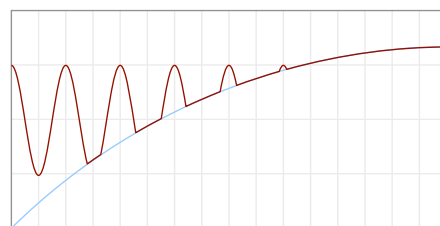
*Scale Curve Below Guide*



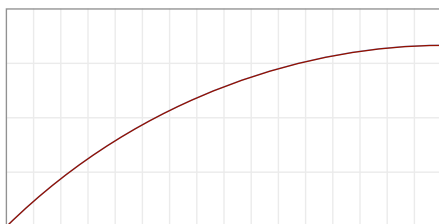
*Scale Curve Above Guide*



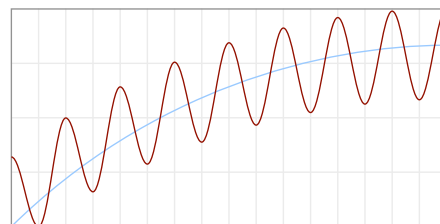
*Cut Away Curve Above Guide*



*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** (a pure sine), as well as various FM modes and feedback options.



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

## 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.

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 the blue arrow or the dark arrow between the Input and FM controls.

## Stereo

Unlike e.g. OSC modules, the FMO is mono by default. If Stereo is active you can use Detune and Width for spatial effects. The phase always starts at zero i.e. there is no Random option here.

## Carrier

Carrier level, the FMO's main output 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

Traditionally called the '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

Click the orange arrows to step through routing options, then adjust the depth 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 the '+' 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.

## 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

## Width

Stereo spread (see Stereo above).

## Pan

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

## 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. As well as offering 8 different kinds of noise, It also has built-in tone controls—the LP and HP knobs:



## Pan | Volume










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

## 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
<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

## LP | HP

The **LP** knob controls lowpass filter cutoff except for the *Digital* Type, where it controls pitch.

For the *White, Pink, Grey and Green* types, **HP** controls high pass cutoff. For the other Types it is effectively a **density** control—see Type above for a few more details.

## Width

Stereo spread.

## Duration | Rate

Disabled when 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 actually quite intuitive—so rather than learning unnecessary technical details, simply play with them both!

## Jitter

Irregularity of repeated noise pulses. Does not affect the Single shapes. Disabled when the Shape is set to Constant.

# Exciter

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



## Volume

Output level.

## Number

Multiple impulses, from 1 to 100.

## Distance

The distance between multiple impulses.

## 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.

## Stiffness

Continuous control from "felt mallet" (thump) to "hard stick" (click) and beyond.

## Stereo

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

ALT .....Multiple impulses are alternately (ALT) panned hard left / 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

## Trigger

The Exciter can be triggered via LFOs, MSEGs, keyboard performance controls (wheels or pressure)... or even note Release.

## Noise, Colour

Adds Noise, effectively softening the clicks. The Colour parameter adjusts the noise tone.

# 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.

Note that the filters are also available as global effects.



See the next few pages for details about each model. First, the controls...

## Filter Parameters

### D-Pad

The four arrows surrounding the graphic on the left can be used for navigating between the various models (up and down arrows) and available slopes (left and right arrows). For an overview of all available options in the **filter palette**, click on the central graphic.

### Cutoff

The filter's 'edge-frequency'. The scale is in 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 KeyF parameter...

### Key F

Short for "Key Follow", but actually how strongly the selected **Pitch Source** affects Cutoff.

### Drive

The Drive parameter or input gain of a filter usually adds some kind of distortion. In Zebra's VCF this is a more generic 'flavour' parameter – see the remarks in the table on the previous page.

### 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.

	LP				BP				HP			
	6	12	18	24	12/6	12	6/12	24	6	12	18	24
Linear	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Vanilla	12	<input type="radio"/>	24	<input checked="" type="radio"/>	6	<input type="radio"/>	12	<input type="radio"/>	12	<input type="radio"/>	24	<input type="radio"/>
SVF	12		<input type="radio"/>		6		<input type="radio"/>		12		<input type="radio"/>	
Ladder	12	<input type="radio"/>	24	<input type="radio"/>	6	<input type="radio"/>	12	<input type="radio"/>	12	<input type="radio"/>	24	<input type="radio"/>
Cascade	12	<input type="radio"/>	24	<input type="radio"/>	6	<input type="radio"/>	12	<input type="radio"/>	12	<input type="radio"/>	24	<input type="radio"/>
Impossible C			24	<input type="radio"/>			12	<input type="radio"/>			24	<input type="radio"/>
Expanse	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Excite	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mid Drive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Old Drive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Yellow	12		<input type="radio"/>		6		<input type="radio"/>		12		<input type="radio"/>	
Allpass			4P	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Phaser			4P	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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

Note: You can also scroll through filter types with a regular mouse wheel, 2D mouse wheel or touchpad-equivalent.

## 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 *</i> .....	Analogue models of OTA cascade circuitry that cannot exist as 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. Tip: Turn up Resonance to use as a peak filter
<i>Phaser</i> .....	4-pole to 12-pole phaser

## 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. It is literally impossible, hence the name.

The behaviour of this model 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 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 hear is therefore a digital model of an analogue filter that can never truly exist.

# EQ

6-band stereo parametric equalizer or resonator. Also available as global effect.



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 on the background for basic editing options: *Copy*, *Paste*, or *Clear* (reset to default settings) as well as *Mode* selection...

## Mode (unlabelled)

*Equalizer* .....bands are arranged in series for traditional EQ operation

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

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

Mode selection is also available in the context menu of the graphic editing area.

## Pitch Source

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

## Track

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

## Band

Steps through bands 1-6. You can also select a band directly by clicking on its numbered handle. Remember: the block of controls to the right only apply to the selected band.

## Freq

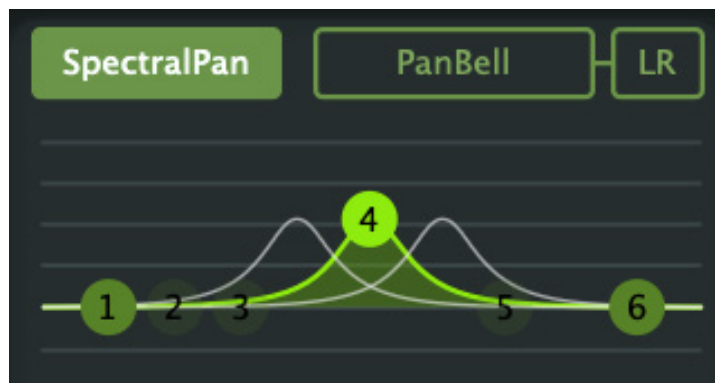
Band cutoff frequency. Alternatively, click on a handle and drag horizontally.

## 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.

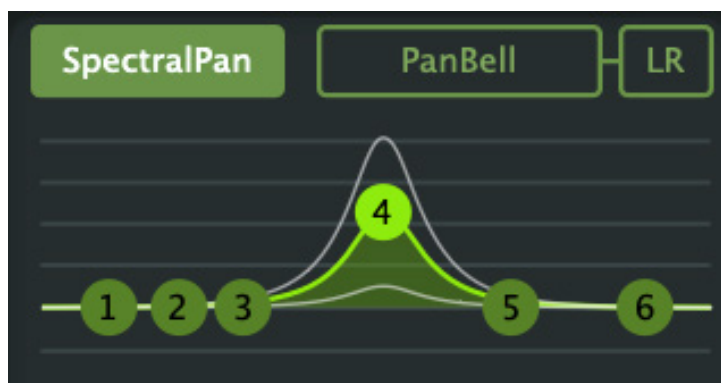


## Width

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.

## 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

## Keyboard 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

Only available if the MODE is set to *complex 4* or *Complex 8*. **Structure** distributes the resonant frequencies to multiples of the fundamental. **Tilt** adjusts the relative volumes of combs according to frequency: Negative Tilt values favour the higher combs, positive values favour the lower ones.

## 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.

## Feedback

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

## Distort

Adds distortion in the feedback path.

## 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.

## Dry

Unprocessed "throughput" from whatever is fed into the Comb

## Width

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

## Pan

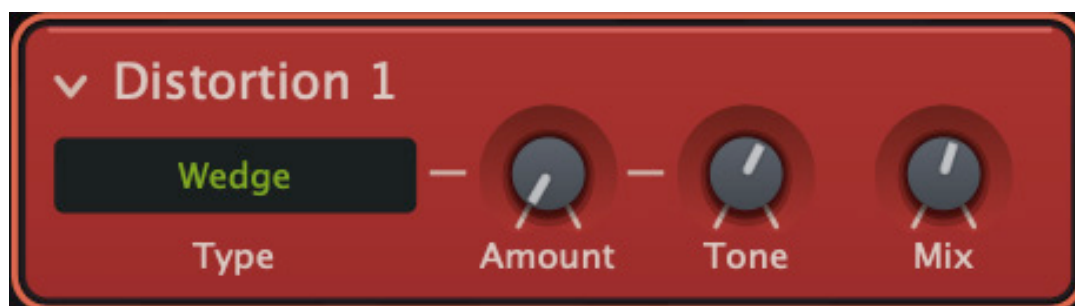
Shifts the overall stereo position of the processed signal towards the left or right channel.

## Volume

Comb output level.

# Distortion

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



Like any other module in the generators rack, this unit is *per voice*. If you want 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 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. Simulating such complex interactions in real time is computationally demanding—so beware!

By adjusting such parameters as the strike position, absorption and overtone 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 synthesis / sound design.

Note: We have avoided using the word 'modes' here, preferring to call them '**partials**' to minimize possible confusion with various other 'modes' in Zebra 3.



## TUNING

### Pitch Source

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

### Stereo

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.

### Tune

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

## 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 partials and therefore the overall timbre. A value of 0.00 represents the center while 100% is an extreme edge.

## DECAY

### Decay

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

### Key Track

Decay time can be modulated by the incoming MIDI note: Turn Key Track down to make low notes longer and high notes shorter, or turn it up for the opposite effect (which is much less natural).

## PARTIALS

### Blend A/B

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

### Disperse

Spreads (positive values) or compresses (negative values) the frequencies of all partials.

### Absorb

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

### Normalize

Controls the balance between low and high partials.

## OUT

### Volume

Adjusts the output level of the processed signal.

### Dry

Sets the output level of the unprocessed signal (direct from the Modal Resonator's input).

### Suppress Dry

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

## Sub-Panel



Click on the '+' to open the sub-panel containing extra parameters...

## Blend Mode

One of three types

*Crossfade* .....Partials are simply mixed. This option can result in a highly complex static tones, as there are likely to be more partials than in the other modes...

*Interpolate* .....Partials are matched between profiles A and B (see below) such that their frequencies and amplitudes blend as smoothly as possible. Note: Partial not assigned a unique "nearest neighbour" will follow the closest ones that are.

*Morph* .....The spectrum is morphed using the algorithm described in the following article: *"Real-time morphing of impact sounds"* by Sadjad Siddiq (Audio Engineering Society Convention 139 in 2015).

## Modal 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 significant, positive difference.

## Profile A / B

Select one or two modal profiles here.

## Atomize

Separates partials in time, which is controlled by the knob. The modes are:

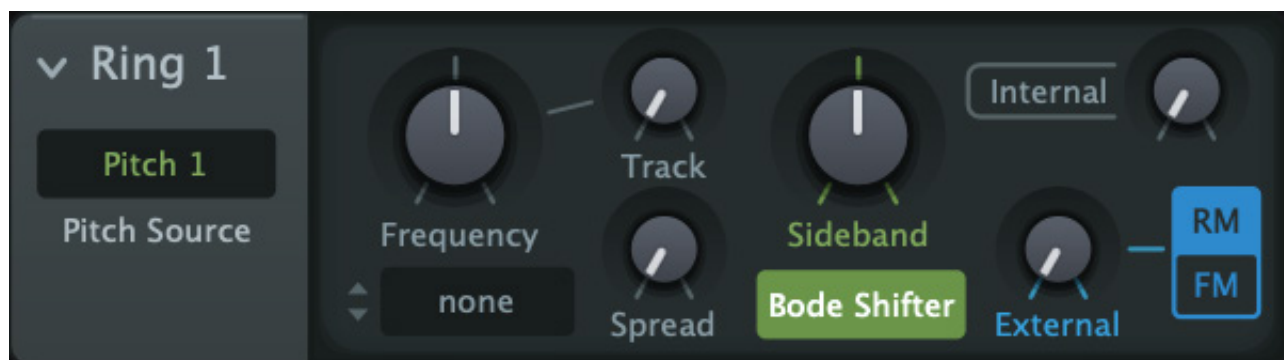
*Sweep* .....Partials are played in descending (negative) or ascending (positive) order.

*Scatter* .....Partials are played in random order. Set negative values for stereo!

# Ring Modulator

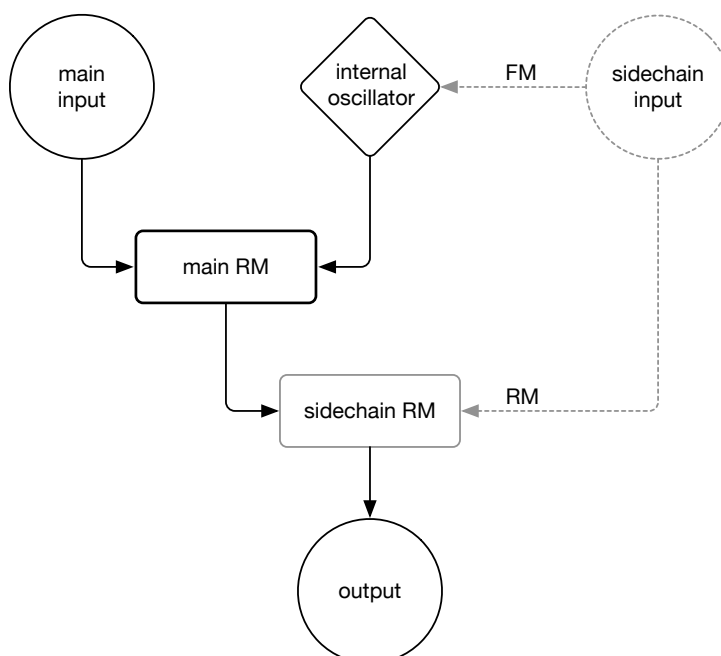
Ring modulation (RM) is a kind of amplitude modulation (AM) where two signals are multiplied together. The input frequencies are suppressed while new frequencies—the sum and difference—are generated. The result is a complex, often inharmonic spectrum, making ring modulation well suited for bells or any kind of metallic or 'robotic' 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 thereof, and even a Bode Frequency Shifter mode.



There are two stereo ring modulators at work here. The primary one multiplies the main input with an 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.

## Spread

Detunes the internal sine: left channel down, right channel up.

## Mode (unlabelled switch)

*Bode Shifter* .....frequency shifter

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

You can use **Bode Shifter** mode to create a polyphonic, stereo phasing effect. Frequency = 0, Sideband = 100, Internal = 50, Spread = 1 or 2.

## 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.

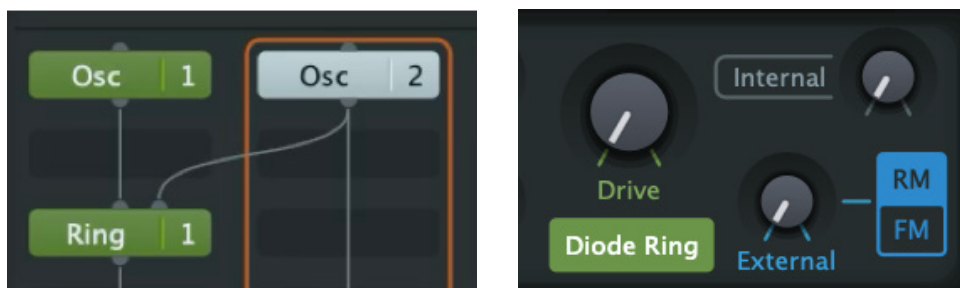
## RM | FM

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

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

## Example

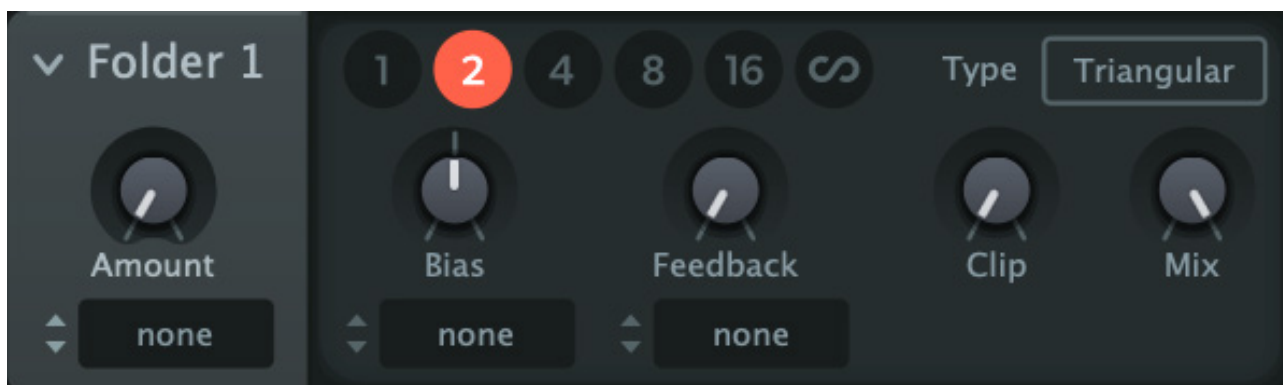
To set up a traditional RM effect, feed the Ring Modulator two different signals, flip the switch to [RM], turn External up to maximum and Internal to minimum:



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

# Folder

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 Folder module often sounds best when applied to signals with little high frequency content, such as a pure sine or triangle.



## Amount

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

## Ripples

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

## Type

Ripple shape: triangular or sinusoidal.

## 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 Folder output signal back into its own input for even more complexity.

## Center Clip

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.

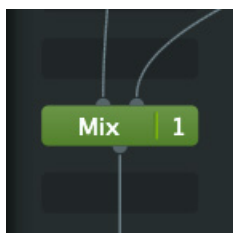
# Mixer

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

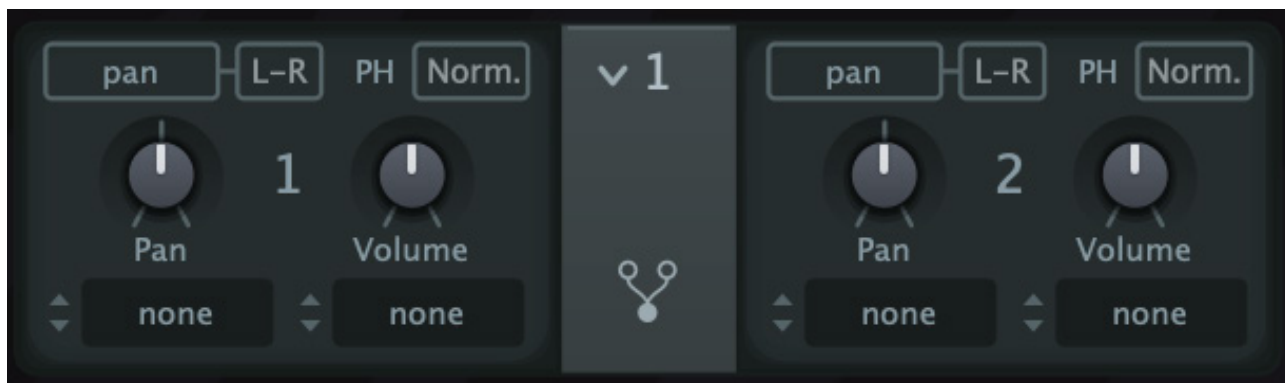
Zebra 3 has three different types of mixer module: **Mix** (aka 2in1), **4in1** and **4in4**...

## 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*.



### Pan Mode (unlabelled)

Toggles between *pan* and *balance*. The difference? **Balancing** to the left involves fading out the righthand channel of your stereo signal, while **panning** to the left means moving it over to the left.

### L-R | R-L (unlabelled)

The R-L option swaps the left and right channels.

### Polarity (Ø)

Inverts the phase of the signal. The *Invert = On* option can create interesting effects by effectively subtracting one waveform from another.

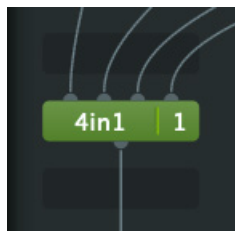
### Pan, Volume

Pan position and output level.



## 4in1

This mixer 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 4 input signals are simply mixed together via the four Volume knobs. There is no pan control.



### Scan Mode

#### Scan

The dial sets the nominal mix of signals (i.e. before modulation).



#### Width

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

#### Blend Law

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

*Linear*.....the lanes are cross-faded linearly

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

## Vector Mode

A, B, C, D and E define 5 different **mixes** of the 4 input signals: The closer the handle is to a corner, the more dominant 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 below the square.



### Trigger

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

### Sync

Basic rate of motion, with the same options as the [LFOs](#). Scaled by the 4 knobs...

### AB, BC, CD, DE

Multiplies the Sync time for each transition, from 0.00% to 500.00%. Double-click for 100%.

### Loop Mode

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

Selects a range of transitions to be repeated. For example, “CDE” means that the transitions from C to D to E will be repeated.

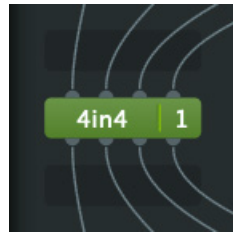
Note that the motion always starts with A, and all loops include E. If fewer than 5 points are required you can put some of them very close together and set the transition time(s) to 0.

### Modulate X, Modulate Y

The output mix (indicated by the white ring) can also be modulated in real time: The two Modulate parameters shift the output mix along the x and y axes.

## 4in4

This mixer has four fixed inputs and four fixed outputs, one for each lane of the grid.



### Mode

*Pull*.....the dials scan through the **inputs**, the outputs are fixed

*Push*.....the inputs are fixed, the dials scan through the **outputs**

### Blend Law

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

*Linear*.....lanes are cross-faded linearly

*Switched*.....lanes are simply switched (Note: Width must be non-zero)

### Scan

The dials set the nominal mix of signals (i.e. before modulation).

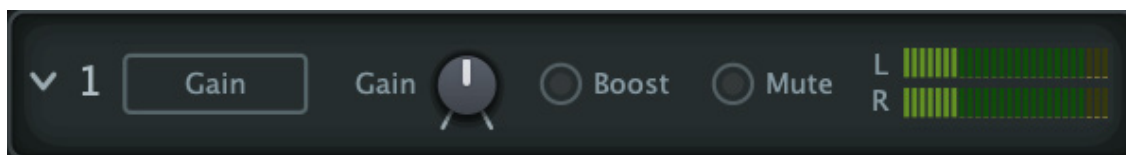
### Width

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

# Utility

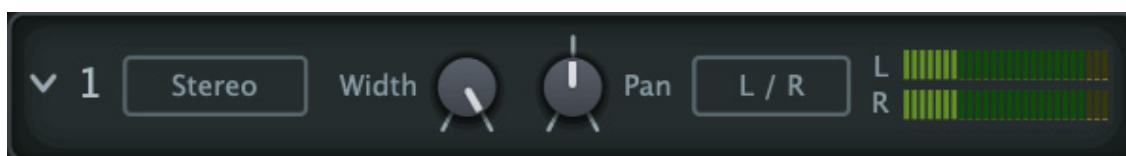
Signal conditioner with metering. The five different **modes** are switched via the selector on the left.

## Gain



A simple volume leveller. The range of the **Gain** knob is (normally) from silence to +6dB. The **Boost** switch adds 12dB unless Gain is set very low. **Mute** simply silences the input.

## Stereo



### Width, Pan

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

### Stereo Mode (unlabelled)

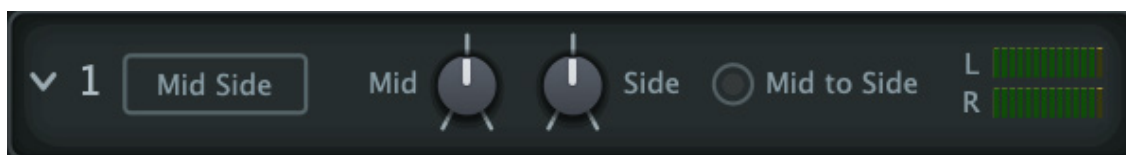
*L/R or R/L* .....Normal stereo image, or stereo image with the channels swapped

*LR > MS*.....Converts stereo to 'mid-side': Signal components common to both channels (i.e. what you hear in the center) are routed to the left channel, while components 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



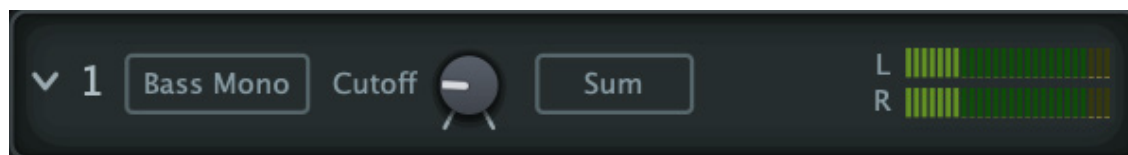
### Mid, Side (knobs)

**Mid** controls the level of any components of the signal that are identical in the left and right channels, while **Side** controls components that differ i.e. all the rest. Maximum boost is +6 dB.

### Mid to Side (button)

Exchanges Mid and Side, making it easy to create very wide sounds from a mono signal. Be aware that the result is no longer mono-compatible i.e. left and right channels will cancel each other out.

## Bass Mono



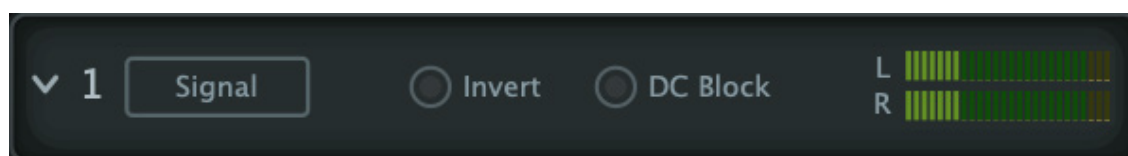
### Cutoff

A crossover filter isolates frequencies below the 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)

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



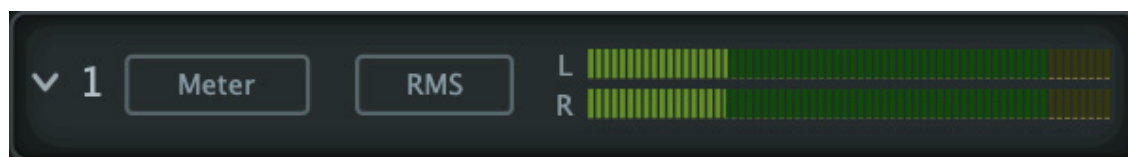
### Invert

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

### DC Block

Only available if the Renderer is set to *Wavetable*. Removes DC ('Direct Current'—static offset components of a signal) and any very low frequencies.

## Meter



### Mode (unlabelled)

**Peak** metering reacts more quickly and is good for monitoring transients to avoiding clipping, while **RMS** (Root Mean Squared) metering is usually better for judging the overall loudness.

# Modulators

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

## Concept

In any synthesizer, including Zebra 3, modulation means using a signal (the *source*) to vary a *target* parameter, either *automatically* or in response to *performance* gestures—playing notes harder, pushing wheels, twisting knobs etc..Zebra 3 has two types of modulation: **direct** or **indirect**.

### Direct Modulation — in the panel

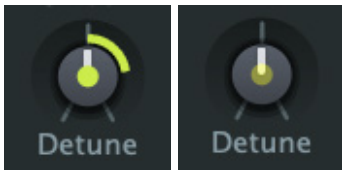


Several of the more important parameters include a **source selector** located beneath the knob's label. Modulation depth is adjusted using the double-triangle control to the left of the selector: This functions like a vertical slider and is also a valid modulation target. Modulation depth is indicated by a coloured arc, or by a coloured line in the case of envelope stages and other sliders.

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.



Most of the knobs and sliders can be modulated indirectly via the modulation matrix. This is displayed at the target in one of two ways: if the active source has focus, the control appears as shown on the left, with a coloured arc indicating modulation depth. If it does not have focus, the control will have a more subtle dot in the center, and no arc.

#### How to put a modulation source in focus so you can adjust the modulation depth

Either click on the appropriate [source pip](#), or right-click on the target and select it in this menu...



With a little practice you should find populating the modulation matrix via *Add Modulation* considerably faster than either [drag & drop](#) or working exclusively within the mod matrix panel.

A similar menu exists for the modulation sources: See [Source Context Menu](#) a few pages down.

## Hidden Parameters

Oscillator *Phase Offset*, Delay *Mod Rate* and Chorus/Flanger (Mod FX) *Noise Floor* have no controls but are still available as target options in the [modulation matrix](#).

Note: **Indirect modulation** is calculated more slowly than the less CPU-efficient [direct modulation](#).

## Drag & Drop Assignment

The Modulation matrix can be populated remotely via 'drag & drop'...

### Modulation Source Pips



Each [modulator panel](#), as well as the MSEG and Mapper tabs in the [editor bar](#), includes a **source pip** for creating assignments via drag and drop. The narrow bar at the bottom of the window also contains modulation sources, which work just like the pips.

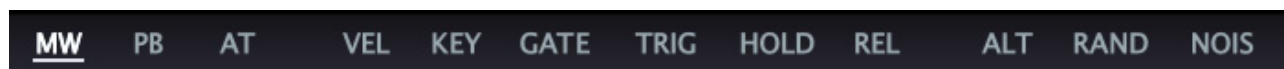


Grab that pip (or one of the sources at the bottom of the window), drag and drop it onto any valid modulation target, and the assignment will appear in the [modulation matrix](#). Note that you can also drag & drop a source onto onto any [direct modulation](#) source selector instead of clicking there.

### Modulation Source 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, they are in the [editor bar](#).

On the left side are several single sources



### MIDI Sources

**MW** .....modulation wheel

**PB** .....pitch bender

**AT** .....aftertouch a.k.a. pressure (channel or poly)

**VEL** .....note velocity

**KEY** .....pure key follow (without pitch bend or glide)

**GATE**.....maximum while a note is being played / sustained

**TRIG**.....trigger, a short impulse at the start of each note

**HOLD** .....hold pedal a.k.a. sustain pedal

**REL** .....maximum when a note is released / 'un-sustained'



## Internal Sources

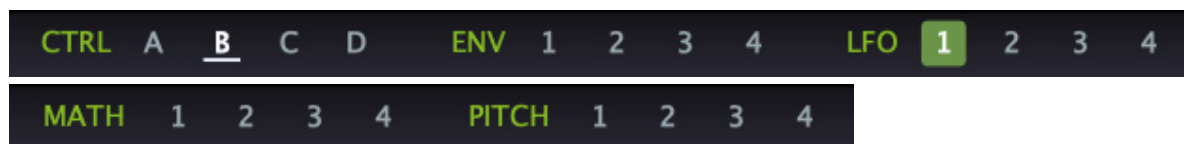
**ALT**.....alternating between -100 and +100 per note

**RAND**.....a random value anywhere between -100 and +100 per note

**NOIS** ..... 'mod noise', low frequency noise

## Multiple Sources

The [Control](#) knobs (ABCD), [envelopes](#), [LFOs](#), [Mod Math](#) and [Pitch](#) modules.



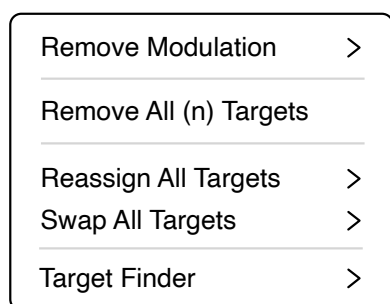
## Status Appearance

Modulation sources already used in the mod matrix but without the focus appear highlighted, like the modulation wheel and Control B in the above screenshots. As LFO 1 currently has the focus here (click on it!), the [1] appears coloured.

Note: Oscillator *Phase Offset* , an otherwise hidden parameter, can be accessed via **drag & drop** onto the oscillator's Phase selector.

## Source Context Menu

Similar to the context menu of the knobs and sliders, modulations sources ([pips](#), [editor bar](#), [modulation source bar](#)) also let you manipulate the content of the matrix remotely via right-click:



*Pip / mod source context menu*



*Target Finder = Tentacles*

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

**Remove All (n) Targets** .....Remove all assigned targets

**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** .....Appearance of the visual aid to find targets assigned to this source:

<i>Highlights</i>	Assigned targets are shown with a brighter border
<i>Lasers</i>	Straight lines connect source and target(s)
<i>Tentacles</i>	Curved lines connect source and target(s)

## Envelope

A traditional ADSR with extras: A one-shot option, retriggering via modulation sources, and two intriguing variation knobs [V1] and [V2]...



### A D S R

**Attack, Decay, Sustain and Release:** Attack is the time it takes for the envelope to rise from zero (or the 'Init' value) to maximum. Decay is the time it takes to drop from maximum to the Sustain level, where it will normally 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.

To reduce clicks a little the minimum Attack isn't absolute zero—but see **V1/Init** on the next page.

### Velocity

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

### Trigger

**Gate** .....Classic ADSR: If a note is released during the Attack or Decay stages, the envelope will immediately jump to the Release stage, starting from the current level.

**One Shot** .....The envelope completes all stages, ignoring how long the note is held (i.e. it is *triggered*, not gated). Although the Sustain appears to be held for a short while, this is actually the Decay smoothly approaching the Sustain level before releasing. Note that increasing Sustain in this mode shortens the Decay.

### Source

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

## V1: unipolar variations

*Delay* .....extends the time before the Attack starts

*Hold* .....extends the time at maximum between Attack and Decay

*Init* .....raises the level at which Attack starts \*

*Stack* .....fast playing (Attacks below 5.00) adds to the level if [Reallocate](#) is on

*Overshoot* .....adds a bump between Attack and Decay

\* whenever you need **the fastest possible attack**, set V1 to *Init* and turn it up to maximum.

## V2: bipolar variations

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

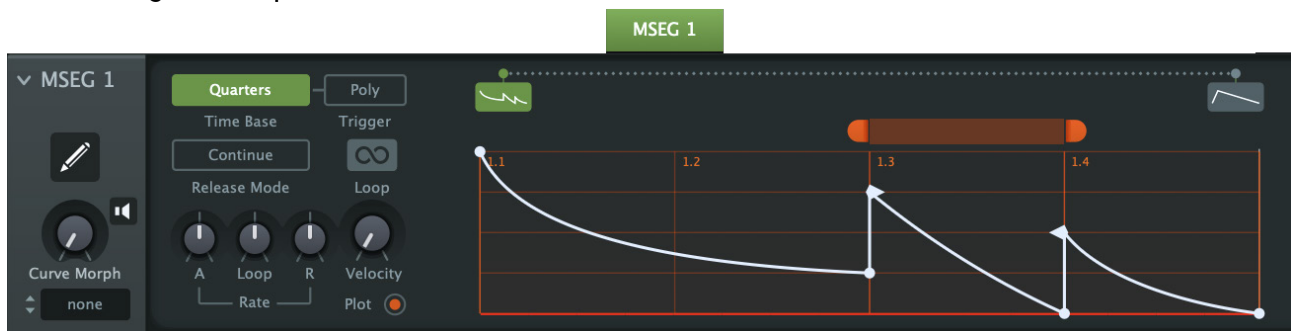
*Key Scale* .....scales attack, decay and release according to the MIDI note. At minimum or maximum the envelope times are halved / doubled for each octave

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

*Stretch* .....scales all envelope times—turn up if maximum decay is still **too short**!

## MSEG

4 Multi-Stage Envelope Generators:



The MSEG consist of **up to 7 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 maximum 7 curves (oscillator: 16 Curves)

The MSEG curve includes a loop

The MSEG curve has a defined length

The MSEG has just one [Guide](#) (oscillator: 3 Guides)

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 for the oscillator](#) with a few extra functions necessary 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

Note: When a marker attaches to a point, that point will change from a dot to a rhombus.

## Expand (pencil icon)

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

## Curve Morph

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

The **PreListen** button to its right freezes the curve selected in the Timeline so you can check its effect without hearing any Curve Morph modulation. Note that PreListen status is not saved with the preset, so remember to disable it afterwards!

## Time Base

Selects the unit that will correspond to integer steps in the editor's time-line. The *Sixteenth*, *Quarters*, and *Notes* (4 quarters) are synchronized to the song tempo, while *Seconds* are not.

## Trigger

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

*Poly* .....standard polyphonic

*Single* .....only retriggers after all notes are released (like an organ 'percussion' register)

*Mono* .....standard monophonic

## Release Mode

On lifting a key...

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

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

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

## Loop (infinite loop)

Activating this button causes the MSEG to continue looping, even after the note is released. Release Rate (see below) is disabled. The infinite loop option itself is disabled if the MSEG is selected as amp envelope in the [Lane Mixer](#).

## A: Attack Rate

Scales the speed of the Attack phase i.e. the part of the MSEG before the loop: -1.00 is half speed, +1.00 is double speed, +2.00 is quadruple speed etc..

## Loop Rate

Scales the speed of the loop: -1.00 is half speed, +1.00 is double speed, +2.00 is quadruple etc..

## R: Release Rate

Scales the speed of. the part of the MSEG after the loop, or the loop itself if Release Mode is set to Continue (see below). Again, -1.00 is half speed, 1.00 is double, 2.00 is quadruple etc..

## Velocity

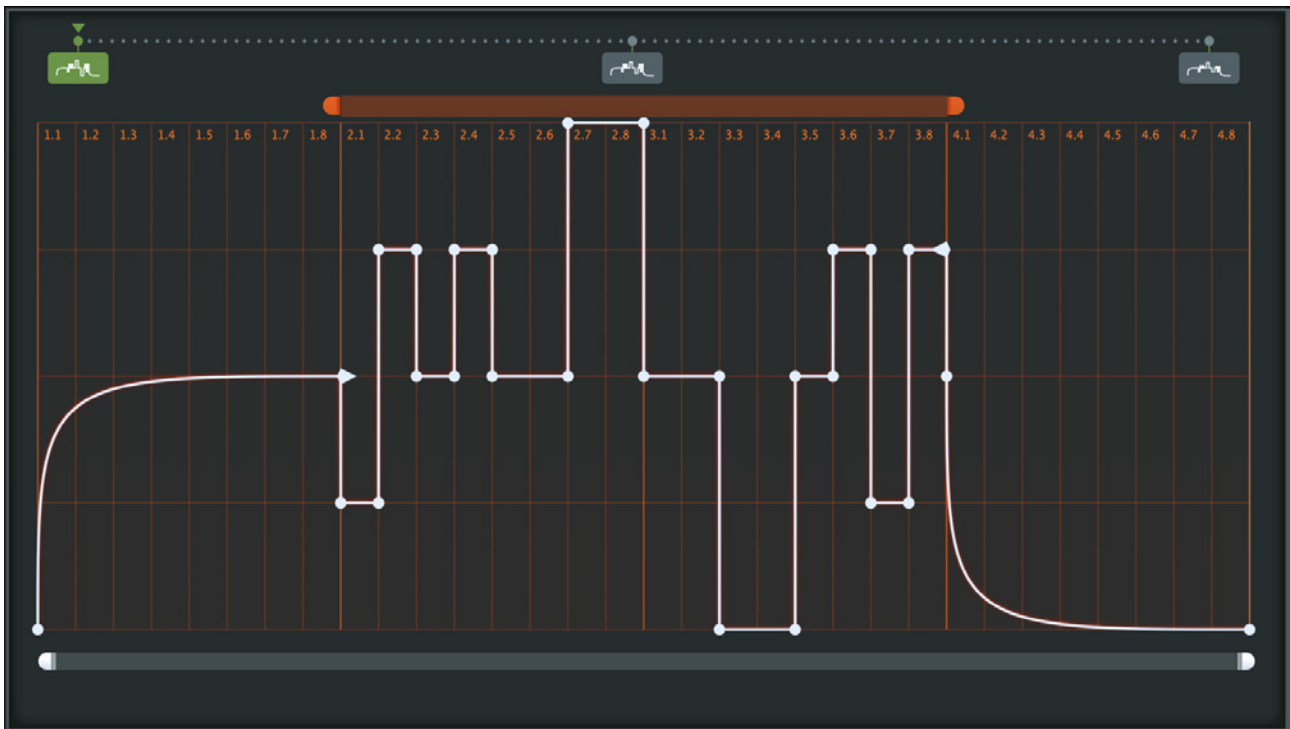
How strongly MIDI velocity influences the MSEG's output level. Higher Velocity values cause softly played notes to significantly reduce the modulation amount.

## Plot

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

## Main Editor

As it doesn't have to share a panel with oscillator effects, the **MSEG Main Editor** window is wider than its oscillator-mangling counterpart. Open an MSEG in the lower panel, then click on the **pencil**:



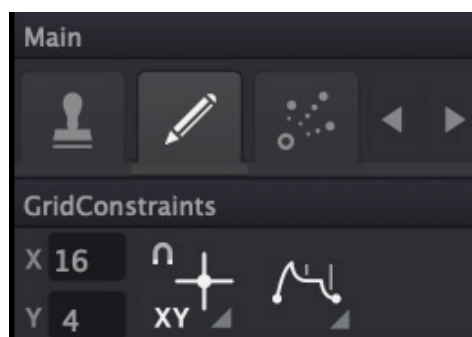
## Zoom Bar

The bar below 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 dragging it or rolling your mouse wheel. Double-click to toggle between the full view and the more restricted view.

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

## Toolbox

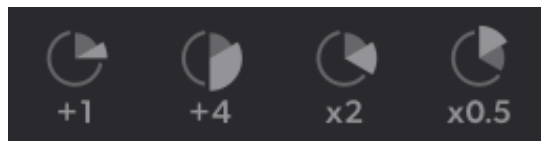
The MSEG toolbox looks very similar to the [oscillator toolbox](#), with only a few differences. Click on the Pencil icon to view the Drawing Tools...



*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:



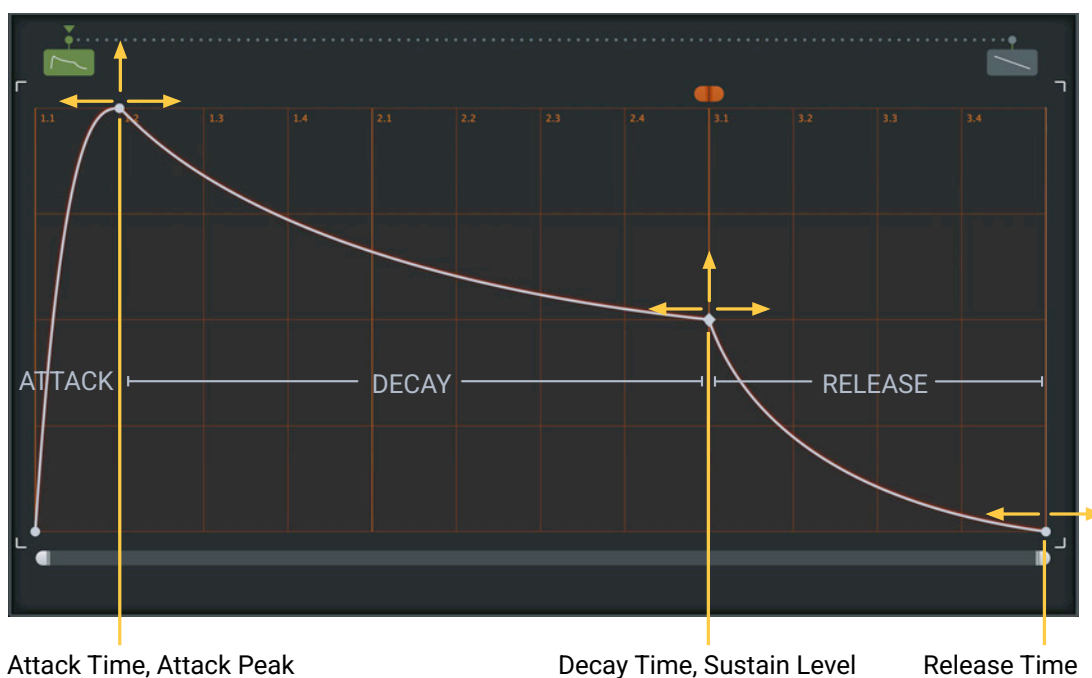
- + 1 .....adds 1 unit to the length of the window
- + 4 .....adds 4 units to the length of the window
- × 2 .....doubles MSEG length, stretching the curve accordingly
- × 0.5 .....halves MSEG length

Note: You might have to reposition the [loop](#) markers afterwards!

## Envelope Mode

Although possibly useful in the oscillator editor, *Env Mode* really 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, then switch [Shape Constraint](#) to *Env Mode*.



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

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

Of course 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

*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 **UNI** button sets the output of the LFO to "unipolar" i.e. positive values only.

### Trigger

*Free*.....free-running, per voice. Similar to *Random* unless [Reallocate](#) is activated.  
*Sync*.....LFOs are synchronized across all voices, as well as to the host tempo if the Timebase 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.

### Timebase

0.1s, 1s, 10s, 1/64 – 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.

### Amplitude

LFO output level.

### Rate

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



## Slew

Smoothness. Unlike a regular slew limiter or the SL modifier in the matrix, this parameter affects individual cycles—the LFO retains its shape, whatever the 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.

## 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 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.

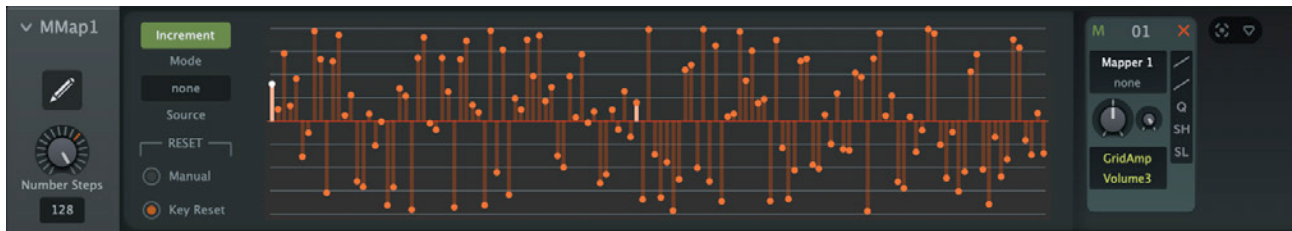
## Delay Time

The selector 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

# Mapper

The Mappers are lists of up to 128 user-defined values each. 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 notes.



## 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.

## Source

Ignored in **Key** mode. In **Map Smooth** or **Map Quantize** mode this parameter selects the modulation source used to 'scan' through the map. In **Increment** mode, each positive transition from zero (e.g. via Pressure, LFO or MSEG) will step through the map.

## Reset

Only available in **Increment** mode.

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*).

## Editing

If the **Draw** mode is set to *Freehand* in the 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>Zero</i> .....	Sets all values in the map to zero
<i>Subdivisions</i> .....	The number of snap-lines (2 to max. 12) above as well as below zero
<i>Soft Snap</i> .....	while drawing, values will <b>tend</b> to snap to the lines
<i>Hard Snap</i> .....	while drawing, values will snap to the lines
<i>Step Count</i> .....	The number of values in the map (2-16, then 24, 32, 48, 64, 96 or 128)

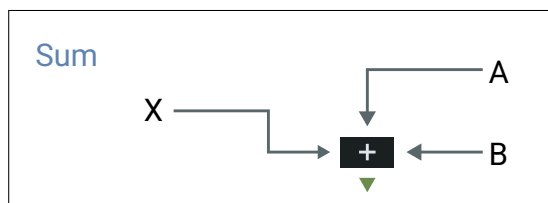
## Mapper Key Commands

While the map has [Key Control](#) focus:

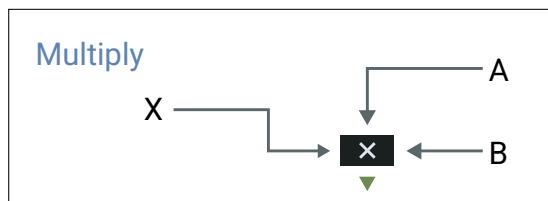
?	Randomize values
i	Invert values
r	Reverse
backspace	Delete values
alt/cmd c, v	Copy, paste
alt/cmd z	Undo
shift+alt/cmd z	Redo
alt/cmd a	Select all
alt/cmd 2,3,4	Select every 2nd, 3rd, 4th
alt/cmd i	Invert selection status
alt/cmd cursor	Shift the selection L-R
esc, or alt/cmd d	Deselect all

## Mod Math

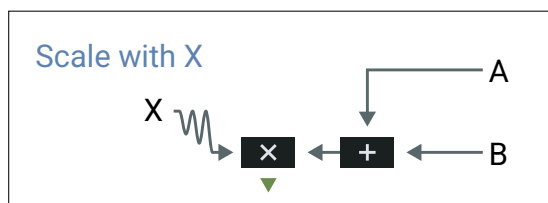
Various ways of combining two modulation sources and a variable (usually called 'X') controlled via a knob, plus a few other options. The wavy arrows in these graphics signify control paths, and the downward-pointing green triangle signifies the final output:



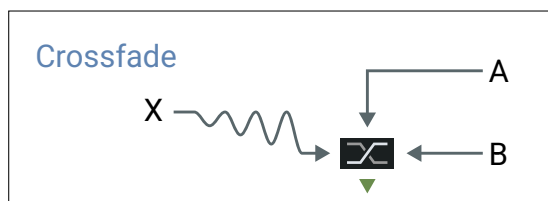
$$X + A + B$$



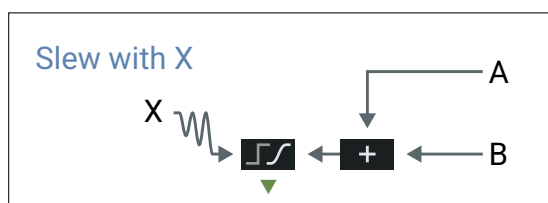
$$X * A * B$$



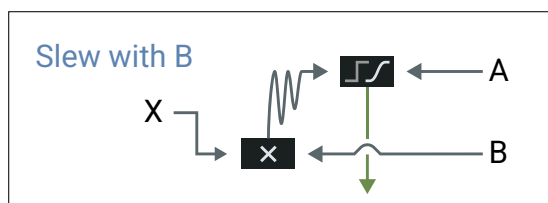
$$X * (A + B)$$



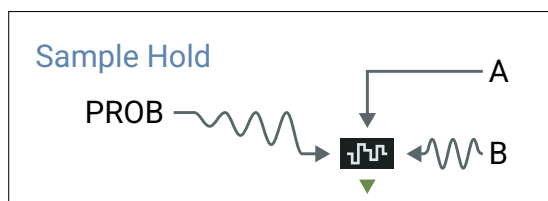
X blends between A and B



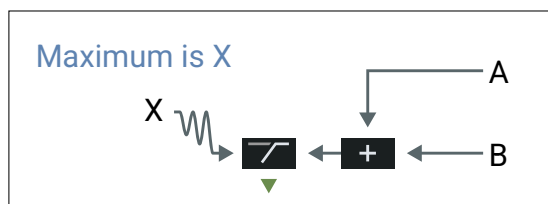
X slews (A + B)



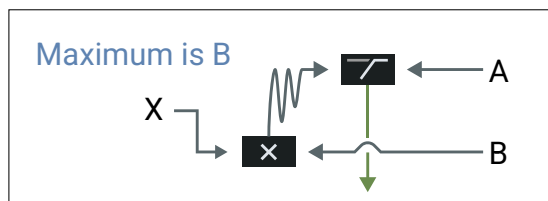
(X \* B) slews A



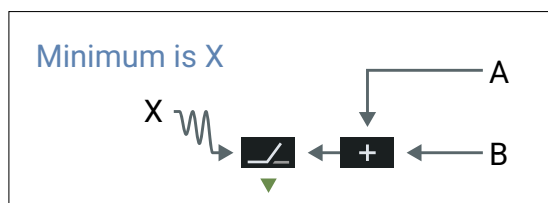
PROB sets the probability of (A sampled by B)



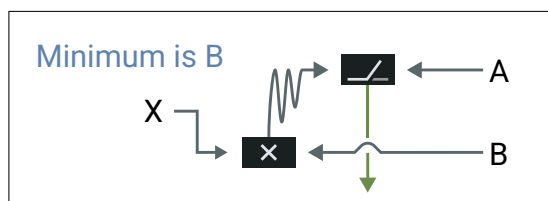
X sets the maximum for (A + B)



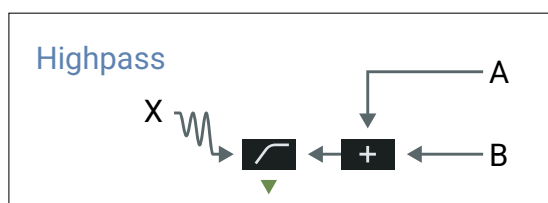
$X * B$  sets the maximum for A



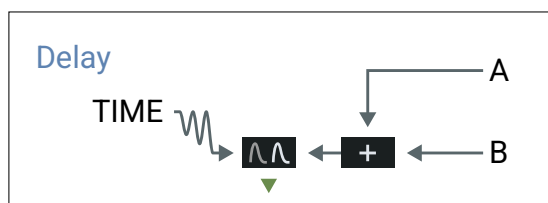
X sets the minimum for (A + B)



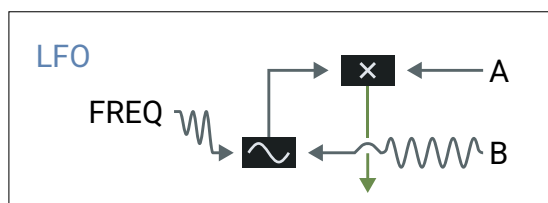
$X * B$  sets the minimum for A



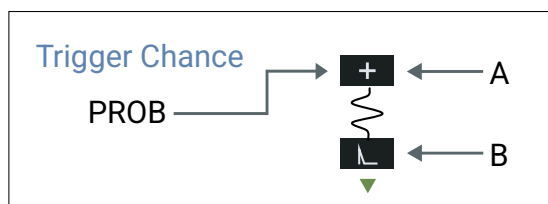
X sets high pass filter cutoff for (A + B)



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



FREQ sets the rate of a sine wave LFO. Source A modulates output level, and the LFO phase is reset by positive zero crossings in source B



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

## MIDI Sources

The modulation source menus also include several MIDI controls...

### Mod Wheel (MW)

MIDI CC01, the wheel or joystick you will find on most MIDI keyboards.

### Pitch Bend (PB)

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

### Control A/B/C/D (CTRL)

User-definable "left hand" controls— see the [Perform](#) panel.

### Key Follow (KEY)

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

### Gate (GATE)

Simple on/off, like an organ envelope.

### Trigger (TRIG)

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

### Velocity (VEL)

MIDI note on velocity.

### Release (REL)

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

### Hold Pedal (HOLD)

A.k.a. sustain pedal (MIDI CC #64).

### Pressure (AT)

Aftertouch. Zebra 3 recognizes *Channel Pressure* as well as *Polyphonic Key Pressure*.

Note: Pressure is often abbreviated to 'AT' (AfterTouch)—it's hard to break with tradition!

## Other Sources

The editable modulation sources (LFO, MSEG, Envelope, Mod Math, Mapper, Pitch) are described earlier in [this chapter](#).

### Voice Index

Steps through voice 'numbers' from 1 to 16, disregarding the polyphony. Very 'niche', so it's only available in the source selectors, not in the modulation source bar.

### Random (RAND)

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

### Alternate (ALT)

Successive notes toggle between -100 and +100. See the Tip [Constant Offset](#).

### Mod Noise (NOIS)

Low frequency noise similar to LFO random glide at maximum rate.

# 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.).



## Quick Tutorial

Load *init* by right-clicking on the data display. Now click on the **[Matrix]** button in the editor bar to view its content. It will be empty except for this pair of elements:



The one on the left is the **free source pip** which you can use to create a new matrix slot without having to specify a source: Drag & drop it onto any valid target (e.g. oscillator Tune) and the matrix will open a new modulation slot with a defined target but an undefined source.

The **free target pip** can be used to create a new matrix slot without having to specify a target—practically the opposite of the free source pip. You can drag and drop any source onto it, or click to open a menu of all sources. Back to our newly created slot...



There are two source fields, both labelled 'none'. Click on the upper one (the primary source) and select MSEG1 from the menu. Now turn up the larger of the two knobs and listen to how the oscillator pitch swoops as you play a note: Not very musical, but it demonstrates the principle.

Try out the **[M]** button top left, which mutes the slot, then remove the slot entirely by clicking on the **[X]** button top right. You can restore the modulation slot via the UNDO button in the [control bar](#).

### Alternative, fast method

Right-click on the oscillator Tune knob, hover over Add Modulation and select MSEG 1 from the list.

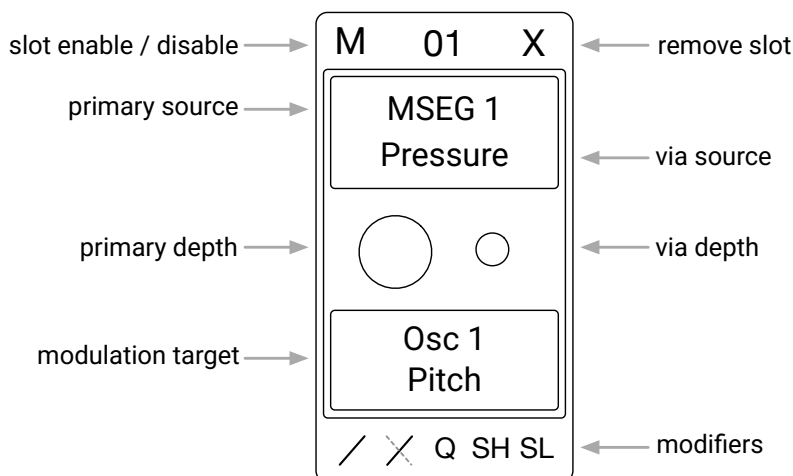
### Modulation indicators

Modulated targets appear with a pale dot in the center, which is highlighted if the assigned source (e.g. MW) has the focus. See also [Modulation Source Pips](#) and [Modulation Source Bar](#).



## 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 a.k.a. aftertouch:



### Slot Enable (M)

Click on the button top left to temporarily disable the modulation slot (the green **M** will turn red).

### 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 source bar](#). The larger of the two knobs (**primary depth**) sets the overall modulation amount, negative or positive.

### Via Source, Depth

An optional secondary modulation source determines how much of the signal from the primary source is actually passed on to the target. The smaller of the two knobs ('via depth') determines how strongly the via source affects the amount of modulation from the primary source.

The little **via depth** knob is also binary, and the default is +100: Set negative values here if you want the secondary (via) source to reduce the modulation amount instead of increasing it.

Note that it will make no difference if the primary and via sources are swapped: LFO via mod wheel is effectively the same as mod wheel via LFO (the [slot modifiers](#) act on the final result).

### Modulation Target (unlabelled)

The quickest way to select a target is usually via drag & drop. Alternatively you can right-click on a modulation target selector to open a menu containing all possible target parameters. Note that unused / inactive parameters will not appear in the modulation target menu.

Tip: If the displayed target appears too cryptic, hover over it and look at the data display.

At the top of the target menu is an option to remove ("unassign") the current target parameter from the matrix slot—also useful for viewing the name of the target in full i.e. avoiding any abbreviation.

### Remove Slot (X)

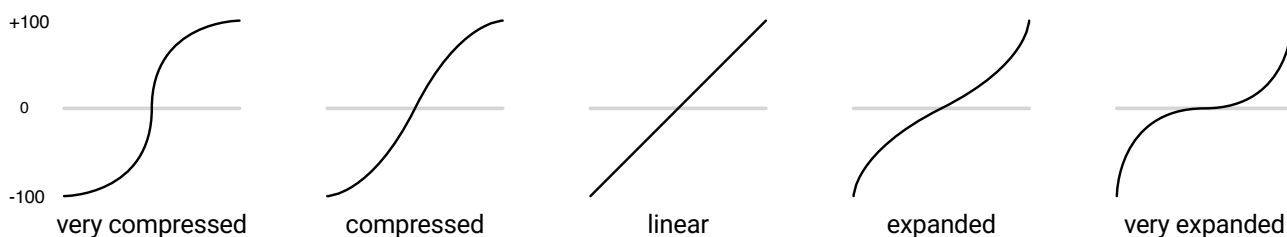
Deletes the modulation slot. Use UNDO to restore it immediately.

## 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

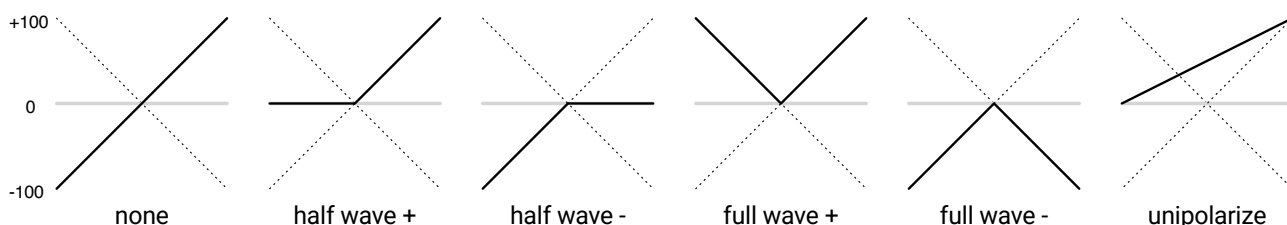
Maps the source onto a curve, like a waveshaper for modulation signals. The grey line in the image below depicts zero i.e. anything below that is modulation in the negative direction. A bipolar ramp, for instance from a rising sawtooth LFO or from the pitch bend control, would be transformed directly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

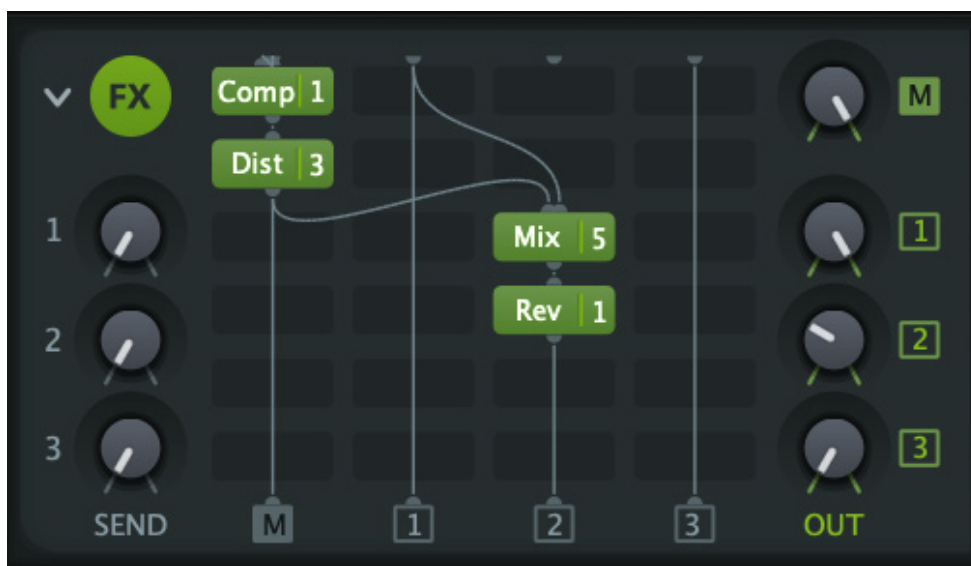
Click on the **[FX/Out]** tab in the editor bar to open this view. You can read about routing from the main grid to the effects grid in the [Lane Mixer](#) section.



## 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.



The downward-pointing arrow in the top left corner lets you copy/paste and load/save the status of the entire effects grid.



Enables/disables all effects. Tip: If you ever get the feeling that **all** of your Zebra 3 patches sound strangely lifeless today, check this button!

## SEND

The three knobs to the left feed the **unprocessed Main** [M] signal into the other three lanes/busses. Note: The Sends are **per voice**, so you can use voice modulation (e.g. Alternate) to control them!

## OUT

The four knobs to the right of the FX grid set the levels of each lane.

# Compressor

The Zebra 3 Compressor has two basic operation modes, **Compressor** or **Limiter**...

## Compressor Mode

A typical stereo compressor:



## PEAK / RMS

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.

## FF / FC / SC

Feed-forward (FF) detection looks at the main input signal and adjusts the output gain accordingly. Feed-back (FB) 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 (SC) 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).

## 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.

## 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.

## Attack

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

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, but set up as a limiter:



## Routing (unlabelled)

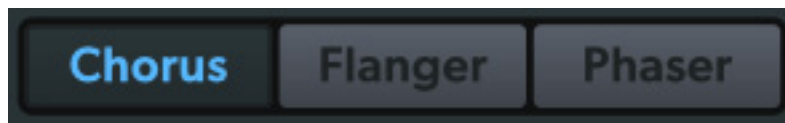
Selects either the main **input** or the **sidechain** as audio source for the detection process.

## Input

Input gain, +/- 24 dB. Replaces the Ratio knob.

## ModFX

**Modulation Effects** with a choice of three flavours: Chorus, Flanger or Phaser.



Several of the parameters are common to all three...



### LFO

The 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.

### Timebase

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 and sine for the LFO.

### Depth

Depth of modulation. Balance carefully with the Speed (see above).

### Noise Floor (hidden parameter!)

Active only in the Chorus or Flanger when Mode is set to Analog (A). Controls the level of simulated analogue-circuit noise, ranging from silent to excessively noisy. To apply a fixed offset, modulate this parameter in the matrix using e.g. a **Math** module or full-wave rectified **Alt** as source.



## Chorus Mode

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 for a slapback effect.

### Offset

Phase difference between the LFOs modulating the delays for the left and right channels.

### Width

Stereo width of the processed signal.

### Mode (A—D)

Analog mode (A) simulates classic 'bucket brigade' circuitry with its typical warm saturation and noise floor, while Digital (D) is clean.

Note: The hidden parameter 'Noise Floor' allows the noise level to be adjusted, even removed, while retaining the other attributes of analog (A) mode. Only available in the modulation matrix.

### 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.

## Flanger Mode

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.

### Offset

Phase offset between the left and right channel LFOs. The range is 0° to 180°.

### Width

Stereo width.

### Invert

Flips the phase of the feedback signal, resulting in a different tonal quality.

### Mode (A—D)

Analog mode (A) simulates 'bucket brigade' circuitry with its typical warm saturation and noise floor, while Digital (D) 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.

## Phaser Mode

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.

## Offset

Phase offset between the left and right channel LFOs. The range is 0° to 180°.

## Width

Stereo width of the effect signal.

## Dry/Wet

Balance between the original and effect signals.

## 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 / Tap 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 Tempo overall, from half speed to double speed.

### Feedback

Regeneration level. Safe from build-up: doesn't repeat indefinitely when set to maximum.

### Invert

Flip the phase of repeats.

### Mod

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.

## Panic



The unlabelled PANIC button immediately stops all feedback.

## Dry/Wet

Balance between unprocessed and processed signal.

## Hidden Parameters

Only available as targets in the [modulation matrix](#). To apply a fixed offset, use a **Math** module or full-wave rectified **Alt** as modulation source.

## Mod Rate

The speed of modulation.

## Noise Floor

Noise level in *Surge* or *Haze* Colour mode (see the previous page), ranging from silent to excessively noisy.

## 8-Tap Delay

Digital delay with eight independent mono delay lines, individually tapped. Each line has a basic delay time/sync, Ratio (multiplier), Gain, Pan, and on/off switch. The 8-tap Delay is capable of polyrhythmic delays that cannot be achieved with a normal delay.



## 1-4 | 5-8

As four or fewer taps are often enough, access to the controls is switched in groups of four.

### Routing (unlabelled)

*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.

### Tap Enable

Click the numbers to switch taps on or off. Taps that are switched off are simply skipped.

### 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 starting point for the four Ratio knobs...

### Ratio

Scales the Tempo, from half to double the speed per tap.

### Gain

Output level of the tap.

### Pan

Pan position of the tap.

### 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).

### Width

Stereo spread.

### Feedback

Regeneration level. Safe from build-up: doesn't repeat indefinitely when set to maximum

### Panic



The unlabelled PANIC button immediately stops all feedback.

### Dry/Wet

Balance between unprocessed and processed signal.

# 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 / Mod

Only available in LUSH mode.

## Tone

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

## Dry/Wet

Balance between the original and effect signals. At maximum, the dry part of the signal is faded out completely, which lets you use this reverb for strong 'guitar body' type resonances: Set Pre to minimum, and fine tune the Size around 5.00. Tip: if you then modulate Size by an LFO with its Trigger set to 'Sync', the plate reverb becomes a special kind of flanger!



## Texture

This module performs 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

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

### Freeze Trigger (unlabeled selector)

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.

## Direction

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.

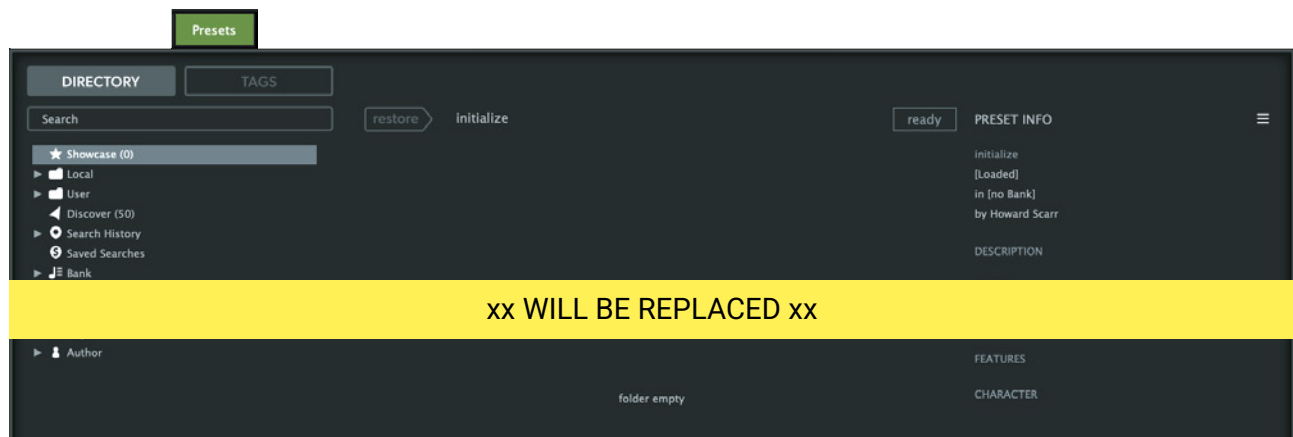
## Burn

The 'CPU eater' module as well as the Module Performance Meter for which it is meant, will be described in detail in a later version of this user guide. For now, please watch this rather entertaining video: <https://www.youtube.com/watch?v=he33jQkjTaQ>

# 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

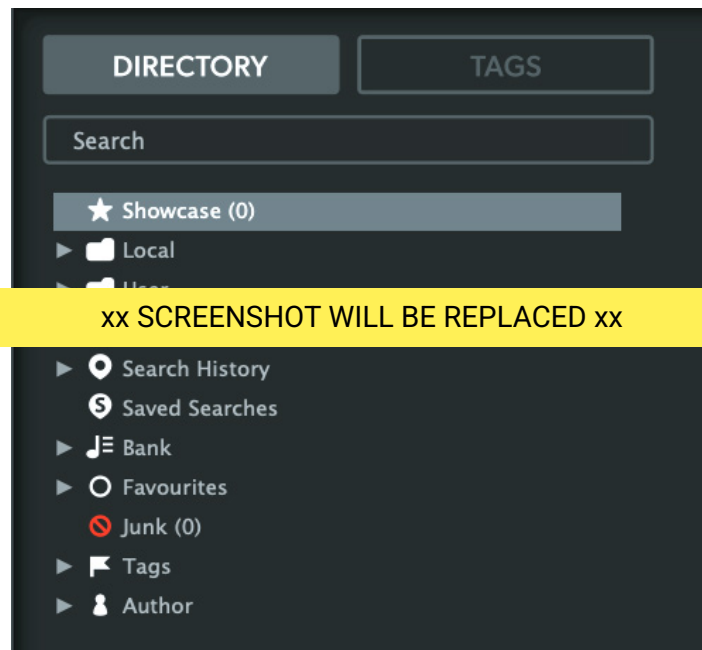
When a new instance of Zebra 3 starts it checks whether the 'Local' root directory contains a preset called 'default', which is then loaded instead of the standard one. The default path also switches from Showcase to Local.

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 selection of factory presets from 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.

### MIDI Programs

Important: Some hosts automatically route MIDI data into effect plug-ins, while others expect you to set this up yourself. For details, please refer to the documentation of your host app.

The 'Local' root contains a folder called 'MIDI Programs', which is normally empty. When the first instance of Zebra 3 starts, up to 128 presets in this folder are all loaded into memory so they can be selected via *MIDI Program Change* messages.

As the presets in the MIDI Programs folder are accessed in alphabetical order it is best to rename them, adding an index e.g. "000 rest-of-name" to "127 rest-of-name".

Unlike regular presets, MIDI Programs cannot be added, removed etc. on the fly. Any changes are only updated after the host has been restarted.

The 'MIDI Programs' folder can contain up to 127 sub-folders of 128 presets each, switchable via MIDI Bank Select message (CC#0) preceding the Program Change message. 'MIDI Programs' is bank 0 and sub-folders are addressed in alphabetical order, starting with bank 1.

When Zebra 3 receives a Program Change message, it will display the bank and program numbers to the left of the preset name (e.g. "0:0" for the first preset in the first bank). In certain hosts, however, the first bank / preset is designated "1" instead of the correct "0".

To avoid another possible source of confusion, please make sure there are no junked presets in the 'MIDI Programs' folder: All files there are addressed, even if hidden!

## 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

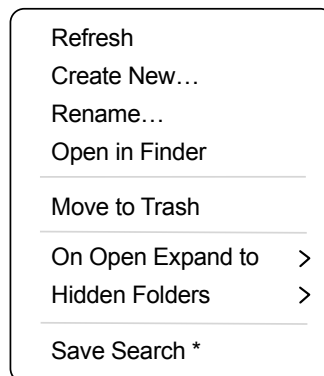
Smart folders for each preset author. Tip: Instead of signing each of your creations individually you could sign just one of them, then select and drag & drop any others onto your new author smart folder. As the process cannot be undone, please use this feature with caution!

## 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

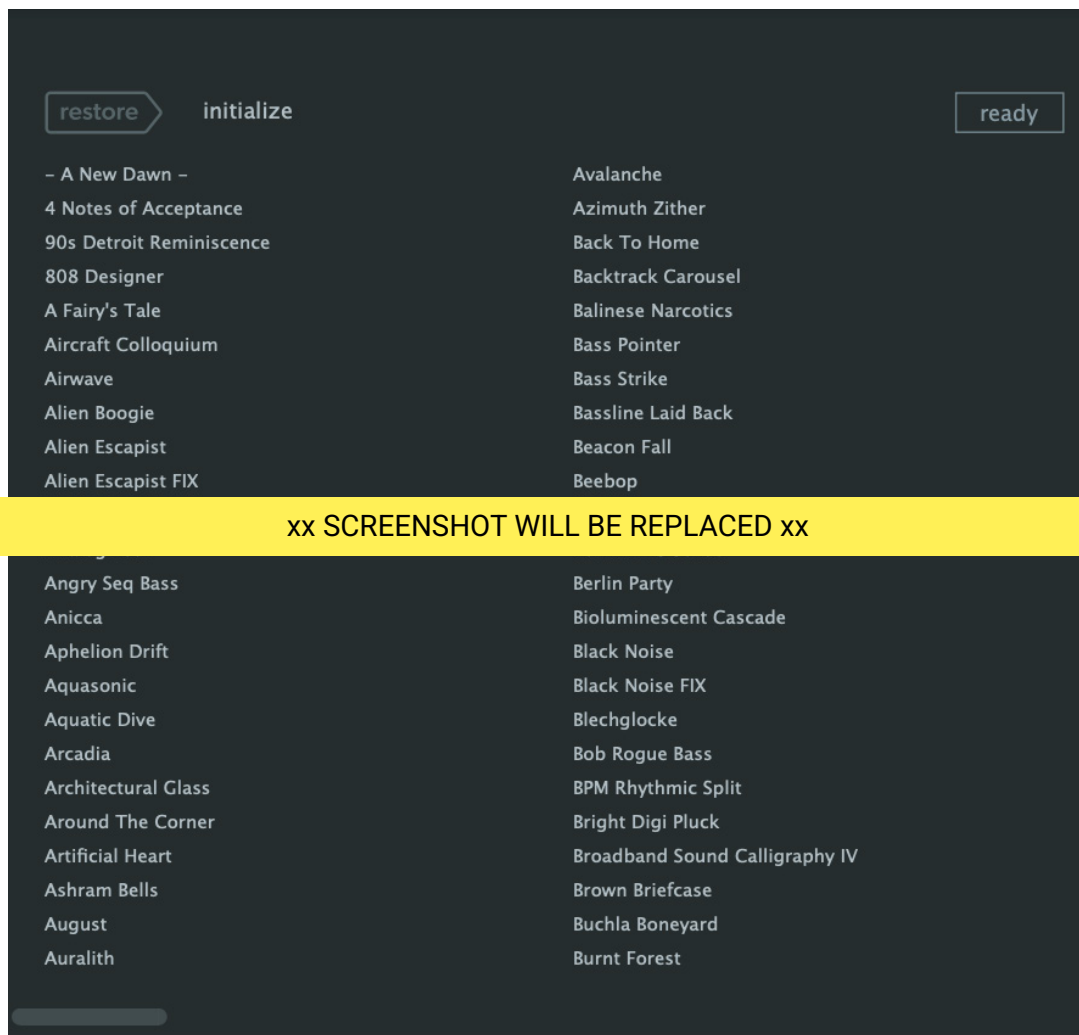
Select any smart folders you don't want to appear in the directory.

## 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

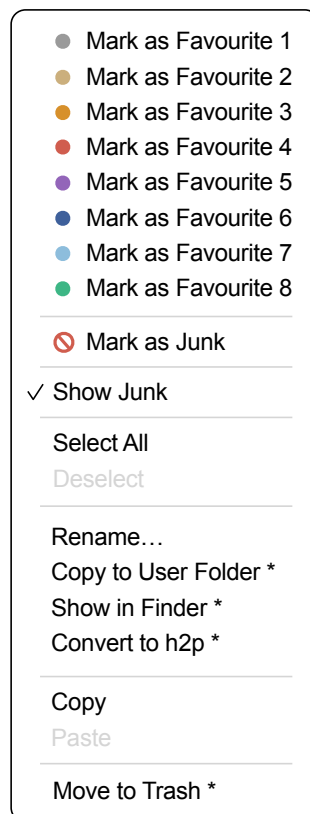
The central area of the browser displays all presets in the current folder. Click to load a preset.



If there are more presets than will fit in the window, a scroll bar 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 plugin into system windows e.g. your desktop. However, attempts to drag & drop anything into the plugin 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

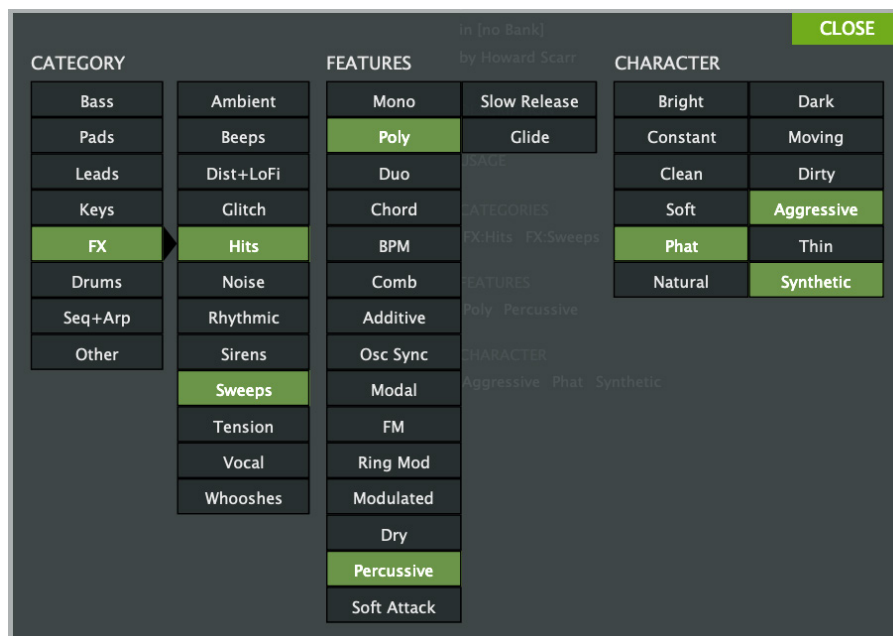
Tags are updated automatically – clicking on the **[SAVE]** button isn't required! The main advantage is that presets don't have to be saved every time you edit a tag. The main caveat is that you should only edit tags after saving your preset.

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 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.

The function Create Search from Tags finds all presets with exactly the same set of Category, Features and Character tags.

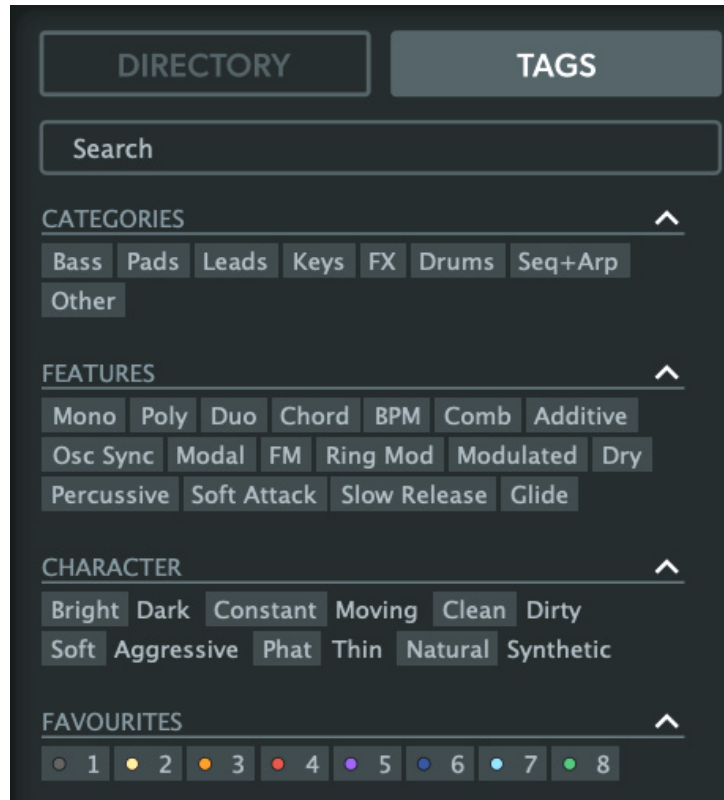
## Tagging via smart folder

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

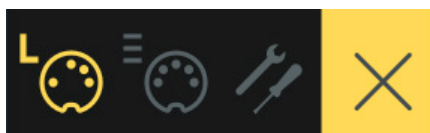
`use:"pw ="` presets with pitch wheel control mentioned in USAGE field

`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 "Control Change" is a multi-purpose message format 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 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 (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 Mod 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 '≡'. 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:Amplifier	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)

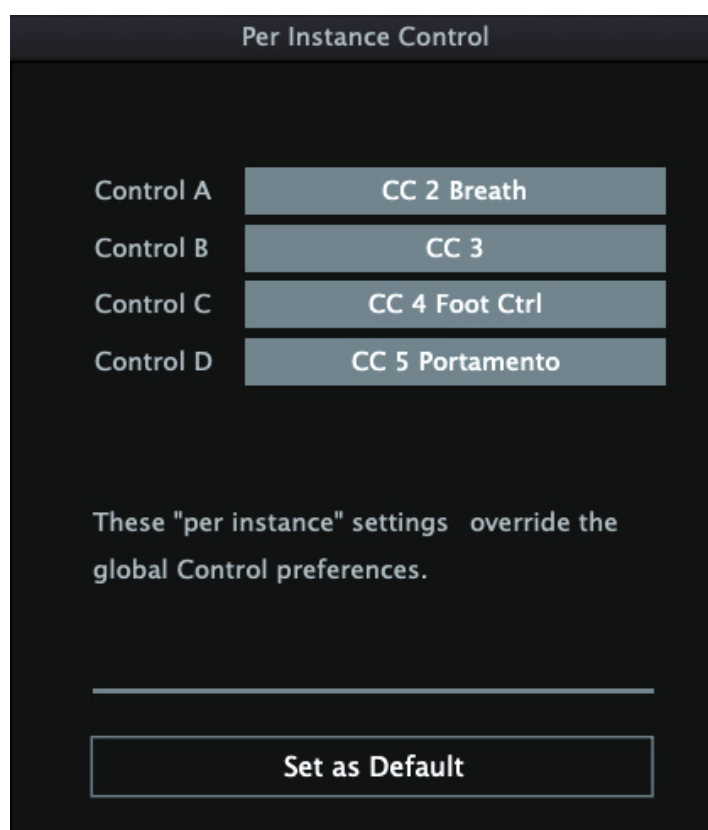
*Continuous 14-bit* .....14-bit MIDI CC (high resolution, rare)

## 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

Non-global versions of the Control A/B/C/D Default settings in the [Preferences](#) (see below).

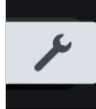



Note: Unlike the equivalent options in the [Preferences](#) page (see below), clicking on these fields does not open a menu (at least not in the current version), but act just like the rotary controls: To set a different CC either drag up and down or hover over the field and roll your mouse wheel.

**[Set as Default]** copies the Control A and Control B settings to the global Preferences...

# Preferences

Click on the 'tools' icon to access the global options...

Preferences Menu

MOUSE

Hide Mouse On Drag

on

Mouse Wheel Mode

auto detect

Mouse Wheel Raster

on

Natural Scrolling

scrollbar & value changes

Scroll Horizontal

standard

APPEARANCE

Animations

fast

Default Size

90%

Gamma

neutral

Graph Mode

fast

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

RACK PANELS

Generator Order

-select-

MSEgs & Mappers

show

Modulator Order

-select-

## MOUSE

---

### Hide Mouse on Drag

On: The mouse pointer will disappear while you are adjusting a parameter, and reappear in the same position as soon as you stop.

### Mouse Wheel Mode

This setting 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 while vertical motion is recognized.

*vertical & horizontal* ..... Vertical scroll for vertical controls, horizontal scroll for horizontal controls.

**Tips:** If you prefer to use only vertical scrolling although your input device is capable of horizontal scrolling, you should select the option *vertical only*. If you would like to enable horizontal scrolling although your mouse has a regular (vertical only) scroll wheel, select *vertical & horizontal* then hold **ctrl** (Windows or Linux) / **command** (Mac) to scroll horizontally.

### Mouse Wheel Raster

If your mouse wheel is rastered (you can feel it clicking slightly as you roll the wheel), set this option to 'on' so that each little click increments the value in sensible steps.

### Natural Scrolling

This setting defines how the inverted scroll direction on Windows or Natural Scrolling on macOS affects scrollbars and controls. If unused, keep the default setting to ensure correct behaviour.

#### macOS

*scrollbar only* ..... (default) Inverts the scrolling for scrollbars only. Knobs, sliders and other controls use the standard direction.

*scrollbar & values* ..... Inverts scrolling for all controls – scrollbars, knobs, sliders etc..

#### Windows

*off* ..... (default) Uses the direction provided by the system or by the device itself for scrollbars and controls.

*on* ..... inverts scrolling for scrollbars only—knobs, sliders and other controls use the standard direction.

### 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

## APPEARANCE

---

### 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 opening the Preferences page by right-clicking anywhere in the background.

### Gamma

Overall brightness.

### Graph Mode

A choice of visual effects for the plot – *eco*, *fast* or *glow*. The latter is quite CPU-intensive.

### Text Antialiasing

Smoothing of labels and values. Normally left on – only in rare special cases will switching this off improve readability.

## PRESETS

---

### 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

---

### 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 the same MIDI CC values as your hardware controller sends, for instance CC 14 to CC 17.

### MIDI Control Slew

Sets the strength of parameter smoothing for the pitch bender, modulation wheel, Control A/B/C/D, and Pressure (aftertouch). With MIDI Control Slew set to 'off', Zebra 3 is more responsive to modulation wheel data for instance, but performance can sound rather grainy. The default *fast setting* provides a good compromise.

## RACK PANELS

---

### Order Generators

Determines the order in which **generator** panels appear in the [Generators Rack](#) with reference to their arrangement in the main grid:

*down lanes first* .....Down Lane 1, then down Lane 2 etc.

*across lanes first* .....Across the first row (Lanes 1 to 4), then across the next row etc.

*by selection history* .....The most recently selected module appears at the top

### Order Modulators

Determines the order in which **modulator** panels appear in the [Modulators Rack](#).

*using default order* .....Standard order (Envelope → LFO → MSEG → Mapper → Math)

*by selection history* .....The most recently selected\* modulator appears at the top

\*selected e.g. by modulation assignment, by clicking in the editor bar / modulation source bar.

### MSEGs & Mappers

*show* .....MSEGs and Mappers will appear in the [Modulators Rack](#).

*hide* .....MSEGs and Mappers will **not** appear in the Modulators Rack

# Tips & Tricks

This section is almost empty right now, but it will be significantly expanded for the final release version. Note: You can 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 phasey layering or “mystery modulation”.

Fewer modules also improves editability: you can return months later and easily understand the patch, making small changes without unraveling a delicate web of dependencies.

Finally, fewer modules generally means lower CPU cost and more predictable performance, which is especially valuable when stacking voices, running high-quality modes, or using multiple instances in a project.

### Other CPU Saving Tips

xx

If you just need a sine or triangle wave, use the Additive Renderer with Harmonics set to the minimum 16, set resolution to *200Hz* and Curve Math to *Fast*.

## Oscillators

xx

### Additive Synthesis

xx

### FX Combi 1: Spectral Decay + Sparse

xx

### FX Combi 2: Sync + Window

xx

### Single oscillator chords

xx

## FMO

xx

### Maps to FMO Ratios

Having 25.00 as the maximum Ratio makes it easier to hit the musically pleasing n.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

XX

### 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

XX

### Faster Attacks

Although setting the attack to zero can still create clicks, especially with pure tones, it is not extremely fast by default. For maximum click, set **V1** to *init* and turn the knob up to maximum.

## LFO

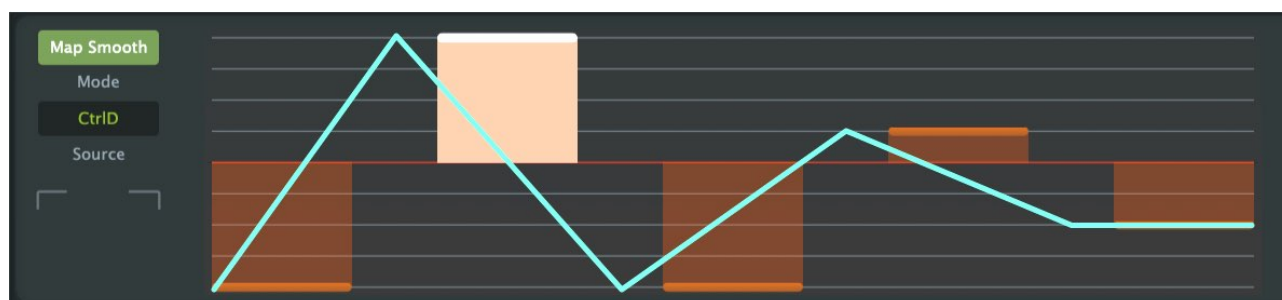
XX

## Mapper

XX

### 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. Here's an example of a curve defined by just 5 steps (blue line added to illustrate the result):



There are two drawbacks to be taken into account:

- Complexity can only be added by increasing the number of steps
- There is a flat bit after the final step has been reached.

## Matrix

### Constant

*Constant* is a seldom-used modulation source in some u-he synths, and it's not even available in Zebra 3. However, it is easy to create by "unipolarizing nothing". Try this little experiment:

- Initialize the preset
- In the matrix, drag & drop the free source pip onto Oscillator 1 'Tune'
- At the bottom of the matrix slot, set the Rectify modifier to *Unipolarize*
- Adjust the modulation knob!

### Multiple Randoms

XX



## Pitches

### Duophony

Classic two note paraphony a.k.a 'duophony' can be achieved by the following method:

- In the [Perform](#) panel, set the voicing mode 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 pitch sources for two oscillators (or two sets of oscillators).

You will find a simple patch called *Duophony* demonstrating this method in the *Templates* folder.