



# ZEBRA<sup>2</sup>

## USER GUIDE



Version 2.8

February 22, 2018

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# Introduction

## About Zebra2

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Zebra2 is a wireless modular synthesizer. Designed for flexibility, ergonomics and low CPU hit, Zebra2 has an excellent reputation for consistently great sound quality. Zebra2 is the weapon of choice for composers and musicians who need an uncompromising workhorse synth – practically all parameters are valid modulation targets.

Zebra2 modules only appear while they are in use: Add an oscillator to the patching grid and it will appear on the left, use an LFO for anything and it will appear on the right. After a little practice you will find programming Zebra2 very comfortable and lightning fast. Which in the end translates to... more fun!

## Installation and updates

Go to the [Zebra2](#) web page and download the latest installer for your system (macOS or Windows). Unzip the compressed file, open the Zebra2 folder and start the installer.

Zebra2 works in demo mode for a while before it cycles through a series of 5 notes instead of the correct ones. Register your copy by clicking on Zebra2's data display and selecting the first entry, *enter serial number*. Then unload and reload Zebra2 to make 100% sure that the registration process is complete.

During installation, files are written to the following locations (the precise paths depend on whether you changed any of the default paths during installation):

### macOS

Presets (local)	<i>MachHD/Library/Audio/Presets/u-he/Zebra2/</i>
Presets (user)	<i>[you]/Library/Audio/Presets/u-he/Zebra2/</i>
Preferences	<i>[you]/Library/Application Support/u-he/com.u-he.Zebra2...</i>
Themes	<i>MachHD/Library/Application Support/u-he/Themes/</i> (skin folders)
Module presets	<i>MachHD/Library/Application Support/u-he/Zebra2/Modules/</i>
Microtuning	<i>MachHD/Library/Application Support/u-he/Tunefiles/</i>

### Windows

Presets (local)	<i>...\\VstPlugins\\u-he\\Zebra2.data\\Presets\\Zebra2\\</i>
Presets (user)	<i>...\\VstPlugins\\u-he\\Zebra2.data\\UserPresets\\Zebra2\\</i>
Preferences	<i>...\\VstPlugins\\u-he\\Zebra2.data\\Support\\</i> (*.txt files)
Themes	<i>...\\VstPlugins\\u-he\\Zebra2.data\\Support\\Themes\\</i> (skin folders)
Module presets	<i>...\\VstPlugins\\u-he\\Zebra2.data\\Modules\\</i>
Microtuning	<i>...\\VstPlugins\\u-he\\Zebra2.data\\Tunefiles\\</i>

To rigorously uninstall absolutely everything (including Zebralette / Zebrify), delete all the above **except** the Mac *Themes* and *Microtuning* folders, which might be used elsewhere.

**Important:** If a realtime malware scanner such as Windows Defender is allowed to check the *Zebra2.data* folder every time it is accessed, the new browser will become unusably slow. In such cases, please add that folder to the exceptions list (we don't put executable files in there). Mac owners running similar software should add all the above */u-he/Zebra2/* resource directories to the exceptions list.

## Online resources

For downloads, news and support, go to the [u-he website](#)  
 For heated debates about u-he products, go to the [u-he forum](#)  
 For friendship and informal news updates, go to our [facebook page](#)  
 For u-he presets (paid or free), go to u-he preset library [PatchLib](#)  
 For video tutorials and more, go to our [youtube channel](#)  
 For personal pics and a few videos, go to our [instagram page](#)  
 For audio demos of soundsets, go to our [soundcloud](#)

### The most frequently asked question by newcomers is:

**Q:** *Why does Zebra go way out of tune after a short while?*

**A:** That's the demo mode restriction.  
 Right-click on the data display, enter your serial number and restart Zebra.

## u-he team 2018

- Urs Heckmann (boss code, vision)
- Sascha Eversmeier (code, bad puns)
- Howard Scarr (HS presets, manuals, necessary grump)
- Sebastian Greger (GUI design, 3D stuff)
- Jan Storm (framework, more code)
- Rob Clifton-Harvey (interwebz & support)
- William Rodewald (student-life-support code)
- Michael Pettit (videos, marketing, web development)
- Viktor Weimer (support, TUC presets, the voice)
- Thomas Binek (QA, bug-hunting, TAS presets)
- Alexandre Bique (all things Linux)
- Frank Hoffmann (more framework, new browser)
- Henna Gramentz (worldly supervision)
- Oddvar Manlig (everything else)

Special thanks Brian Rzycki for maintaining [PatchLib](#)

## Quick and Easy Tutorial

Load Zebra2 into your preferred plugin host / sequencer / DAW. If you're not sure how to do this, please refer to the documentation belonging to that application.

Click on the **PRESETS** button in Zebra's upper bar. The browser shows a list of folders to the left and the contents i.e. individual presets in the main area. The window should look something like this (perhaps with more preset folders visible on the left):



*The preset browser, with the Local folder contracted*

In the folders pane, click on **Local**. This is the top level of Zebra's directory, which contains several demonstration presets plus one more called 'initialize' as well as the categorized folders in **Local** (if you can't see those folders, click on the triangle to the left). Click on one of the presets and play your keyboard.

While auditioning presets you should always try the performance controls **velocity**, **pitch bend**, **modulation wheel** and **pressure**. Many presets are also programmed to react to Breath (MIDI CC#02) and/or Expression (MIDI CC#11). Note that these two have been replaced with user-definable CC called **CtrlA** and **CtrlB** (Control A and Control B).

Presets whose names end with a '+' generally use the on-screen X/Y performance pads, in which case you should click on the **PERFORM** button.

Now that you know how to audition factory presets, it's time to familiarize yourself with the Zebra2 way of creating your own! Start by loading the very last entry in the Local directory, the preset called **Initialize**. Then click on the **SYNTHESIS** button:



*SYNTHESIS window of the 'initialize' preset*

Zebra's main programming window! Only three modules are visible because *initialize* only uses one oscillator (OSC1 in the left pane), one envelope and one LFO (both of those are in the righthand pane). Play your keyboard – it sounds even simpler than it looks, but it is this simplicity that makes *initialize* a great starting point for creating your own presets.

Click on the **OSC1** button in the lower bar, grab the highlighted rectangle in the waveform editor and move it to the right while playing some notes. You will see and hear the waveform turn from a **sawtooth** into a **square**, then ever narrower pulse waves. Move it to the far left to check out Wave 1 (a kind of triangle), then go back to Wave 5, the sawtooth.

Click in the main grid immediately below OSC1 and select **OSC2** from the list. A second oscillator appears in the lefthand pane. Turn the Detune knob in one of the oscillators up to 15 and play some notes. Move the Vibrato control in the other oscillator up to about 25 for some extra movement... in the righthand rack, take LFO1 Rate down to 50.

Now click immediately below OSC2 and select the multi-mode filter VCF1 from the list. The default mode is *LP Xcite*. Click on that word and select *LP Allround* instead – a more resonant lowpass model. Move the Cutoff knob while playing the keyboard with your left hand, then leave it at about 75. Click on the unlabeled knob on the far left and select Env2. The label **Env2** appears – turn it up to 70 and play your keyboard. In the righthand rack, adjust ENV 2 Attack to about 20 and Env 2 Velocity to maximum.

Click on the **Global** button at the far left of the lower bar. In the middle you will see a small **effects grid**, which is used for selecting and routing effect modules.

Click on the top-left cell of the effects grid and select **NuRev1** from the bottom of the menu. Reverb parameters appear in a panel to the right, replacing whatever was already there. Adjust the **Dry/Wet** mixture to taste.

Next, add an **EQ** module immediately below [NuRev] by clicking on an unused cell and selecting EQ1 from the menu: EQ controls will appear instead of the reverb panel.

In the effects grid, click on [EQ1] and drag it up: EQ will swap places with [Rev1] so that the dry signal is equalized before the reverb. Experiment with all effect settings (click on the corresponding [cell] to reveal their panels) as well as the modules in the racks.



*the SYNTHESIS window after following the above tutorial, with the GLOBAL panel open*

Now would be a good time to learn more about Zebra's GUI – see the next section...

If you're feeling confident you could try refining this simple preset while looking up the appropriate information in the reference chapters. Tip: For fine control, hold down SHIFT on your computer keyboard before adjusting the knob. Whenever you arrive at an interesting sound, press the **SAVE** button. Saved presets will land in the root of the *User* folder by default (you can change this behaviour: see [Preferences](#)).

A personal note: After a shaky start, I found programming Zebra2 to be a thoroughly satisfying experience – it actually does what you tell it to, and it does that remarkably well. Zebra2 has given me more pleasure over a longer period of time than I dared hope for. I must have created thousands of presets already. Because Zebra2 is software, that SAVE button still hasn't worn out!

# User Interface

## Basic Operation

---

Although operating Zebra is fairly intuitive, there are a few points worth mentioning...

### Standard controls



Values are adjusted via click-and-drag, with fine control by holding down a SHIFT key. All knobs are either **unipolar** like *Release* in this image, or **bipolar** like *Velocity* in this image. Bipolar knobs are usually centre-zero, with negative values to the left and positive values to the right, but there are exceptions e.g. the [Delay](#) times.

A double-click resets any knob to its default value. If your mouse has a scroll wheel, try hovering over any control and rolling the wheel. For finer control, hold a SHIFT key.

### Assignable controls



Most of Zebra's modules include freely assignable controls that directly modulate important parameters. Select a source by clicking the label (or the knob if unassigned). The target is the knob above or to the right, indicated by a small triangle. Note that both assignable controls in the VCF module affect Cutoff. Also, what appear to be assignable controls in the envelopes are actually pre-attack and post-sustain options (see [ENV](#)).

### Buttons, switches, mouse wheel

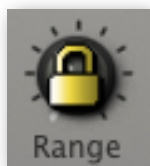
Most of the rectangular buttons open drop-down menus. Like the knobs, most of them also react to mouse wheel movement (this is particularly useful in the *Arp/Seq* panel).

If your mouse wheel is rastered (noticeable clicks), check that *Mouse Wheel Raster* is switched on (see [Preferences](#)). This ensures that each click corresponds to a 'sensible' step e.g. integer increments.

### Modulator panels

While generator panels appear as soon as a cell is defined in the grid, modulator panels only appear if they are being used to modulate something. To take a quick peek at an unused modulator, you simply have to 'use' it – click on an assignable control and select that modulator (e.g. MMap1) from the dropdown menu.

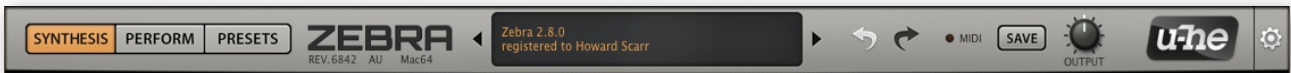
### Parameter locking



Right-click on a control and select 'Lock'. The lock only prevents the value from changing **when you switch presets**, it does not prevent you from adjusting the value directly. To unlock, right-click again and untick 'Locked' in the menu. Example: Lock both Microtuning options to audition various presets, all with the same non-standard tuning.

## Upper Bar

At the top of Zebra's window you will see this bar:



The **SYNTHESIS**, **PERFORM** and **PRESETS** buttons on the left are for selecting Zebra's three main windows. Try clicking on them.

The central **Data Display** has three distinct jobs:

Firstly, it shows the name of the currently selected preset. You can step forwards and backwards through the presets by clicking on the triangles to the left and right. Clicking on the name opens a drop-down menu of all presets in the current directory – a convenient way to load another preset without opening the PRESETS window.

Secondly, it shows the value of the parameter being edited. Watch the display whenever you need to set specific values. After about 2 seconds, it reverts to the preset name.

Thirdly, right-clicking on the display toggles between compatibility mode 2.3 (a faint '2.3' appears on the right) and the regular 2.5+. While editing 2.3 presets, remember that this mode does not support some more recent features and improvements. Also, the sound can change when you switch from 2.3 to 2.5, mainly due to the improved [XMF](#) module.

**INITIALIZE:** At the top of the same context menu (right-click on the display) is a simple template called *init* you can load any time you want to start with a blank slate. The main grid contains only one oscillator (which is not even activated), and the effects grid is empty. As ENV1 is used for all four lanes, however, that module is visible.

**UNDO / REDO:** The curved arrows to the right of the data display can be used to fix recent 'mistakes'. Although the number of steps in the undo buffer is limited, you can even undo a change of preset so that switching presets before saving doesn't mean losing your work.

**MIDI activity:** This small indicator lights up whenever MIDI data is being received.

**SAVE button:** Stores the preset into either the currently selected folder or the 'User' folder, depending on the *Save Presets To* setting (see [Preferences](#)). To select a different folder, click on PRESETS and navigate in the directory. Then click on [SAVE], give your preset a suitable name and enter any details you would like to appear in the INFO area of the browser. Please avoid using the following characters: (\ / ? % \* : " > < =).

Right-clicking on [SAVE] opens a menu with a choice of file formats. The recommended *h2p* option is our normal cross-platform format (editable text), while *h2p extended* includes extra readable information. The *native* option is the standard format of your system (.fxp for VST and AAX, .aupreset for Audio Units).

**OUTPUT knob:** The final volume (the sum of Master, Return1 and Return2). OUTPUT is one of the few parameters in Zebra that cannot be modulated by envelopes, LFOs etc.. Controls the same parameter as the OUTPUT knob below the [FX Grid](#). Normally set to 12 o'clock (100%), a preset's volume can be boosted up to 200% if necessary.



Clicking on the **u-he badge** opens a popup menu containing links to this user guide, to our homepage, to our support forum, and to various social networks.

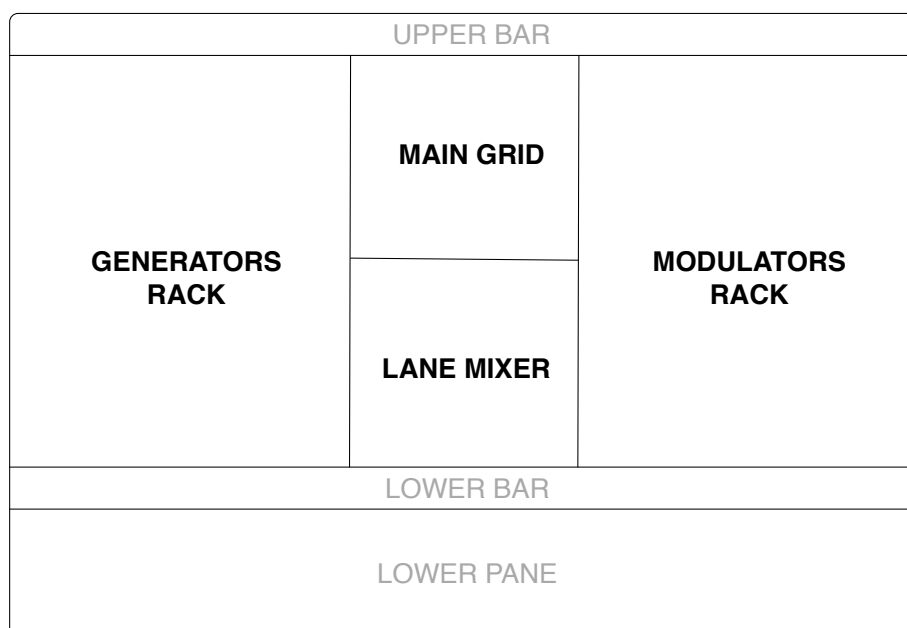
## Temporary GUI settings

Right-clicking anywhere in the background of the control bar or lower pane opens a menu with options for **GUI skins** i.e. alternative designs (the current standard is *DotEight*) as well as **GUI sizes** (as percentages and as width x height in pixels).

More permanent settings are available in the [Preferences](#) page.

## Synthesis Window

Click on the **SYNTHESIS** button in the upper bar...



*areas of the SYNTHESIS window*

### Generators rack

The area to the left contains control panels for each active module in the main grid (see the next page). Generator panels can be reordered by clicking on the dividing line between them.

### Modulators rack

The area to the right contains panels for control signals (envelopes, LFOs etc.) currently in use. Modulators are not defined in the grid, but automatically appear as soon as they are used as modulation sources. Modulator panels can also be reordered by clicking on the dividing line between them.

If the rack isn't tall enough to display all active generator or modulator panels, a scroll bar appears. Right-click in an empty area of either rack to choose **auto scroll** (scrolls down to reveal the hidden panel) or **selected on top** (moves the panel of the module selected in the grid to the top).

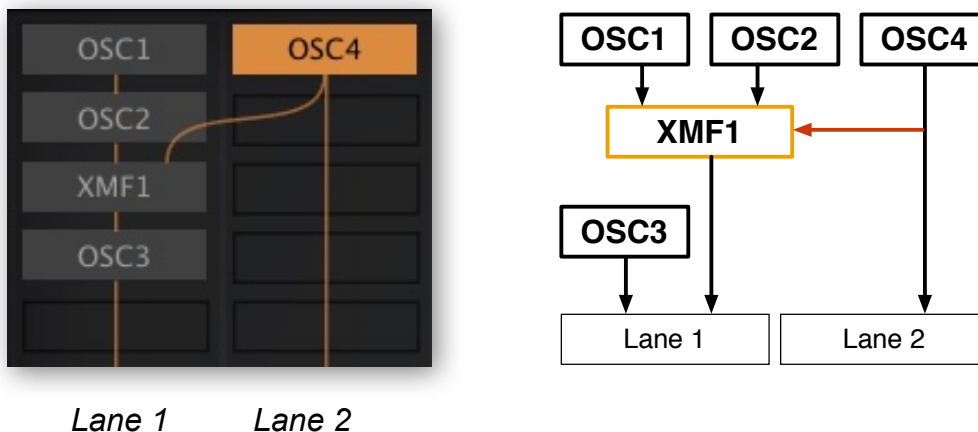
The order of panels in the generators rack will seldom reflect the patch structure as defined in the grid. However, you can swap their positions by clicking between them.

## Main grid

The center of the Synthesis window is a grid consisting of four vertical **lanes**. This area is used for connecting generators together, whereby the signal flow is **top to bottom**.

To add a module, click on an empty cell and select from the list. Drag modules around the grid, deactivate via **double-click** (or Mac: **cmd+click**, Win: **alt+click**), specify input routing or remove the module via right-click. Clicking on a module will highlight the corresponding control panel in the generators pane.

**IMPORTANT:** Oscillators and noise generators (as well as FMOs in certain modes) do not process audio, so when placed on top of one another in the same lane, the signals are simply mixed together.



In the above example, both OSC1 and OSC2 flow into XMF1 (a filter). The XMF1 output is then mixed with (not processed by!) OSC3, and the mixture flows down lane 1. OSC4 flows down lane 2 as well as modulating XMF1 cutoff (the red arrow).

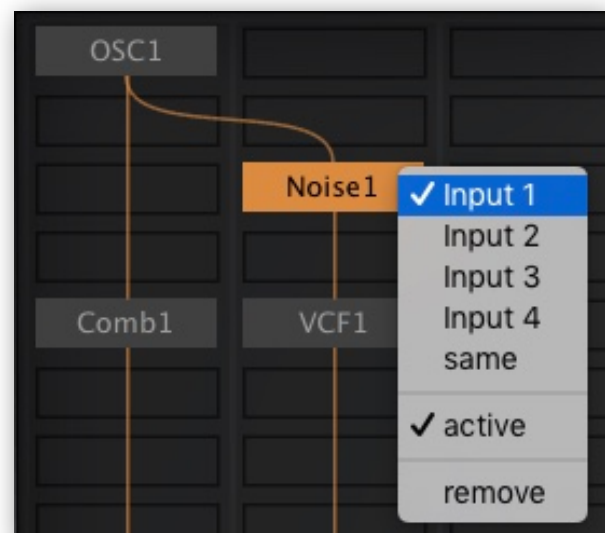
### Routing between lanes

Any module can route signals between lanes. Select the source ('Input') lane for the module by right-clicking on it.

In this example, OSC1 is comb-filtered in lane 1. Both OSC1 and Noise1 are filtered by VCF1 in lane 2.

By the way: If Noise1 had been two cells further down lane 2, the Noise module would have taken its input from Comb1.

*Note: For the sake of simplicity and brevity, the names of modules as they appear in the grid (which often differ from the titles of panels) are used throughout this manual.*



## Lane Mixer

Below the main grid is what looks like a 4-channel mixer. Indeed, this is where you adjust the pans/volumes and select envelopes as well as routing to the [FX grid](#) for each lane.



4 channel lane mixer

### Mute

A handy mute button for each lane. In the image above, lane 2 is muted.

### FX Bus Select

Where to route the output of each lane:

*main*.....to the left lane of the FX grid (MAIN)  
*bus1*.....to the center lane of the FX grid (BUS 1)  
*bus2*.....to the right lane of the FX grid (BUS 2)

### PAN / MOD

Pan position with assignable modulation knob. Right-click on the Pan knob to toggle between *pan* and *balance* modes. Remember: Balancing to the left means losing the right channel of your stereo signal, while panning means moving it over to the left.

### Amp Envelope

Selects which envelope is used for that lane.

*Env(n)*.....envelopes 1 to 4  
*Gate*.....a simple on/off envelope, smoothed a bit

### VOL / MOD

Lane volume and assignable modulation knob. Modulation here *scales* the volume from 0% through 100% (center) to 200%. In the example above, the modulation wheel fades lane 1 down to silence, irrespective of the VOL level (which is about 70 here).

Tip: To fade in from zero, convert the modulation wheel to bipolar using a ModMapper containing a ramp. Then use MMap1 as MOD source, set MOD to 100 and VOL to 50.

## Performance Window

Zebra's performance window is opened by clicking on the **PERFORM** button in the upper bar. The four X/Y pads can control up to 16 parameters each, all at the same time.

By convention all presets ending with the '+' character make use of X/Y pads.



*the PERFORM window, with an 'XY' panel selected below*

- Click anywhere to jump to a new position – find different variations of the sound
- Click and drag to move smoothly – for realtime performance
- Double-click to reset to the center
- Right-click for additional functions (currently *Lock* plus four fixed presets)

Next to each pad is an area where you can add some text e.g. a functional description as in the above image. Simply double-click in the text area.

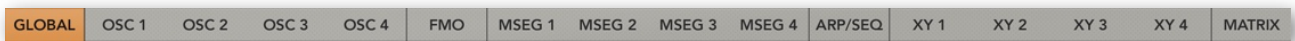
Clicking on the [≡] icon of each pad replaces that text with a list of X/Y assignments. You can even edit or add X/Y assignments without opening the XY panel in the lower pane. Even drag&drop assignment also works (see the image), but as the racks are not visible, this is more of a convenience than a full-blown feature.

For details about how to program the X/Y pads [go here](#).

## Lower Bar and Lower Pane

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The lower bar switches the contents of the *lower pane*:



### GLOBAL

Output levels, the FX grid and FX panel, miscellaneous preset settings. [Go there](#)

### OSC1 to OSC4

Wave Editor, oscillator load/save, miscellaneous oscillator settings. [Go there](#)

### FMO

Additional settings for all 4 FMOs. [Go there](#)

### MSEG1 to MSEG4

Multi-Stage Envelope Generators. [Go there](#)

### XY1 to XY4

For programming the X/Y pads. [Go there](#)

### ARP/SEQ

For programming the arpeggiator / sequencer. [Go there](#)

### MATRIX

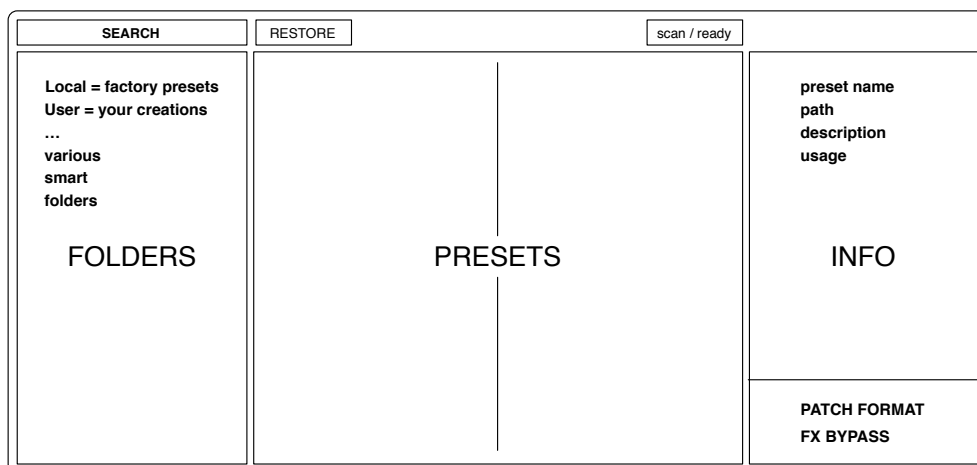
The modulation matrix. [Go there](#)

*Note: The lower bar and lower pane remain active in all window modes.*

# Preset Browser

## Overview

To open Zebra's preset browser, click on the **PRESETS** button in the upper bar.



Folders are on the left, presets in the centre and information about the currently active preset on the right. If you can't see any presets, click on *Local* then on one of its subdirectories (for instance *1 Basics*). If you don't see the INFO panel on the right, click on the [≡] button in the top righthand corner and tick *Show Preset Info*.

### Default, initialize

Whenever Zebra2 is started it checks whether the Local root contains a preset called default. If this file exists, it is loaded instead of the standard demo sound. So if you want a simple template every time you start a new instance of Zebra2, do this: Right-click on the data display and select *init*. Select the Local folder and SAVE this preset under the name *default*. Note: It will not appear in Zebra's browser. If a fresh instance doesn't load your new *default*, it probably landed in the *User* folder instead. In this case you should change the *Save Presets To* setting (see [Preferences](#)).

### Patch Format

At the bottom right of the browser you can specify the format in which your patches will be saved. The default setting is u-he's proprietary *.h2p*. To save in your plugin version's native format, select *native*. However, we recommend *.h2p* because patches in this format can be directly exchanged between different computer platforms. The *.h2p* files are editable text except for a block of compressed data at the end. More readable still is the *.h2p* extended format, as it includes comments for each line.

### Save Only Active Modules

If switched on, data from unused modules will not be saved with the preset. The main advantage is that the *.h2p* files are then smaller. The disadvantage is that newly created modules will adopt settings from previously loaded presets, which can be confusing.

### Bypass Effect

Mirrors the FX BYPASS button in the GLOBAL panel. Click on this button to temporarily deactivate all effects in the grid. Note that the BYPASS switch is truly global – you won't hear any effects in any of your presets on any day of the week until you deactivate it!

## Folders Panel

### Local and User Folders

The factory presets are sorted into folders 0 through 9. We recommend that you do not add or remove any presets in 'Local', but save all your work in the 'User' folder. You can either select the *User* folder before saving, or set a global preference ensuring that presets will always be saved to *User* – see the *Save Presets To* [preference](#).

### MIDI Programs

As well as factory presets, 'Local' also contains a special folder called 'MIDI Programs'. When the first instance of Zebra2 starts, all presets in that folder (up to 128) are loaded into memory so they can be selected via MIDI Program Change messages. It is best to rename them to be sorted by number e.g. '000 rest-of-name' to '127 rest-of-name'.

'MIDI Programs' can contain up to 127 sub-folders, switchable via MIDI Bank Select messages (CC#0). Send *Bank Select* first, then *Program Change*. 'MIDI Programs' itself is bank 0, then sub-folders are addressed in alphabetical order starting with bank 1. Important - 'MIDI Programs' cannot be added, removed or renamed on the fly – any changes to that directory will only be updated after the host application is restarted.

### Smart Folders

These are not regular folders, but the results of querying a database of the presets. The content is therefore dynamic; it will change whenever the underlying data changes.

*Search History* displays the results of past searches. To make those results permanent, right-click and select *save Search...* To remove all searches from the list, right-click on 'Search History' and select *clear*.

*Saved Searches* contains 'Search History' entries saved via right-click. To remove entries, right-click and *delete*. Items dragged from 'Saved Searches' and dropped into 'Local' or 'User' will create a folder containing true copies of all the listed presets. This is quite a powerful tool for reorganizing your presets.

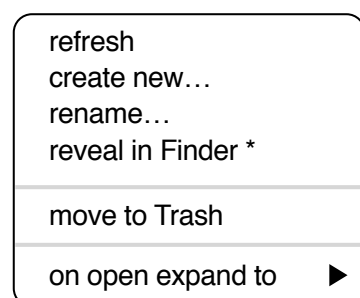
*Favourites* are 8 colour-coded folders – see Presets context menu on the next page.

*Junk* shows all junked presets. Presets dropped onto this folder are immediately junked; they will disappear from the rest of the browser unless made visible via *show junk*.

*Author* displays a folder for each *author name* as defined while saving. Presets dropped onto these folders will adopt the new author name.

### Directory context menu

Right-clicking on any folder within Local or User will open this menu:



*refresh*: Updates the contents of the browser. This becomes necessary after you have moved, added, deleted or renamed any folders or presets using Finder / Explorer.

*create new...* Insert an empty subfolder.

*rename...* Edit the folder name.

*reveal in Finder / open in Explorer*: Opens a system window for the clicked folder. Remember to *refresh* (see above) after editing anything in those particular system folders.

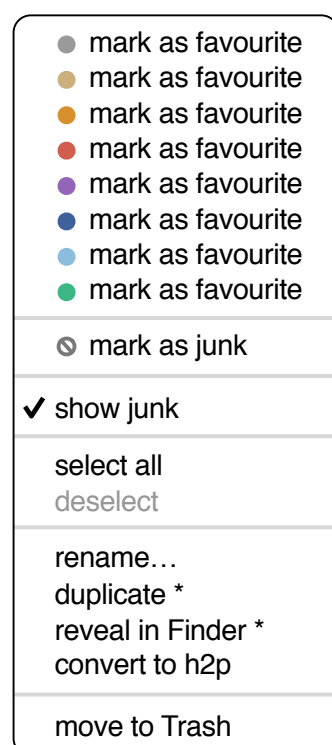
*on open expand to*: Determines how deeply nested directories will be opened whenever the GUI is loaded. The first option collapses all folders, while the final option reveals all folders, however deeply they are nested.

## Presets Panel

The central, unlabelled area of the browser is where you click to load presets...

### Presets context menu

Right-click in the preset list to open a menu containing the following functions:



*mark as favourite*: Choose one of eight 'favourite' marks. The selected entry will be replaced with *unmark as favourite*.

*mark as junk*: Instead of deleting any unloved presets, you can mark them as 'junk' so that they disappear from the browser...

*show junk*: Display junked files, marked with a STOP symbol.

*select all, deselect*: See 'Multiple Selection' below.

*rename*: Change the name of a preset. Note: Multiple presets cannot be renamed, but only the most recently selected one.

*duplicate / copy to User Folder*: The entry here depends on the status of the [preference Save Presets To](#) as well as on whether the source presets are in the 'Local' or 'User' folder. Selected presets are copied with a number appended to the name. Like 'Auto Versioning', this number increments so that presets cannot be overwritten by mistake.

*reveal in Finder (Mac) / open in Explorer (Win)*: Opens a system window for the preset. After making any changes there, please remember to *refresh* (see directory context menu)!

*convert to native / h2p / h2p extended*: All selected presets are converted into the format specified by either right-clicking on the [SAVE] button or changing the PATCH FORMAT (bottom right of the browser window).

*move to Trash / Recycle Bin*: Moves the selected preset(s) to the system trash.

### The RESTORE button

You can use the browser to audition any presets without losing track of the one that was previously loaded. [RESTORE] reloads and reveals that preset in its enclosing folder.

### Scan / Ready

Progress indicator for *refresh* (see *Directory context menu* on the previous page). It is best not to close the plug-in or the host while the scan is in progress.

### Multiple selection, drag & drop

A block of adjacent presets can be selected via shift+click, and individual presets can be added to an existing selection via cmd-click (Mac) / alt+click (Win).

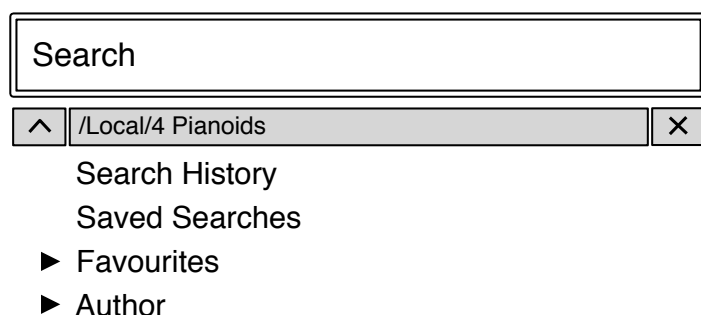
Presets can be moved to a different folder via drag & drop. Use SHIFT etc. on your computer keyboard to highlight the files you want to move, click and drag them from the files area and drop them onto a target folder. To deselect, either click on an unselected preset or choose deselect from the context menu.

# Search

## Function

The text field at the top left of the browser lets you search for presets according to a text string. The search normally looks into the preset name, author name, DESCRIPTION and USAGE (see the INFO panel). The search is not case-sensitive. Quotes are not required unless you need to include spaces.

If you want to restrict the search to a particular path e.g. *Local/04 Pianoids*, double click on the *04 Pianoids* folder. This path appears below the Search field, and you will still see the smart folders:



The [^] button to the left moves the search path up one level, in this case to /Local. The [x] button to the right sets the search path to the default 'Local' and 'User' (all Zebra2 presets), and the regular preset folders become visible again.

Try a text search: Enter three or four letters then hit *Return*. For instance, *star* will find all files containing the text string *star* (e.g. *mustard* or *starters*). Entering "star wars" (with the quotes) would find e.g. *Battlestar Warship*, if such a string existed in a preset.

## Syntax

### Scope

You can limit the search to just the preset name or parts of INFO by using *name*, *author*, *desc* (*description*) or *use* (*usage*) followed by a colon. For instance, *author:the* finds all presets by authors whose names include 'the'. Similarly, *desc:space* will find all presets with the word *space* in the description.

### Logic

AND requires that presets contain both words. The AND is implicit, but can be written explicitly if you prefer: For example, *star AND wars* (or simply *star wars*) will find presets that contain both *star* and *wars*.

OR only requires that presets contain one of the words. For example, *star OR wars* will find presets that contain *star* as well as presets that contain *wars*. Or both.

NOT excludes presets containing the word. To find all presets that contain *star* but do not contain *wars*, enter *star NOT wars*.

### Examples

<i>brass OR string</i>	'brass' or 'string' appear in the Name, Author, Description or Usage
<i>brass string</i>	both 'brass' AND 'string' appear somewhere
<i>use:vibrato</i>	'vibrato' appears in Usage
<i>"at ="</i>	aftertouch usage is mentioned

# Global Settings

To open this panel, click on the GLOBAL tab in the lower bar.



*Lower pane, the GLOBAL panel*

## PITCH

### Transpose, Fine Tune

Shifts the overall pitch within a range of +/- 24 semitones and +/- 50 cents.

### - Bend +

Sets pitch bend ranges, independently from 0 to +/- 48 semitones.

## GLIDE

### Mode

*time*..... However far apart notes are, glide will take the same amount of time.

*rate*..... When notes are further apart, glide is proportionally slower.

### Range

Full-range portamento in polyphonic synths is often an 'overkill' effect, and therefore not generally useful. The Range parameter addresses this problem: Lower values shift the beginning of the slur closer to the target note – great for 'sloppy' intonation effects!

### Glide, Glide2

A smooth pitch transition between consecutive notes. Glide affects the Key Follow modulator, so it is applied to all modules that include this parameter (OSCs, FMOs, Combs, VCFs and XMFs). Glide2 is a bipolar offset for the even-numbered modules. The modulation source KeyFol2 is the same as KeyFol, but includes the Glide2 offset.

## VOICES / MODE

### Maximum Voices (VOICES)

To prevent glitches while running complex, CPU-intensive presets, you can reduce the maximum number of notes that Zebra2 will attempt to play at once. Due to intelligent voice allocation, these numbers are only approximations.

*Few*..... 4 notes

*Medium*..... 8 notes

*Many*..... 16 notes

**Voice Drift**

When set to On, each new note is slightly detuned, emulating the imprecise pitch of classic analogue oscillators. Switch this off for absolute precision.

**Voice Mode (MODE)**

*Poly*: normal polyphonic.

*Retrigger*: monophonic, each new note triggers the envelopes.

*Legato*: monophonic, envelopes continue i.e. they are not retriggered until you leave a space between consecutive notes. Enables more interesting musical phrasing.

*Arpeggiator*: polyphonic, triggers and pitch offsets etc. are defined in the Arp/Seq panel.

*Duophonic*: emulates an interesting feature of a few classic analogue synths which offered both low note AND high note priority. Zebra's duophonic mode distributes modules like this: odd-numbered OSC, FMO, Comb, VCF and XMF modules follow the lowest note, while even-numbered modules follow the highest note. Glide rates (see Glide2 on the previous page) can also differ, and there is a even a 'KeyFol2' modulation source that includes the Glide2 offset.

## MICROTUNING

**Microtuning**

Zebra2 supports standard .TUN microtuning tables. Tuning tables are available online, and most of them are free. Put .tun files into the following folder on your hard drive...

Win: `C:\Program Files\vst plugins\u-he\Zebra2.data\Tunefiles`

Mac: `~/Library/Application Support/u-he/Tunefiles`

...or equivalent locations in accordance with your VST and Zebra2 installation paths.

**Soft Attack**

Instantaneous attack times allow clicks at the start of each note to become audible. To avoid this (quite natural) effect, switch Smooth Attacks on.

## SWING

**Swing Generator**

In most synthesizers, 'swing' is only applied to the timing of an arpeggiator or mini-sequencer. In Zebra2, it also affects any synchronized LFOs. Set a rhythmic basis in the popup menu and a swing factor using the knob. Trial-and-error is often the best strategy here. Note that the indicator will stop flashing if swing is set to zero.

**Bypass FX**

Click on this button to deactivate all effects in the grid. A preset already drenched in effects can be difficult to edit methodically, and in such cases it's a good idea to temporarily deactivate them. Tip: I often catch myself forgetting to reactivate the effects – so if all your presets sound strangely lifeless today, check the status of Bypass FX!

# Generators

## OSC main panel

To state that the Zebra2 oscillators are ‘highly flexible’ would be a huge understatement. They are so powerful that the Zebra2 package includes an extra instrument called Zebralette (just one oscillator transplanted into a much simpler synth framework). The Zebra2 ‘OSC’ module looks like this:



*oscillator panel with the MIXER sub-panel selected*

The button next to the module label is for loading oscillator presets (see [Oscillator Preset](#)).

## Switches

### Stack

Selects single or polywave i.e. 2, 4 or 11 stacked oscillators. The *eleven* mode is much more than a “supersaw”, as the polywave effect can be applied to any waveform at all.

### PWM

Adds an inverted copy of the waveform. Applied to a sawtooth, phase modulation creates an effect very similar to classic PWM (only the phase of the original wave is shifted around, while that of the inverted copy remains fixed). See PHASE below.

### Sync

Activates oscillator-internal hard sync. See PHASE below.

### Reset

Causes the oscillator to start at the same phase position each time.

## Knobs

### Wave

Position (index 1–16) in the waveset. Unlike the row of selectors below the wave editor, this knob lets you set intermediate values. The next knob to the right is for wave modulation ( $\pm 16$ ). How smoothly or precisely waves are interpolated depends on the oscillator’s [Resolution](#) setting.

The true center of the waveset is actually 8.5, and a modulation depth of 7.5 from a bipolar source is enough to reach both limits of the waveset: ( $8.5 - 7.5 = 1$  and  $8.5 + 7.5 = 16$ ). The knob to the right is for wave index modulation – right-click to select a source!

## Tune

Oscillator pitch offset (+/- 48 semitones). Of course you can hold down SHIFT for even finer control, but there is also a Detune knob to the right. The next knob to the right is for Tune modulation (+/- 48 semitones). Right-click to select a source.

## Detune

Detune actually has two slightly different meanings, depending on the polywave setting: In Single mode it is for fine tuning (+/- 50 cents). In Dual, Quad or Eleven modes it does not lower or raise the overall pitch of the oscillator, but spreads detuning equally. Of course you can still fine tune the oscillator via Shift+Tune.

## Vibrato

The amount of pitch modulation directly from LFO1 (0 – 100). The maximum depth here is only +/- 50 cents – for deeper vibrato, click on the assignable ‘...’ control to the right of the Tune knob, and select LFO1 from the list.

The oscillators in Zebra2 may appear quite harmless, but there is a lot more than meets the eye. Apart from the extra parameters in the [lower panel](#), oscillators have 3 switchable sub-panels, *Phase/Sync*, *Osc FX* and *Mixer*, selected via the buttons at the top right...

## PHASE

Click on the oscillator’s **PHASE** tab:



### Phase/PW

Adjusts the oscillator phase (from 0° to 180°, but you can modulate it up to 360°). Rapid phase modulation normally affects pitch, but if the PWM switch (see above) is on, the effect is similar to pulse width modulation (PWM).

### Sync

Offset for the oscillator-internal hard-sync effect. This classic ‘analogue’ sync adds a lot of upper harmonics.

## OSC FX

Click on the **OSC FX** tab:



The oscillator waveform can be processed by a couple of **spectral effects**, which are routed in series (left > right).

To select a spectral effect, click on the **label** of an upper knob. Adjust the value and/or modulate to taste using the assignable control. Here, the *Scrambler* effect is set to zero, but is modulated by the pitch bender.

Note: When modulated, the speed and smoothness of most of the spectral effects are highly dependent on the oscillator’s [Resolution](#) setting.

## List of spectral effects

<i>Fundamental</i>	Adjusts the level of the fundamental. Range = -200% (inverted) to +200%. At the central position, the fundamental is inaudible.
<i>Odd for Even</i>	Even-numbered harmonics are cross-faded into odd harmonics. This results in a more 'squarish' waveform (square waves contain only odd harmonics). With negative values, the opposite applies – odd harmonics become even harmonics.
<i>Brilliance</i>	Boosts (positive) or attenuates (negative) higher harmonics, resulting in brighter or darker waveforms.
<i>Filter</i>	A combination of lowpass (negative values) and highpass (positive values) filters. Because in reality the 'filter' code only manipulates amplitudes, its slope is more than 100dB/octave.
<i>Bandworks</i>	A combined bandpass (positive) and notch filter (negative).
<i>Registerizer</i>	Boosts any octaves of the fundamental while attenuating all other harmonics, often resulting in an organ-like sound.
<i>Scrambler</i>	Similar to operator feedback in FM synthesizers: the phase of the waveform is modulated by the wave itself, creating many new overtones. If you need dirty-sounding digital oscillators, this is the one.
<i>Turbulence</i>	Periodically shuffles the harmonics at random. Even if not modulated, the speed of this effect is dependent on the oscillator <a href="#">Resolution</a> . Turbulence is useful in SpectroBlend mode with only a few harmonics.
<i>Expander</i>	Expands (or contracts when negative) the spectrum. Similar to brilliance if the harmonics are distributed evenly.
<i>Symmetry</i>	Contracts the waveform towards the beginning or end of its cycle. Often sounds like pulse width modulation – and for a square wave, that's precisely what it is!
<i>Phase Xfer</i>	A variant of PD (phase distortion) synthesis. The original waveform is not output directly, but is used as the phase response of an extra sine wave – which you can hear when the value is zero.
<i>Phase Root</i>	The original wave multiplies the phase response of the sine wave.
<i>Trajector</i>	The original wave adds to the phase response of the sine wave. Like phase modulation in 'FM' synthesizers – try Trajector on a pure sine.
<i>Ripples</i>	Multiplies the waveform with a variable harmonic, resulting in quasi-resonant sounds.
<i>Formanzilla</i>	Multiplies the spectrum of the waveform with a variable harmonic, resulting in formant-like spectra with several strong peaks and troughs.
<i>Sync Mojo</i>	Simulates hard sync by contracting the time axis then writing the waveform back into wave memory.

<i>Fractalz</i>	Like Sync Mojo, except that the already contracted wave is contracted again etc.. This results in a fractal waveform with even more harmonics than Sync Mojo. Fractal structures can be found in nature (try googling the word 'fractal').
<i>Exophase</i>	A classic 7-stage phaser is applied to the original wave. This effect is equally useful for static coloration or resonant sweeps.
<i>Scale</i>	The relative amplitudes of harmonics are scaled, either to the power of 2 (negative, softer) or 3 (positive, brighter). This results in finer resolution of quieter harmonics, and therefore more precise control over the overtone structure.
<i>Scatter</i>	Similar to the Scrambler effect (see above), but in this case the phase of the waveform is modulated by itself squared (i.e. to the power of 2). An FM triangle or square from a pure sine or absolute chaos from a sawtooth – Scatter is flexible.
<i>ChopLift</i>	Negative values raise an amplitude threshold below which all harmonics are faded out (Chop). Positive values raise the levels of fainter harmonics (Lift).
<i>HyperComb</i>	Adds 3 copies of the original wave to the wavetable. For positive values (only), the phases are randomly shifted, resulting in a subtle to dramatic effect similar to chorus. Even when not modulated, positive HyperComb is dependent on the value of oscillator <a href="#">Resolution</a> .
<i>PhaseDist</i>	Phase distortion, as in the '80s Casio CZ series of synthesizers. The wave acts as a function for the phase of an inverse cosine. The amount knob crossfades between no effect and full effect, so the most dramatic uses of this effect involve modulating the Wave index.
<i>Wrap</i>	Inverts parts of the wave that extend above or below a variable threshold. The limits for multiple wrapping are greater with negative values.

## MIXER

Click on the oscillator's **MIXER** tab:



### Pan

Panorama shifts the stereo position to the left or right.

### Volume

Oscillator output level.

### Width

If the oscillator's STACK setting is *dual*, *quad* or *eleven*, this knob controls the stereo separation of the polywave. Does nothing if STACK is set to 'single'.

## OSC Lower Panel

Center-stage in the oscillator's lower panel is its [Wave Editor](#). To the left is a sub-panel containing the following elements...



### Preset

This button is used for loading / saving complete oscillator templates. Left-click to select a preset from a small floating window, or right-click to open a drop-down menu instead. Or select **save oscillator settings** from this menu to store a complete oscillator.

Note that all modulation assignments (e.g. Wave modulated by LFO2) ARE oscillator settings, while the settings in the modulation sources themselves are NOT. This means that an oscillator preset might not sound the same as when you saved it – for instance if the original LFO2 was a 1/16 square wave but the current one is a 10s triangle.

FYI the oscillator presets belong in the following locations:

Win: ...\\VstPlugins\\u-he\\Zebra2.data\\Modules\\Oscillator\\

Mac: ~/Library/Application Support/u-he/Zebra2/Modules/Oscillator/

### Waveform

This button selects the basic mode for the current oscillator: *Geomorph*, *SpectroMorph*, *GeoBlend* or *SpectroBlend*. All will become clear in the next few pages...

### Renderer

Affects how brilliant/sharp the oscillator is. Tip: Only switch to *Crisp* if you really need the extra spikes and are not overly concerned about aliasing.

### Norm (normalization)

The output level of the generated wave is analyzed (RMS), then low-level waves are boosted so that the final level would be 0dB if Normalize were at 100%.

High normalization values are OK for boosting most low-level waves, but please keep them lower on very spiky waves – unless of course you enjoy blasting a lot of high frequencies through your system!

### Resolution

This parameter controls the interval (in time) between successive waveform calculations. This trick ensures that Zebra2 is still very CPU-efficient compared with other synthesizers that calculate their waveforms in realtime.

The range is 4 seconds (at 1.00) to less than one millisecond (at 9.00). Theoretically, high resolution leads to more precise transitions **at the cost of higher CPU load**.

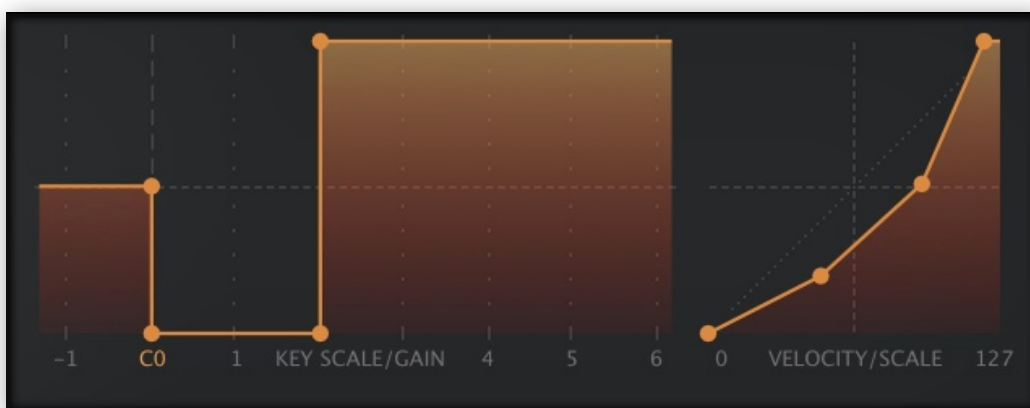
Low resolution can actually make transitions smoother (intermediates are interpolated), but can also introduce other unwanted effects (e.g. during rapid pitch-modulation). For most purposes, the default value of 5.00 is best.

### KeyS (key scale)

MIDI note to oscillator pitch, centered around the note E2. A bipolar 'KeyFol' for the oscillators. Set to 100.00 for perfect semitones.

## Scaling

To the right is a sub-panel containing graphic controls for scaling the oscillator gain...



### KEY SCALE / GAIN

OSC gain (volume) scaling by MIDI note. The horizontal axis is MIDI note (8 octaves) and the vertical axis is oscillator gain. Note that this feature is independent of the oscillator's Volume control. It can be used to balance oscillator volumes across the keyboard or even define 'keyboard splits' between them.

### VELOCITY / GAIN

OSC gain (volume) scaling by velocity. The horizontal axis is MIDI velocity and the vertical axis is oscillator gain. Note that this feature is independent of the oscillator's Volume control. It can be used to create velocity cross-fades between oscillators or even define 'velocity switching' between them.

## OSC Wave Editor

The Wave Editor is where you create your own waveforms. As the editor manages up to 16 different waves per **Waveset**, it includes a **Wave Selector** bar below the editing area:



The wave selector has almost the same function as the Wave knob in the oscillator's main panel – if you adjust one, the other will move accordingly. Unlike the Wave knob, however, the selector doesn't allow intermediate values (e.g. Wave = 1.5).

## Mouse operations in the Wave Selector

Some extra features that work with multiple waves:

### *rearrange*

(Mac) alt + drag

(Win) ctrl + drag

### *morph or blend*

(Mac) cmd + click on the desired target wave

(Win) alt + click on the desired target wave

### *duplicate*

(Mac) alt + cmd + click on the desired target wave

(Win) ctrl + alt + click on the desired target wave

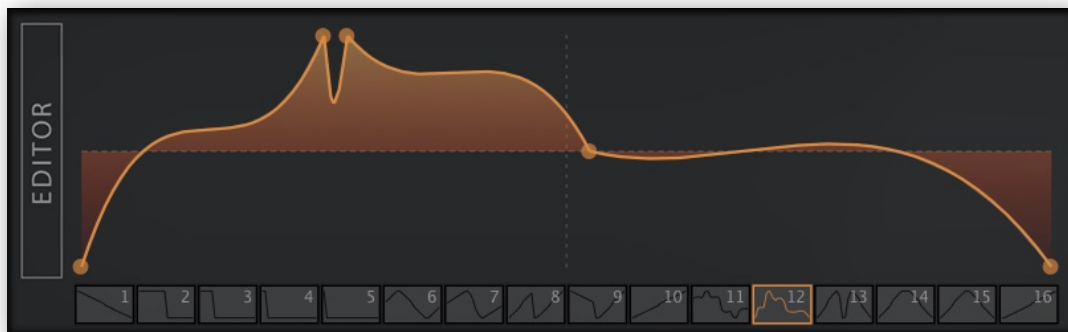
### *context menu (right-click)*

Morph / blend, duplicate or exchange this wave with the currently highlighted one

## GeoMorph & SpectroMorph

Although there are four oscillator modes, only two editing methods are necessary. This section describes the 'Morph' waveform modes, and how to edit them...

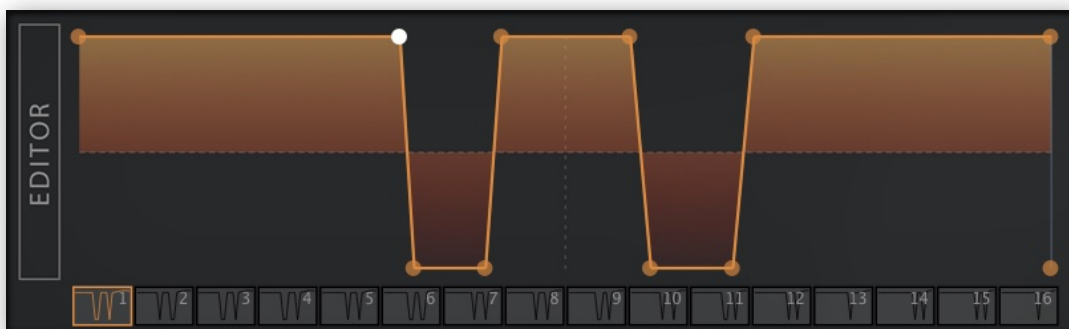
### GeoMorph



*a curvy GeoMorph wave*

GeoMorph mode lets you draw waveforms by positioning up to 32 handles, and adjusting the curvature of the lines between them. Note that the first and last handles cannot be deleted or moved horizontally – they define the level at 0° phase. The minimum number of handles is 4, and all waves in the waveset adopt the same total number.

### SpectroMorph



*typical SpectroMorph wave*

Although it looks and feels like GeoMorph, SpectroMorph is a very different animal! It does not depict a waveform directly, but rather its spectrum. 1023 harmonics in the horizontal axis are scaled logarithmically for a total range of about 10 octaves. In this mode, a horizontal line spanning the width of the editor so that all harmonics have equal levels creates a bright saw wave. By the way, the example above is a bright saw (the upper horizontal line) with two rather wide troughs – practically a dual band-reject filtered saw.

## Mouse operations in GeoMorph and SpectroMorph modes

*create or remove a handle*

(Mac) cmd + right-click

(Win) alt + right-click

*multiple selection*

Click in the background and drag over one or more handles

Shift + click on a handle to add or remove it from the selection

To move all selected handles, click and drag one of them

*adjust curvature (left, right)*

(Mac) alt + drag, cmd + drag

(Win) ctrl + drag, alt + drag

Experimenting with the curvature is better than a (necessarily) long-winded explanation.

*context menu (right-click in the editor window)*

insert point..... creates a new handle (appears in all waves in the waveset)

smooth..... adjusts all curves in the selection for minimum spikes.

linear..... straightens all curves in the selection

peaks..... adjusts all curves in the selection for maximum spikes

distribute all..... adjusts the horizontal positions of all handles for equal spacing

line up selected..... line up all handles with the leftmost / rightmost in the selection

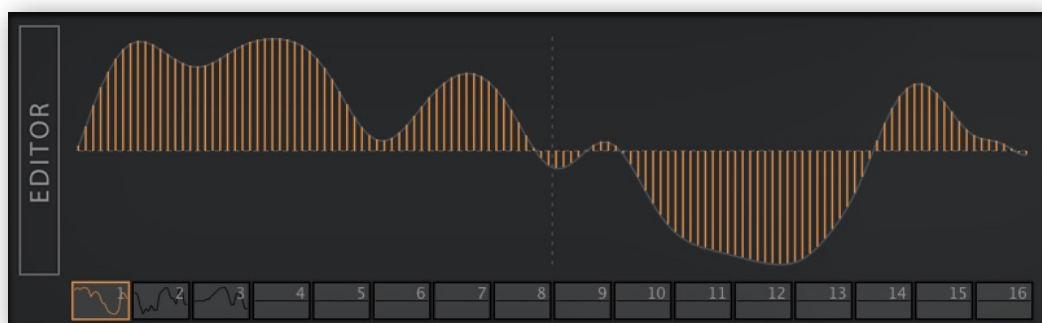
clear..... resets all handles to minimum level

copy / paste..... transfers wavesets between oscillators (also between presets)

## GeoBlend & SpectroBlend

This section describes the two 'Blend' waveform modes, and how to edit them...

### GeoBlend



*Typical GeoBlend wave*

A single cycle is defined by 128 columns. GeoBlend is similar to GeoMorph in that it reflects the actual shape of the wave. However, when the morph function is used or the

wave index is modulated, waveforms are not morphed, they are *blended*. The main advantage of GeoBlend over GeoMorph is that waveforms can be drawn freehand.

GeoMorph wavesets can be extracted from audio sources. A few third-party utilities are available for this purpose (try googling 'Wav2Zebra' and 'Blueberry Thing'), but they do require some dedication.

## SpectroBlend



*Typical SpectroBlend wave*

The spectrum is represented by 128 bipolar columns. Similar to SpectroMorph except that it has fewer harmonics, and these are scaled linearly for a total range of six octaves.

The lower half is 'anti-phase', so the same harmonic in adjacent waves (e.g. 1 and 2), but with opposite phases, can cancel each other out (at exactly 1.50 in this example). This cancellation effect can be put to good use – see the oscillator preset 'Bells Flipper'.

The main advantage of SpectroBlend over SpectroMorph is the total control over individual harmonics, including polarity. Waves are not morphed in this mode, they are *blended*.

## Mouse operations in GeoBlend and SpectroBlend modes

### *draw freehand*

click + drag

### *draw a straight line*

(Mac) alt + drag

(Win) ctrl + drag

### *reset sections to zero*

(Mac) cmd + drag

(Win) alt + drag

### *context menu (right-click)*

blur.....softens transitions between columns

sharpen.....accentuates transitions between columns

maximize.....sets the highest column to maximum, scales the rest accordingly

copy/paste.....transfers wavesets between oscillators (even between presets)

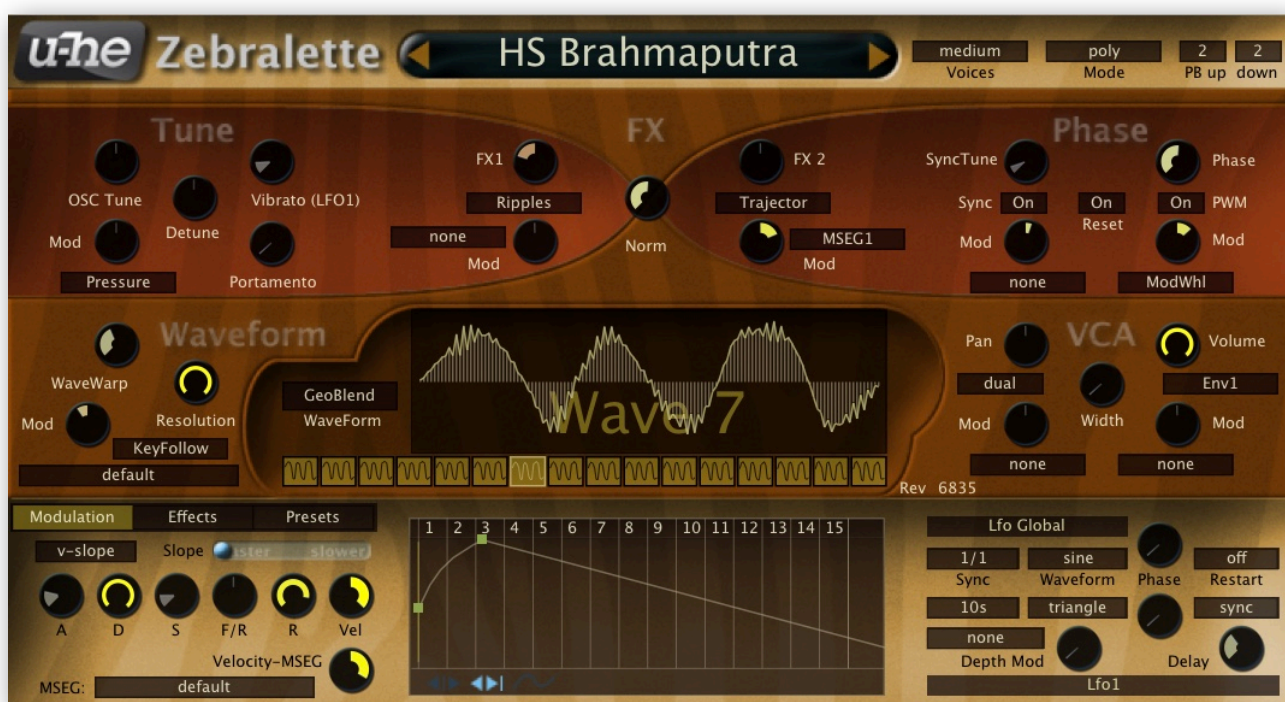
## Expand

For a larger EDITOR, click on the vertical label to the left of the data area. To exit again, click on the same button, which has been conveniently renamed “CLOSE”.

While an oscillator is expanded, the lower pane contains a copy of the oscillator panel as it appears in the generators rack. Note: The expanded editor requires a modern processor, otherwise it can react too slowly for comfort.

## Zebralette

Making your own sounds in Zebralette (freeware!) is the best way to become a real Zebra2 oscillator expert, as there is zero risk of being distracted by all the other Zebra2 features. You can load Zebralette programs into Zebra2. Zebralette comes bundled with the Zebra2 package, but has its own (separate) manual.



## FMO main panel

FMO stands for Frequency Modulation Oscillator, and this module is indeed closely related to the famous Yamaha DX7. Compare the Zebra2 preset *HS DY7 Add Pad* with the typical DX7 e-piano sounds of the 1980s, which were often layered with analogue pads.



*the FMO module panel*

### TYPE (input mode)

*FM by input:* The FMO is modulated by its input, and the FM knob controls input level.

*FM self (+):* The FMO modulates itself for a brighter tone approaching a sawtooth. Note that FM values above 50% can produce some interesting digital noise.

*RM input:* The FMO is actually ring-modulated with its input. No FM here!

*Filtered FM:* Like FM by Input mode, except that the FM knob opens a lowpass filter instead of setting the input level (which is fixed at 100%). This results in a warmer tone.

*FM self2 (+):* Like FM Self (+) except that the input signal is the output squared. Great for triangular / squarish tones, including a pure 'shark-fin' wave when the FM depth is somewhere between 25 and 30.

### Mono / Stereo

Like the OSC module, the FMO can also run in stereo mode. This is hardly noticeable unless the FMO is detuned and Width is turned up because, unlike OSC modules, the phase of an FMO is always reset to zero when a note is played.

### Tune

FMO pitch offset (+/- 48 semitones).

### 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 and flattens the right channel at the same time. Of course you can still fine tune the FMO via Shift+Tune.

### Width

Stereo spread while the FMO is in stereo mode.

### Vibrato

The amount of pitch modulation directly from LFO1 (0 – 100). The maximum depth here is only +/- 50 cents. If you need deeper vibrato, click on the assignable knob below 'Tune', select LFO1 from the list and set the amount to about 1.00.

**Pan**

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

**Volume**

Output level.

**FM**

Generally FM depth / input level – see *TYPE* on the previous page for details.

## FMO lower panel

---

Like the standard oscillators, the FMOs use the lower panel for extra parameters. Unlike the standard oscillators, all four FMOs share the same panel:



*part of the FMO pane*

**Generator Mode** (rectangular icon)

Click to select from a list of alternatives to the standard sine wave. The current mode appears to the right of the icon – for the FMO1 in this screenshot it is *pure sine*., for FMO2 it is quadric shift.

**Key Scale** (unlabelled horizontal slider)

MIDI note to FMO pitch, centered around the note E2. A bipolar 'KeyFol' for the FMO modules. Double-click to set the default 100 (perfect semitones).

**KEY SCALE / GAIN**

FMO gain scaling by MIDI note. The horizontal axis is the full 8 octaves of MIDI notes and the vertical axis is the volume of the FMO from 0 to 100%, independent of the FMO's regular Volume setting. This feature can be used to balance volumes across the keyboard, for instance, or to define 'keyboard splits'.

**VELOCITY / GAIN**

FMO gain scaling by velocity. The horizontal axis is MIDI velocity from 0 (actually 1) to 127 and the vertical axis is the volume of the FMO from 0 to 100%, independent of the FMO's regular Volume setting. This feature can be used to create velocity cross-fades between oscillators or even define velocity-switching (see FMO1 in the above image).

## Noise

Noise has traditionally been used for percussive sounds, wind effects, explosions etc..



*the Noise module*

### TYPE

A choice of four different flavours of noise:

*White* is a random signal with equal power across the spectrum.

*Pink* is darker – high frequencies are attenuated by 3dB / octave.

*Digital* is a square wave with random polarity, like lo-fi oscillator. It can be played in tune if Filter1 is modulated by KeyFol with amount set to 64.00.

*Crackles* produces random impulses, like a Geiger counter or worn-out vinyl.

### Mono / Stereo

Even the noise modules can be stereo. See *Width* below.

### LP Cutoff, HP Cutoff

Lowpass and highpass filters. In both *White* and *Pink* modes, the LP is 6dB/octave, as is the HP. In *Digital* mode, the LP is actually pitch, while the HP adds more irregularities. In *Crackles* mode, the HP reduces the probability of impulses.

### Pan

Shifts the stereo position towards the left or right channels.

### Volume

Noise output level.

### Width

Controls stereo spread if the stereo switch is on. See *Mono/Stereo* above.

## VCF

VCF stands for Voltage Controlled Filter. Although there are no high voltages in Zebra2 pushing and pulling electrons around, but most of Zebra's VCF types are almost as 'alive' as their analogue forbears. Note: The VCF modules are less CPU-hungry than the XMF modules (see 2 pages down).



*VCF module panel*

## Filter Types

<i>LP Xcite</i>	24dB lowpass, with a frequency-dependent exciter as Drive, adding high frequencies.
<i>LP Allround</i>	CPU-friendly 24dB lowpass, with a strong resonance and smooth coloration via Drive.
<i>LP MidDrive</i>	Boosts mid-range frequencies via Drive, good for leads that can cut through the mix.
<i>LP OldDrive</i>	Adds even-numbered harmonics, for a vintage sound bordering on 'cheesy'!
<i>LP Formant</i>	Vocal filter type. Combines a non-resonant 12dB/octave lowpass with a resonant formant stage. The Formant parameter replaces resonance, and the vowel parameter morphs through <b>A–E–I–O–U</b> . Great for 'singing' voices and vocoder-like pads. Note: The modulation target of the righthand assignable knob is the <i>Vowel</i> parameter here!
<i>LP Vintage</i>	CPU-cheap analogue-modeled transistor ladder with 24dB rolloff.
<i>LP 12dB</i>	A 12dB version of LP Allround
<i>LP 6dB</i>	A simple lowpass with a very shallow rolloff, non-resonant
<i>BP RezBand</i>	A resonant 12dB bandpass model
<i>BP QBand</i>	Another resonant bandpass, with a different character
<i>HP 24dB</i>	Resonant 24dB highpass
<i>HP 12dB</i>	12dB version of the above
<i>BR Notch</i>	24dB band reject

<i>EQ Peaking</i>	Peak / reject filter, like parametric ‘mid’ on a mixing desk. Res controls the slope of the peak. Gain has a range of -20dB (deep notch) to +24dB (strong peak). This type has little or no effect if Gain is zero.
<i>EQ LoShelf</i> <i>EQ HiShelf</i>	Two shelving models, to complete the trio of ‘parametric EQ’ filters. Like in EQ Peaking, Gain attenuates or boosts the frequency range (low or high), and the Res parameter controls the slope.
<i>AP Phaser4</i> <i>AP Phaser8</i>	The two phasing models use 4 or 8 stage all-pass (AP) filters to generate typical phasing effects. Cutoff controls the center frequency, and Res controls intensity. In the Phaser8 model, the Split parameter detunes the 8 stages.
<i>LP Vintage2</i>	More CPU-intensive version of LP Vintage, capable of self-oscillation.
<i>SR</i> <i>Decimate</i>	Not really a filter, this is a sample-rate reduction processor. The Cutoff parameter controls rate, meaning it can be tuned harmonically (set KeyF to 100). Neither Res nor Drive are used.
<i>LP TN6SVF*</i>	<a href="#">TyrellN6</a> ’s state variable lowpass. An octave higher than other types!
<i>LP MS2035*</i>	Early version of <a href="#">Diva</a> ’s rev1 BITE lowpass
<i>LP S20SK*</i>	Early version of <a href="#">Diva</a> ’s rev2 BITE lowpass

\* the last 3 were included by mistake in a previous version of Zebra. Reintroduced for compatibility reasons, although the CPU hit is significantly higher than the other types.

## Controls

### Cutoff

The *Cutoff* determines a filter’s edge-frequency. Like all frequency parameters in Zebra2, the scale is in semitones, as tuning cutoff in musical terms makes more sense than the very scientific ‘Hertz’. With KeyF (key follow) turned down, the cutoff values of most filter types correspond to MIDI note numbers minus 12 (one octave). For instance, with cutoff set to 81.00 a filter would resonate at 440Hz (middle A).

### Resonance

Resonance is an internal feedback loop that emphasizes the cutoff frequency. In some filter types (e.g. EQ Peaking), this parameter is actually a Q-factor, the slope of a band centered around the cutoff frequency.

### KeyF

The ‘key follow’ parameter adjusts how strongly the cutoff follows MIDI notes (the higher the note, the higher the cutoff). At 100%, it follows semitones precisely.

### Drive / Gain

The Drive or Gain parameter of a filter usually adds some kind of distortion. In Zebra’s VCF this is more of a generic ‘flavour’ parameter – see the remarks in the above list.

## XMF

The XMF (cross-modulation filter) module is an extremely flexible multimode filter featuring self-oscillation, input-dependent distortion and audio-rate FM via the extra input. The XMF is more CPU-intensive than any of the VCF models.



*XMF module panel*

There are 15 filter types / combinations, but you actually have **two of these** in stereo, with differential cutoff. So if you ever need a 3-pole allpass in parallel (or series) with a 2-pole bandreject / lowpass combination... no problem!

Distortion in the XMF is highly dependent on the level of the input signals – they affect the sound as much as Overload does. You should try e.g. oscillator volumes as low as 2%!

## Filter Types

From top to bottom, the four switches in the window are: *Type1*, **Routing**, *Type2*, **Driver**.

### Type1

*LP4, LP3, LP2, LP1*..... Lowpass modes, 4 slopes (24, 18, 12 and 6 dB per octave).  
Note that even the 1-pole model is resonant.

*HP3, HP2, HP1*..... Highpass models, three different slopes

*BP4, BP2*..... Bandpass, two different slopes.

*BR2*..... Bandreject, 2-pole only

*AP3*..... Allpass, 3-pole only

*HP3LP, HP2LP*..... Combination of 3-pole or 2-pole highpass + 2-pole lowpass

*BR2LP*..... Combination of 2-pole bandreject + 2-pole lowpass

*AP3LP*..... Combination of 3-pole allpass + 2-pole lowpass.

### Routing (R)

Each XMF module has two stereo filters, which can be routed in four different ways:

*single*..... Standard mode. Actually two filters with stereo-splittable cutoff values for spectacular panning effects – try modulating Offset with an LFO.

*serial*..... Type1 filter is fed into the Type2 filter.

*parallel*..... Type1 and Type2 filters are output separately.

*diff'ed*..... The difference signal (Type1 minus Type2). Note that if the two types are the same and there is zero offset, the result is total cancellation.

**Type2**

*Same*..... Type2 adopts the Type1 setting. For all other options, see the Type1 list.

**Driver**

There are 5 options for the resonance/overload character. Note that output volumes can vary depending on the values of Res and Over (see below).

*XMF*..... Standard high-quality – plenty of bite.

*analogue*..... Classic ladder filter overdrive – warm / dark.

*biased*..... Diode-like asymmetrical distortion, for more even-numbered harmonics.

*eco*..... CPU-friendly version of *analogue*, lower quality Overload (see below).

*folded*..... Positive peaks that would otherwise clip are folded back down.

**Controls****Cutoff**

Cutoff determines the filter's edge-frequency. Like all frequency parameters in Zebra2, the scale is in semitones – tuning cutoff in musical terms makes more sense than the more scientific 'Hertz'. Cutoff values correspond to standard MIDI note numbers minus 12 (one octave), so 81.00 means a middle A (440Hz) before any modulation.

Note the two assignable cutoff modulation knobs in the top row.

**Res**

Resonance is an internal feedback loop that emphasizes the cutoff frequencies. High resonance is very interesting in combination with Overload. Set Resonance to maximum, and the filter will self-oscillate (see *Click* below).

**KeyF**

KeyFollow, the depth of cutoff modulation from MIDI note / keyboard. At 100%, it follows semitones perfectly. Note that the breakpoint (the key that doesn't change) here is E2.

**Offset**

Splits the cutoff values of the two channels, in semitones (+/-48). Great for panning effects with the standard *single* routing, or for multiple resonances in *serial*, *parallel* or *diff'ed* mode (see the previous page). *Offset* has a assignable modulation knob.

**FM**

For audio-rate cutoff modulation ('Filter FM') from the XMF's second input. By default, the FM source is the same as the input signal, but using a different FM source can be highly rewarding: right-click on the [XMF] cell to change the sidechain input to another lane – and put something in that lane! *FM* also has a assignable modulation knob.

**Over (overload)**

Pushes the filter 'too far'! For interesting distortion effects and general oomph. Note that high overload can amplify the signal a lot – you might need to reduce the level elsewhere e.g. the volume control of the lane you are using. See also *Character* above.

**Click**

Injects a short impulse into the filter at the start of each note. Turn up for harder attacks or more instantaneous self-oscillation.

## Comb

Comb filters are based on ultra-short delay lines with a feedback pathway. Even if the input is a very short impulse, the feedback loop can turn this into a slowly decaying tone. The frequency response curve resembles a regular row of spikes, hence the name.



*Comb module panel*

You can create envelope-driven polyphonic flangers, realistic plucked and bowed strings, flutes, mallet and other percussion instruments... but remember to turn up *Feedb*!

## Switches

### MODE

Zebra2 has what you could call a 'multimode' comb filter. Four delay lines connected together in various ways, but always in stereo. The options are:

*Comb*: A simple stereo delay tuned to the played note. In this mode, neither Tone nor Flavour have any effect.

*Split Comb*: Any input is summed to mono and fed to the first of two delays, which then cross-feed each other. In this mode, Tone is the ratio between the delay times and Flavour controls the amount of input signal fed (directly) into the second delay. The output is completely split: the left channel is delay 1 and the right channel is delay 2.

*Split Dual*: The same as *Split Comb* except that input signal is not summed to mono.

*Diff Comb*: The same as *Split Dual* except that the second delay is an allpass filter. Especially good for strange, complex sounds. The Flavour parameter is the feedback of the allpass filter. As non-harmonic frequencies can dominate the sound, you have to tune this one rather carefully.

*Dissonant*: A 4x4 feedback delay network which always sounds metallic. The Tone and Flavour parameters both affect the delay ratios (i.e. the pitches), but Distort is unused.

*Cluster*: Experimental mode. Left in for the moment, but very likely to be removed (or at least modified) in future updates. Use at your own risk!

*Blown*: This mode uses a bandpass filter in the feedback path to accentuate harmonics (modulate the Flavour parameter) rather than the fundamental. You can get very realistic flutes and trumpets etc., but it does require careful tuning.

## PREFILL TYPE

The comb filter includes an internal impulse generator so it can generate sound on its own. The impulse can have one of the following waveforms, click the button to the left of the PreFill knob:

*Noise*.....a short burst of white noise – bright, different characteristics for each note

*Saw*.....a single cycle sawtooth – full / warm

*Square*.....a single cycle square wave – hollow / nasal

## SOUND, OUTPUT

These tabs switch the bottom row of knobs – see the next page.

## Main controls



*Comb panel, main controls*

### PreFill

The level of the internal impulse signal. See *Impulse* above.

### Tune

Nominal pitch. The range is +/-24 semitones.

### Detune

For *Split Comb* this is normal fine tuning. In other modes it detunes in both directions.

### Vibrato

Amount of pitch modulation directly from LFO1 (0 – 100), with a range of +/- 50 cents.

### Input

Input level. Almost (but not quite) redundant, as all audio sources have output levels. However, the unprocessed (Dry) output allows low input and higher level throughput at the same time. See *Output controls* below.

### Damp

A 6dB lowpass filter in the feedback path simulates how a plucked string is naturally dampened by various physical constraints.

### Feedbk

Bipolar feedback level control. Negative values lower the pitch by an octave, and the timbre is more hollow.

## SOUND



*Comb panel, SOUND sub-panel*

### Tone

The function of this parameter changes from mode to mode. Usually a ratio between delay times. For details, see MODE above.

### Flavour

The function of this parameter changes from mode to mode. Usually a level within one or more feedback paths. For details, see MODE above.

### Distort

Distortion adds harmonics into the feedback. Use with caution!

### KeyScale

MIDI note to pitch, centered around the note E2. Effectively a bipolar 'KeyFol' for the comb. Leave at 100.00 for semitone steps (a double-click takes you straight to 100). For flanging and resonance effects, set KeyScale to 0.00 and take the Tune value down.

## OUTPUT



*Comb panel, OUTPUT sub-panel*

### Volume

Comb output level. Careful! If this reaches zero either through modulation or simply by turning down the Volume knob, the Dry signal suddenly shoots up to 100%. Whether this is a feature or a bug, it can make interesting rhythms – try modulating Volume from an LFO, and adjusting the Volume knob.

### Pan

Panorama shifts the stereo position of the processed signal towards the left or right. Pan does not affect the position(s) of the Dry signal.

### Dry

Unprocessed “throughput” from whatever is fed into the Comb.

### Width

Stereo separation of the processed signal. Does not affect the Dry signal.

## SB (Sideband)

The Sideband module is a stereo frequency shifter, the origins of which go back to the early days of radio. Related to ring modulation in which two signals are multiplied, resulting in two 'sidebands'. The Sideband module can also lend the signal a metallic character, as frequencies are shifted by a constant (e.g. 100Hz) instead of a factor (e.g. 2.00 times). While the 'beating' effect of mild oscillator detuning can become irritatingly fast when you play higher up the keyboard, frequency shifting keeps this effect constant.



*SideBand module panel*

### Range

The SB module offers 3 bipolar frequency range options, which all start at 0Hz (center):

10Hz.....for relatively slow-moving cyclical effects e.g. stereo phasing.

200Hz.....for low-frequency effects e.g. deep bells, rumbles... or even phone dial-tones

4kHz.....for high-frequency or very wide range effects

### Freq

Bipolar frequency shift. Positive values make the upper sideband louder.

### Offset

Bipolar offset between left and right channels. Great for stereo rotary effects. Offset can be used for a special kind of phasing that continually rises in the left channel, while continually falling in the right channel. Check this out in headphones: Set the range to 10Hz, Freq to zero, Offset to 2.00, Mix to 50 – and feed it a medium dose of pink noise!

### Mix

Bipolar cross-fade between the original signal and the frequency-shifted signal. Negative values invert the processed signal. For maximum phasing effects, set to +/-50.

## Shape

The Shapers are input level dependent distortion units with a choice of 4 algorithms.



*Shaper module panel*

### TYPE

*Shape:* Classic waveshaper. The Depth parameter adds a DC bias before the shaper, making it positively asymmetrical (for even-numbered harmonics like 'tube' distortion). Note that the DC bias can considerably reduce signal level.

**T-Drive:** Frequency-dependent waveshaper, like a transformer. Can boost 'presence'.

**Crush:** Bit-reduction via Depth knob. Neither Input nor HiOut are used in this mode.

**Wedge:** A high-order waveshaper with foldback function (loud signals can become silent or even phase-inverted). Depth boosts the input signal, a locally modulatable distortion amount. Placed after a resonant filter, this type can emulate "acid basslines".

### Depth

Distortion threshold, effectively a distortion amount control. Like a guitar amplifier, every knob in this module affects the amount of distortion in some way or other!

### Edge

The main tone control.

### Input / Output

Attenuate / boost the input and output signals. Also affects tone...

### HiOut

Attenuates / amplifies high frequencies – the final tone control in this module!

## Distortion

The Distortion module creates traditional analogue-type saturation. If used in the FX Grid, it can mimic a complete guitar amplifier and speaker cabinet.



*Distortion module panel*

*input amp → pre tilt filter → distortion → post tilt filter → post filter → output amp*

### TYPE

**Tube Class A:** Simulates a complete tube preamplifier. Class-A is the 'traditional' type of tube distortion, creating both odd and even harmonics by using a single tube and applying DC bias. Due to the asymmetry of the operational curve, Class A distortion sounds relatively warm.

**Tube Class AB:** Simulates a preamplifier with two tubes in a 'push-pull' arrangement, which leads to symmetrical distortion with no even-harmonic partials.

**Tube 2 Stages:** Mimics a tube amplifier with two class-A stages in series. Like class A, this also creates odd and even harmonics, but the results are richer and more dynamic. This mode applies additional internal filtering and feedback for more sonic complexity. At high gain settings you should hear more pronounced treble roll-off and more bass lift.

**Hard Clip:** This mode simply chops off the top and bottom of the waveform.

*Rectify*: Full-wave rectification. The negative half-wave becomes positive and the resulting waveform is fed through a DC-blocking filter. Interesting note: A pure triangle wave will be simply doubled in frequency, without altering the waveform.

*Foldback*: Also known as 'fold-over distortion'. *Foldback* is similar to soft clipping, except that increasing the gain does not slam the signal against the ceiling (it reduces the gain instead). Listen out for strange intermodulation artifacts!

### Input

Sets the gain (in decibels) at the input.

### Output

Sets the final output gain. Note that this stage includes soft clipping, which can create even more distortion when turned up 'too high'

### Pre Tilt

A combination of low and high-shelving EQ is applied to the input signal, and Pre-Tilt makes the distortion frequency-dependent (at zero, the response remains flat). Negative Pre-Tilt strengthens the bass and dampens the treble, positive values strengthen the treble and dampen the bass.

### Center Freq

Combined low and high shelf frequency control.

### Post Tilt

Use this to balance the tone (in a similar manner to Pre-Tilt) *after* the distortion.

### Low and High

In *Dual-Band Shelf* mode (see Post Filter below), these knobs control the gains of the shelving filters. In *Guitar Cab 4x12* mode they determine the amount of cabinet resonance i.e. bass and speaker 'edge'.

### POST FILTER

*Dual-Band Shelf*: This is a simple corrective EQ – a low shelf fixed at 100Hz and a high shelf fixed at 10kHz. See *Low and High* above.

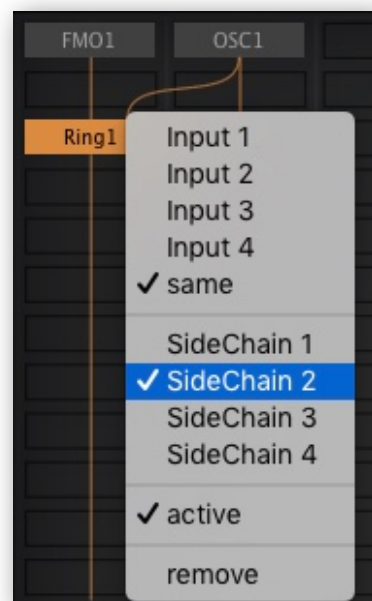
*Guitar Cab 4x12*: This mode mimics the frequency response of a very popular vintage speaker cabinet, producing its typical mid-range focused sound (including peaks and dips caused by resonance within the cabinet as well as the effects of close miking).

## Ring

Ring modulation is a variant of amplitude modulation (AM): Two input signals are balanced so that they disappear completely, leaving only the sum and difference frequencies. These frequencies are seldom harmonically related, so ring modulation is often used for bell-type sounds. For the purest results, use sine waves – FMOs and/or *SpectroBlend* OSCs.

The ring modulators in Zebra2 don't require a panel, but they do need two input signals. The image to the right is the result of right-clicking on the 'Ring1' cell. **SideChain 2** is selected so that FMO1 is being ring modulated with OSC 1.

The circuit originally used to implement this technique in analogue devices had the shape of a ring, hence the name. With today's computers, ring modulation is very easy to achieve: the two signals are simply multiplied.



## Mix

This modules can mix two signals, it can be used for cross-fading ('Mix' is a modulation target) or for reducing stereo width: Select 'Pan Mono' and set Mix to 100 – you will only hear the sidechain signal now, fully mono.



*Mix module panel*

Mixers can often be avoided. In the lefthand image here, Mix1 was added so that the unfiltered signal could be sent down lane 2 to be treated separately (FX processing). However, the mixer isn't actually necessary for this patch, as the arrangement on the right does the same job.



### PAN MODE

*Bal L-R, Pan L-R, Bal R-L, Pan R-L and Pan Mono.*

With the Pan knob set to the centre, the two *Balance* modes have 0dB of gain for both channels – only one channel is attenuated as the control is moved away from the centre position. The *Pan L-R* and *Pan R-L* modes, however, mix one channel onto the other while adhering to the *Pan Law* (google those two words!)

### Pan

Shifts the stereo position towards the left or right.

### Mix

The relative levels of the two inputs.

## Fold

A ‘Wavefolder’ is a special kind of waveshaper which maps the input signal onto a sine, folding it back on itself multiple times. Like hardware wavefolders, Zebra2’s *Fold* sounds best when applied to signals with very little high frequency content – try a pure FMO first.



*6 Ripples, 22% Folds, 30% Bias and maximum Slope*

### Ripples

The total number of cycles, from 1 to 7.

### Live View

The button activates realtime animation of any *Folds* and *Bias* modulation. If you need to save CPU, keep this disabled.

### Folds

The percentage of Ripples used. As it is effectively an input level control, setting *Folds* to zero without any modulation will result in silence.

### Bias

Shifts the used section of the curve to the left or right. Note that bias modulation is applied in opposite directions per stereo channel, resulting in a unique stereo effect.

### Ratio

The relative level of the ripples, effectively an output boost control.

### Slope

Tilts the curve downwards or upwards.

### Soft Clip

The smoothness of the two ‘knees’ to the left and right of the ripples.

Note: *Fold* is highly sensitive to variations in signal levels and phase between the various sample rates. If your preset sounds too different after switching to a higher sample rate, try adjusting the *Folds* parameter, then save as “name-of-preset (96k)” or similar.

# Modulators

Modulation is what we use to turn static tones into interesting instruments or soundscapes. Zebra2 lets you modulate practically any 'target' parameter in the synth. As well as LFOs and envelopes, the list of modulators include some standard MIDI messages for external control: pitchbend, mod-wheel (CC#01), polyphonic or channel aftertouch, expression (CC#11), velocity and Gate.

Notes: Practically all the controls can be automated. Using the X/Y performance pads is the best way to control a lot of parameters at once, and they can also be automated.

## List of Modulation Sources

ModWhl	modulation wheel (CC#01)
PitchW	pitch wheel / pitch bender
CtrlA	MIDI control A, default = Breath (CC#02)
Ctrl B	MIDI control B, default = Expression (CC#11)
LfoG(1,2)	global LFOs
Gate	note on/off
KeyFol(2)	key follow (center = E2) + glide. (2) includes glide offset
Velocity	MIDI note velocity
ATouch	channel or key (polyphonic) aftertouch, smoothened.
ArpMod(1,2)	arpeggiator modulation
Env(1-4)	standard envelopes
MSEG(1-4)	Multi-Stage Envelope Generators
Lfo(1-4)	voice LFOs
MMap(1,2)	modulation mappers
MMix(1-4)	modulation mixers

For a complete list of all modulation **targets**, go [here](#).

## Modulation Matrix

All generator panels include assignable knobs (unused ones appear with an ellipsis ... as label) for setting up local modulation. The mod matrix, on the other hand, is a switchboard where you can set up any kind of control rate modulation. The image below shows just three of the twelve modulation slots...

### SRC

The lefthand knob selects the primary modulator and sets its (bipolar) amount.

### VIA

The righthand knob selects a secondary modulator and sets its (bipolar) amount. 'Via' controls how much of the primary modulator reaches its target.

### TARGET

The parameter to be modulated. Because of the recently implemented drag & drop function (see below), opening the list of modulation targets now requires a right-click.

**Two examples:** In slot 10, Env2 decay is negatively modulated by Aftertouch: The harder you press, the shorter the decay.

In slot 11, Env2 modulates an oscillator's detuning, at 100%. However, this amount is being partially *scaled* by the mod wheel – the amount of Env2 reaching its target will be less than maximum until the mod wheel is all the way up. If 'VIA' had been set to +100% instead, none of the Env2 signal would reach the oscillator unless the modulation wheel was pushed up at least a bit.



### Drag & Drop

As a quick alternative to selecting a target from the menu, you can use Drag & Drop. Left-click on a Target selector, drag the crosshair onto a control in the Synthesis page then release the mouse button.

Of course you don't have drag & drop access to any of the controls in the lower pane (Global, Osc 1, Osc 2 etc.), but these are available in the target's context menu.

### Those Tricky Intervals

Setting precise pitch intervals in the modulation matrix requires a bit of arithmetic, as the 96 semitone range (+/- 4 octaves) is mapped onto 100 steps. For instance:

12 semitones (octave).....  $100 / 96 \times 12 = 12.50$  (absolutely precise)

7 semitones (a fifth).....  $100 / 96 \times 7 = 07.29$  (also try 07.30 and 07.31)

## ENV

When you load the *Initialize* preset, envelope 1 is visible in the modulators pane because in this particular preset, envelope 1 has been designated as the audio envelope for all four lanes of the main grid.



*an ENV module in v-slope mode*

Although it looks like a regular ADSR with just a few extras, the ENV module also has a few tricks up its sleeve: It is syncable, loopable, and offers 2-stage attack or release...

## Switches

### TIME BASE

**8sX:** Up to eight seconds. The knob scale is exponential (mid-position is 1 second)

**16sX:** Up to sixteen seconds. The knob scale is exponential (mid-position is 2 seconds)

**10s:** Up to ten seconds. The knob scale is linear, so 20.00 means 2 seconds etc.

**1/4, 1/1, 4/1:** Times are relative to song tempo (beat, bar, 4 bars). Knob scale is linear.

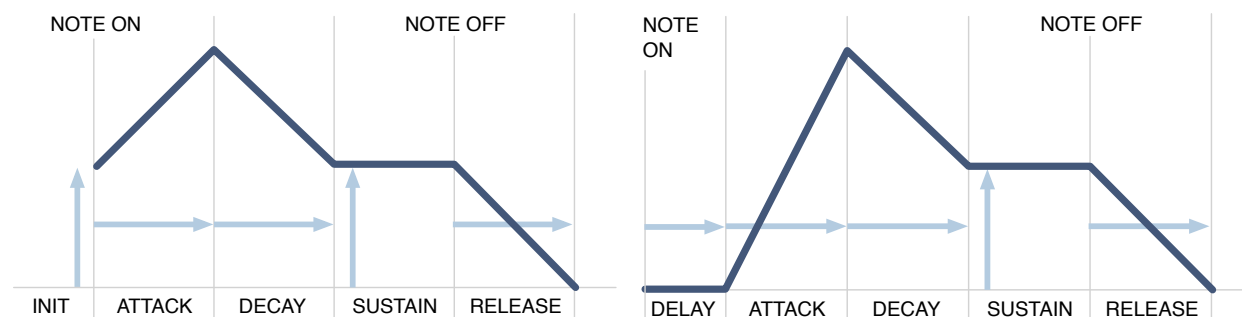
### MODE

The curvature of all time-based envelope stages:

**quadric:** Exponential curves. Attack is convex, Decay and Release are concave.

**linear:** Straight lines. Linear envelopes can sound unnatural.

**v-slope:** Exponential curvature via a slider: the far left position is extremely concave, -50 is close to quadric, the center is linear, the far right is extremely convex.



*the main ADSR envelope stages, here with Init or Delay (see the next page)*

## Controls

### Pre-Attack

The top lefthand knob is NOT for assignable modulation, it is one of the following:

*Init*: Attack stage starts at a level other than zero (see lefthand image above)

*Delay*: The Attack stage is delayed (see righthand image above)

### Attack

The time it takes for the envelope to rise from zero (or the *Init* value) to maximum

### Decay

The time it takes to drop from maximum to the Sustain level

### Sustain

The level after Decay. Normally remains at that position until the note is released

The extra envelope stages below can be tricky. If you prefer to use standard ADSRs only, simply ignore these options...

### F/R (Fall / Rise time)

Negative values: either fall to zero, or fall/rise to the Sust2 level (see Post-Sustain)

Positive values: either rise to maximum, or fall/rise to the Sust2 level

### Post-Sustain

This knob is NOT for assignable modulation, but for the following extra options:

*Sust2*..... A second Sustain level, after F/R

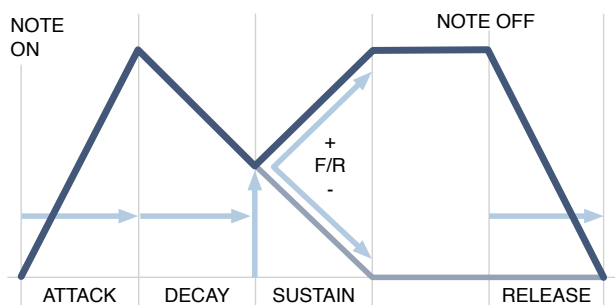
*LoopA*..... Loop back to Attack

*LoopD*..... Loop back to Decay

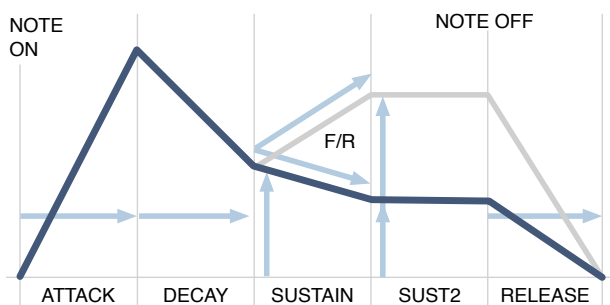
*LoopS*..... Loop back to Sustain

*Rel(nn)*..... Extra release stage (the 'nn' numbers are percentages of maximum level)

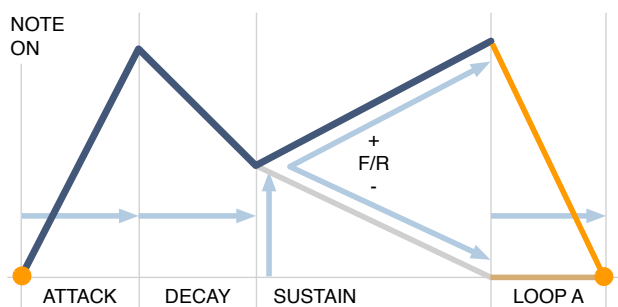
Note: The diagrams below are simplifications. For example, Release (or Rel25/50/75/100) can start at any point within the envelope, as it is initiated by a MIDI Note Off message.



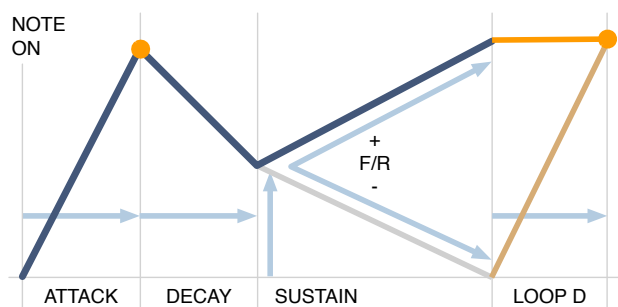
*Normal F/R behaviour, no Sust2 stage*



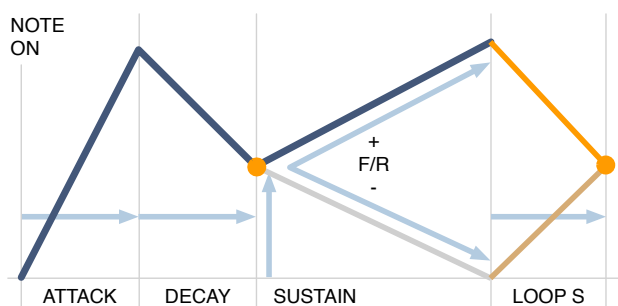
*F/R behaviour when there is a Sust2 stage  
(two possible Sust2 values shown here)*



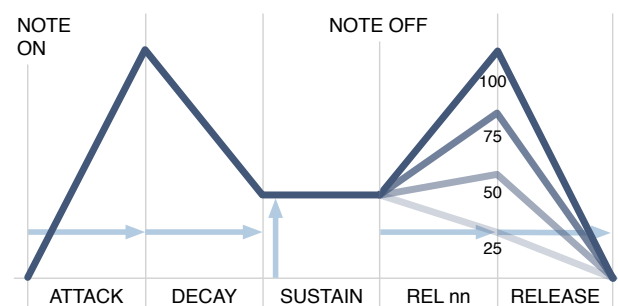
*LoopA: Time to return from end of F/R (100 or zero) to zero (start of Attack).*



*LoopD: Time to return from end of F/R (100 or zero) to 100 (start of Decay)*



*LoopS: Time to return from end of F/R (100 or zero) to Sustain level.*



*Rel25/50/75/100: Time to rise or fall from Sustain to 25/50/75/100%, followed by the normal Release stage.*

## Release

The time it takes to drop to zero after a note is released. See also *Rel(nn)* above.

## Velocity

For dynamic envelopes – keyboard velocity scales the envelope's output level.

## VELOCITY SCALE and KEY SCALE

To see these controls, click on the **[+]** icon in the top righthand corner of the panel.



*ENV module, with scaling sub-panel open*

These are velocity and key follow scaling controls for each parameter in the upper panel. For instance, setting a positive value for the Velocity Scale knob below Release will make the release time longer the harder you play. Setting a negative Key Scale for Release will shorten the release times of higher notes, etcetera.

## MSEG

The Multi Stage Envelope Generator is a complex modulation source offering total shape control as well as continuous rate control. Click on the MSEG 1 button in the lower bar...



*part of an MSEG panel*

Many different uses for MSEGs can be found in the factory presets. A few examples:

rhythms.....6 *Lupins / Twangle*  
 pitches.....6 *Lupins / Seven of Eight* (MSEG 3)  
 multiple attacks.....8 *Perkers / Drums of Mordor+* (MSEG 1 and 2)  
 combinations.....2 *Leaders / I am Zebra* (All 4 MSEGs)  
 snappy envelopes.....6 *Lupins / How Money More Times*  
 twisted regularity.....7 *Noises / Combotor* (MSEG 2, MATRIX slot 02)

## Controls

### Preset (unlabeled)

Like the oscillators, MSEGs can be loaded and saved. Click on the long button to load from the mini-browser, or right-click to select from a menu or save to the current folder.

The MSEG browser's context menu includes 'reveal' and 'refresh' functions – use these whenever you want to transfer MSEG templates.

### Time Unit

Selects the unit that will correspond to integer steps in the editor's time-line. Note that the timing can always be shifted by setting non-zero Attack, Loop or Release values.

*Sixteenth / Quarters / Notes:* These are note lengths, synchronized to song tempo.

*Seconds:* Units are 4 seconds long. For seconds, set Attack / Loop / Release to 2.00.

### Trigger

*poly*..... standard polyphonic

*single*.....only retriggers after all notes are released (like organ "percussion" register)

*mono*..... standard monophonic

### Attack

Slows down / speeds up everything before the loop. -1.00 is half speed, 1.00 is double speed, 2.00 is quadruple speed etc..

**Loop**

Slows down / speeds up the loop. -1.00 is half speed, 1.00 is double speed, 2.00 is quadruple speed etc..

**Release**

Slows down / speeds up everything after the loop. -1.00 is half speed, 1.00 is double speed, 2.00 is quadruple speed etc..

**Velocity**

For dynamic envelopes – velocity controls the MSEG output level, as a percentage.

**Editor functions****Expand**

For a larger EDITOR, click on the vertical label to the left of the data area. Note: The expanded editor requires a modern processor, otherwise it can react too slowly for comfort. To exit again, click on the same button, which is conveniently named “CLOSE”.

While an MSEG is expanded, the lower pane becomes an editable list of all its uses, either as assignable knobs in the panels, or in the modulation matrix. Modulation depths can be adjusted here, either by moving the slider left-right or the VALUE vertically.

Source assignments can even be added by clicking on the *Add* button, but please note that the current version doesn't allow this to be changed afterwards. Work in progress! To remove an assignment, click on the [x] button to the right.

**Edit Mode Switches**

Above the MSEG1 selector button are three small icons. From left to right, these are:

*Single*.....moves individual handles, the other handles remain fixed

*Shift*.....moves individual handles, all following handles also move

*Draw*.....moves multiple handles vertically – click on a handle and ‘draw’

Note that handles will jump to the nearest *unit snap* and *value snap* positions if these are defined (see *Context Menu* on the next page).

**Create New Handle** (max. = 33)

Mac.....cmd + click on the background

Win.....alt + click on the background

**Curvature**

To adjust line curvature, click on a line and drag it in any direction. S-curves are also possible: Again, hands-on experience is better than a long-winded explanation here.

**Zoom & Scroll**

To zoom in or out, click on the background and drag up or down. For ‘optimum’ zoom, double-click. To scroll to invisible sections of the envelope, click and drag left / right.

**Context Menu** (right-click in the **background**)

*copy / paste*..... clipboard functions  
*half size*..... shortens the envelope  
*double size*..... lengthens the envelope  
*upside down*..... inverts the envelope  
*unit snap*..... horizontally restricts new input to 3, 4, 6 or 8 steps per unit  
*value snap*..... vertically restricts new input to 12, 24, 36, 48 or 15 levels  
*quantise to snap*.... quantizes all handles to the nearest step (see *unit snap*)  
*unit spacing*..... distributes all handles to successive units  
*even spacing*..... evenly distributes all handles between the leftmost and rightmost  
*pointer*..... resolution of the position indicator (reverts to *Course* by default)

**Context Menu** (right-click on a **handle**)

The *Remove Point* (*min.* = 2), *Loop Start* and *Loop End* functions are self-explanatory. To make a loop of zero length (you might need this from time to time), simply delete the handle that is currently set as 'loop end'. Note that MSEGs can continue looping during the release phase (of standard envelopes) if the loop end is set to the very last point.

## LFO

---

Alongside envelopes, low frequency oscillators represent THE classic modulators – for vibrato or any cyclic movement e.g. a slowly drifting tonal change. Once again, the LFOs in Zebra2 have more under the hood than meets the eye:



*frequency is host-synchronized here, but the RESTART phase is random*

This is called a 'voice' (or polyphonic) LFO because, unlike the LFOG, it is instantiated per voice – every note you play gets its own LFO. The main advantage over the LFOG is that different notes in a chord can have different amplitudes, phases and rates.

In all OSC, FM and Comb modules, 'Vibrato' is permanently connected to LFO 1. To set up traditional vibrato control via mod-wheel, click on the knob to the left of 'Amp', select 'ModWhl' and turn the knob up to maximum... and turn up some 'Vibrato' levels!

**Waveforms**

*sine*..... pure sine wave  
*triangle*..... pure triangle wave  
*saw up*..... rising saw ('ramp')  
*saw down*..... falling saw  
*sqr lo-hi*..... square wave, restarted at the lower level  
*sqr hi-lo*..... square wave, restarted at the higher level  
*rand hold*..... random steps  
*rand glide*..... random curves  
*user*..... definable steps or lines – see **User mode** on the next page

**SYNC**

Range / nominal rate options:

0.1s, 1s, 10s..... absolute time, three ranges

1/64 – 8/1..... sync to song tempo, includes dotted and triplets, up to eight bars

**RESTART**

*free*: the LFO starts at a random position within its wave every time a note is played

*gate*: the LFO always starts at the same position in its wave (see Phase below)

**SLEW**

*off* can produce clicks, while *fast* and *slow* smooth out any sharp transitions.

**Rate**

LFO rate. This bipolar control *scales* the value set by the Sync parameter.

**Amp**

Amplitude i.e. output level of the LFO. For typical “vibrato via modulation wheel”, click on the assignable knob and select *ModWhl* as source. Note that the assignable control *scales* the existing Amp value, it does not add to it.

**Phase**

Sets the phase (i.e. the position within its cycle) at which the LFO will be restarted every time a note is played. This parameter is meaningless if Restart is set to *free*.

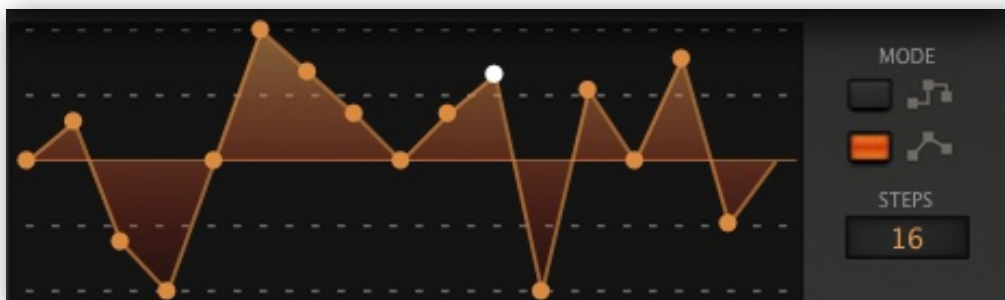
**Delay**

Actually a fade-in time. Typically used for so-called ‘delayed vibrato’.

**User mode**

*LFO in user mode, 16 steps*

The Sync value is the length of each step, so the length of one LFO cycle in this example is  $16 \times 1/16\text{th} = 1$  bar in 4/4 time.



*LFO in user mode, 16 lines*

A right-click on the LFO's edit window in user mode opens the same context menu as the one in the modulation mapper - see [there!](#)

## LFOG

The global LFO is simpler than the normal LFO, as the assignable knobs and the Delay are missing. However, the main difference is that the LFOG does not retrigger per voice. See above (LFO) for the list of waveforms and user mode options.



*LFOG module, sine wave, synced to 'beats' and retriggered every 3 bars*

### SYNC

Range / LFO rate. The list of synced values includes dotted and triplet note lengths.

0.1s, 1s, 10s..... absolute time, three ranges scaled via *Rate*

1/64 – 8/1..... sync to song tempo, up to eight bars

### RESTART

Automatic restart after the specified number of bars (off i.e. no restart, or 1 to 32).

### SLEW

*off* can produce clicks, while *fast* and *slow* smooth out any sharp transitions.

### Amp

Output level.

### Rate

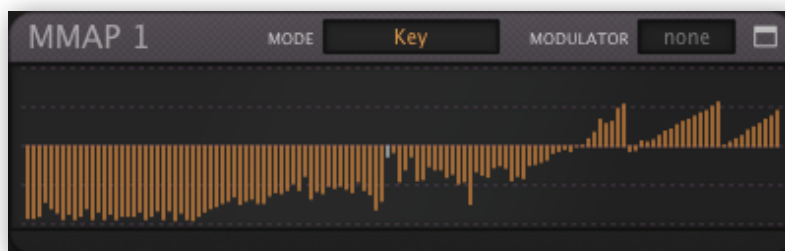
LFOG speed. This bipolar control *scales* the value set by the SYNC parameter.

### Phase

Sets the phase (position within its cycle) at which the LFOG restarts. See RESTART.

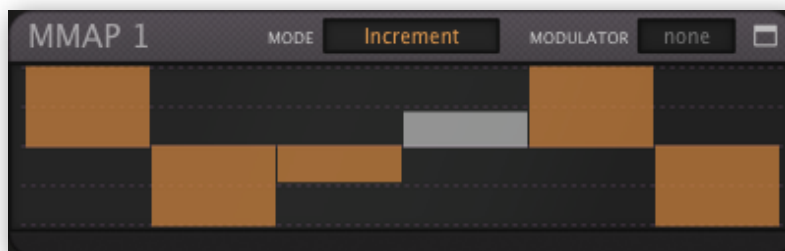
## MMap

Zebra's modulation mapper is a general purpose table of 128 individual values. The MMap modules can be used for countless tasks – e.g. tuning the *tone* of individual notes on the keyboard, as in this example...



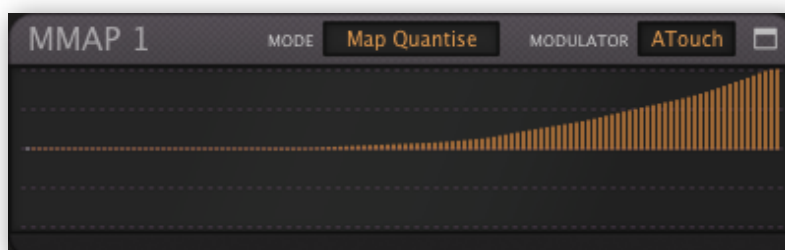
*the map used in HS Ligetimat+*

...or for 'round-robin' effects. Old polysynths had a limited number of voice circuits, and the tuning of e.g. pitch and cutoff was also fixed (via trimmers) for each one. This example simulates six of those trimmers...



*one of the maps used in HS Poppington*

...or for remapping a modulation source. In the example here, the aftertouch response is altered: Aftertouch has zero effect until you press the keys hard enough to reach the point where the curve starts to rise.



*the map used in e.g. HS Seed*

### Mode

Specifies how the map is controlled. Note that the two *Map* modes won't do anything if you haven't defined a Modulator.

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

*Map Smooth*..... the 128 modulator values, interpolated for smooth transitions

*Map Quantize*.... the 128 modulator values, not smoothed

*Increment*..... played notes step through the map

### Modulator

This button selects a modulation source (LFO, envelope, whatever) to be mapped in either of the two *Map* modes. In *Key* or *Increment* mode, this setting is ignored.

### Expand

Click on the window icon to expand the map. In the first example above, precision isn't a problem as points can be selected by playing MIDI notes and the bars are 'magnetic'.

While a map is expanded, the lower pane becomes a list of all its uses. Modulation depths can be adjusted here, and source assignments can even be added by clicking on the *Add* button (please note that the current version doesn't allow assignments to be edited afterwards). To remove an assignment, click on its [x] button.

## Selection / Drawing Tools

To edit a map, draw in the windows by clicking and dragging. To highlight a selection, hold down the **SHIFT** key while dragging. The various functions are restricted to the selection, if one exists. To deselect everything, either click in the background (i.e. away from the selection) or right-click and choose 'deselect' from the *selection* sub-menu...

Right-clicking on the modulation mapper's edit window opens a long list of editing tools. **Shift** is used for selection, and **alt** (Win) or **cmd** (Mac) is used for applying the selected *draw* option. Note: All these options also apply to LFO and LFOG in user mode!

*copy / paste*.....copies the map to the clipboard, or replaces the map with a previously copied one. Note that you can even use copy/paste to transfer maps between different presets.

*shapes*.....draws a preset curve: ramp, triangle, sine, cosine, root or quadric. Note: If the map has fewer values than 128 (see 2-128 below), the chosen shape will be repeated to fill all 128.

*alt/cmd-draw*.....sets the drawing mode to erase (zero), scale (multiply), shift (2D move) or warp (2D bend). To apply these functions, hold down the **alt** (Win) or **cmd** (Mac) key before clicking in the edit window.

*selection* .....applies functions to the selection: *invert*, *shift left*, *shift right*, *every 2nd/3rd/4th*. If there is nothing selected, only 'every' options appear.

*reverse*.....flips the current selection horizontally

*invert*.....flips the current selection vertically

*randomize*.....adds random offset to all values in the selection

*soften* .....interpolates between values

*normalize*.....expands vertically to minimum / maximum

*straighten* .....draws a straight line for the selection / window

*reset*.....sets all values in the map to zero

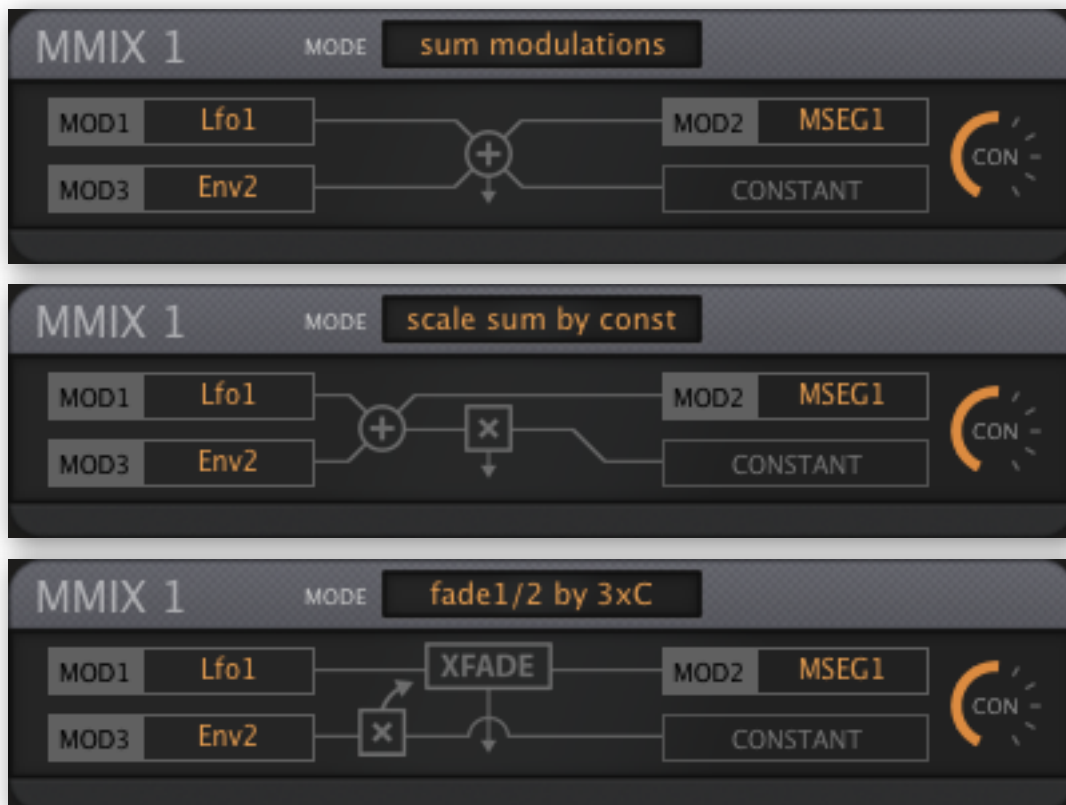
*quantize 4–24*...adjusts values to an equally-spaced grid. Tip: Select '12' here and use the map for pitch modulation (also set the modulation amount in the oscillator to 12).

*2–128*.....the number of values used for the map

copy
shapes ▶
cmd-draw ▶
selection ▶
reverse
invert
randomize
soften
normalize
make unipolar
straighten
reset
Quantise 4
Quantise 6
Quantise 8
Quantise 12
Quantise 16
Quantise 24
2
3
4
5
6
7
8
9
10
11
12
16
24
32
48
64
96
128
Lock

## MMix

Zebra's **Modulation Mixer** processes up to 3 modulation sources in one of three ways...



*the 3 MMix modes*

### Mode

*sum modulations:* All 3 modulation sources plus the value of Const (constant) are added together – which saves work and Matrix slots if (for instance) you want to modulate several parameters at the same time from the same bunch of modulators!

*scale sum by const:* The same as *sum* except that the result is multiplied by Const.

*fade 1/2 by 3xC:* The constant determines how much of the Mod3 signal cross-fades between Mod1 and Mod2.

### MOD1, MOD2, MOD3

Selectors for the 3 modulators.

### CON

The *Constant* adds to the output in *sum modulations* mode, scales the output in *scale sum by constant* mode, or scales the amount of Mod3 in *fade 1/2 by 3xC* mode. Note that *Constant* itself can be modulated (it is available in the modulation matrix).

# Outputs and Effects

## The FX Grid

Whenever you select Global in the lower bar, you will see the FX Grid in the middle of the lower pane. The principle is the same as the main grid, but with effect modules. For how to route signals from the main grid into the FX grid, see the section about the [Lane Mixer](#).

To add a new module, click on an empty cell. Double-click a module to switch it on/off. Right-click to select input(s) or remove the module.

Seven of the FX module types are the same as ‘processing’ generators available in the main grid: *Shape*, *Mix*, *Ring*, *VCF*, *SB*, *XMF* and *Dist*. The other six types – *ModFX*, *Delay*, *Rev*, *Comp*, *EQ* and *NuRev* – are described below.



*FX Grid with example routing*

## Output controls

### Send1 and Send2

Both *Send1* and *Send2* take whatever is coming *into the master lane*, and route this unprocessed signal to the Return1 and Return2 lanes respectively. In the image above, Send2 is feeding the SB3 module. The amount (about 50% in the example) can be faded out completely via mod-wheel (Send2’s assignable knob).

### FX BYPASS

Click on this button (it turns dark orange) to temporarily deactivate all effects in the grid. The BYPASS switch is truly global – you won’t hear any effects in any of your presets on any day of the week until you deactivate this again!

### MAIN, BUS 1 and BUS 2

The output levels for the left, center and righthand lanes of the FX grid.

### OUTPUT

The final volume (the sum of Master, Return1 and Return2). OUTPUT is one of the few parameters in Zebra that cannot be modulated by envelopes, LFOs etc.. Controls the same parameter as the OUTPUT knob in the [upper bar](#). Normally set to 12 o’clock (100%), a preset’s volume can be boosted up to 200% if necessary.

## A note about modulating effect parameters

Zebra lets you use *any* modulation source in the Matrix to modulate global parameters such as reverb size or delay feedback. However, many of the available modulators are instantiated per-voice (e.g. envelopes and LFOs). To avoid conflicting values, the effects only use the modulation provided by the most recently played voice. Depending on the modulation source, target and depth, this can result in audible glitches.

## ModFX1 / ModFX2

Analogue purists may shudder at the mention of built-in chorus (which suggests a lack of ‘beef’ in other departments), but we believe no synthesizer should be without one:



*ModFX panel, Chorus mode, equalizer On*

### MODE

*Chorus*.....chorus / flanger using short delay lines

*Phorus*.....chorus / flanger using allpass filters

*Phaser*.....classic phaser unit

### Feedbk

Bipolar feedback control for ‘flanger’ type resonances.

### Center

Nominal delay time / allpass cutoff.

### Depth

Amount of *Center* modulation from the integrated LFO. See *Speed* below.

### Stereo

LFO phase offset between the two stereo channels.

Note that 50% often delivers the widest effect.

### Mix

Balance between the dry and wet signals.

### Speed

The rate of the ModFX module’s own LFO (from 0.1Hz to 1Hz).

## Quad

The volume of an **additional** chorus effect, with independent LFO.

## Q-Phase

Modulation LFO phase offset (see *Stereo* above) for the Quad effect.

## EQUALIZER

This unique feature is a pair of low and high filters between the dry and chorused signal. They can be used to preserve the stereo position of bass frequencies while softening the chorus, for instance.

*On/Off*.....switches ModFX equalization on/off

*Low Freq*.....low crossover frequency

*High Freq*.....high crossover frequency

*2 x Boost*.....gain controls for the “dry” signal

## Delay1 / Delay2

The delay in Zebra2 is (as you should already have begun to suspect) very flexible. It has four delay lines, each with time scaling and pan controls. Two flavours of feedback with inserted low and highpass filters can run at the same time, feeding each other...



*Delay module in stereo 2 mode (ping-pong regeneration via x-back)*

## MODE

*stereo 2*.....stereo delay, uses delay 1 and 2 only

*multitap 4*..... all four delays in parallel

*dubby 2+2*..... like two instances of stereo 2 in series

*serial 2*..... ping-pong delay, uses delay 1 and 2 only

## Feedback & X-back

Normal regeneration and cross-regeneration amounts.

In multitap mode, the X-back routing is 1→2, 2→3, 3→4 and 4→1.

## Lowpass & Hipass

Simple filters in the feedback paths affect the tonal quality of successive repeats.

## Mix

Cross-fades between the dry and wet signal

## Sync, Ratio & Pan

The button above each Ratio and Pan knob sets either a synchronized value (1/64th to 1/1 triplet) or absolute time (1 second). The Ratio knob scales this from 0% (4 samples long) to 200%. Pan is of course the stereo position of each delay line.

*Tip: Try using a little random LFOG to modulate one or two of the delay Ratios*

## Rev1

Zebra's original reverb unit. See also [NuRev](#).



*Reverb panel, 'Reverb' mode*

The upper row is the usual set of reverb parameters, and the lower row has a similar set of controls for the DIFFUSOR (diffusion adds more reflections, increasing reverb density).

### Mode

*Reverb* is Zebra's standard model while *Metalverb* sounds more artificial and wider.

### PreDelay

A delay before the reverb starts. Useful for retaining the presence of the dry signal while using lots of reverb. Or for slap-back effects with short Decay and small Size.

### Range, D-Range

Reverb/Diffusion length i.e. delay times, from 'extremely short' to 'rather long'! Together, the *Range* and *Feedback* parameters shape the impression of room size.

### Feedb, D-Feedb

How much of the reverb signal is fed back into the reverb input. If *Range* and *Feedback* are set to maximum and *Damp* is at zero, the reverb will carry on almost indefinitely.

### Damp

A simple low pass filter in the feedback loop causes higher frequencies to fade faster than low frequencies, imitating the 'warming' effect of carpets, curtains etc. in a room, or the audience in a concert hall.

### D-Mix

The amount of diffusion.

## Speed, D-Speed

The rates of the LFOs modulating Range and Feedback / D-Range and D-Feedb.

## Mod, D-Mod

The levels of the LFOs modulating Range and Feedback / D-Range and D-Feedb.

## Dry, Wet

Separate controls for unprocessed and processed signal levels – modulating individual levels is more flexible than cross-fading dry/wet.

# Comp1 / Comp2

Zebra's compressor module. If you are more familiar with modular synthesizers, you can think of it as a VCA negatively controlled by an envelope follower.



*The compressor in smooth mode*

## TYPE

*eco*..... original lo-fi version, with very low CPU-hit.

*smooth*..... smooth compression, the best choice for most sounds.

*strong*.....very powerful compression, best for bold percussive sounds.

## Threshold

Threshold sets the level above which compression will be applied, and below which compression will be released – so lower values will result in more compression than higher values.

## Comp

Sets the amount of compression. Think of this as a dry/wet crossfade.

## GR

Gain reduction indicator.

## Attack

The time it takes to reach maximum compression after the threshold has been crossed. Attack can affect brightness: very fast values cause the compressor to reduce the gain

immediately, which can dull the attack of the original sound. Note: When set to zero, the Attack is only one sample in length.

## Release

Recovery time i.e. the time the compressor takes to return to unity gain after the input signal has fallen below the threshold. Very short Release can distort low-frequency input, overly long Release can 'clamp' the sound down and not release enough before the next 'attack' arrives. When set to zero, Release is only one sample in length.

## Input

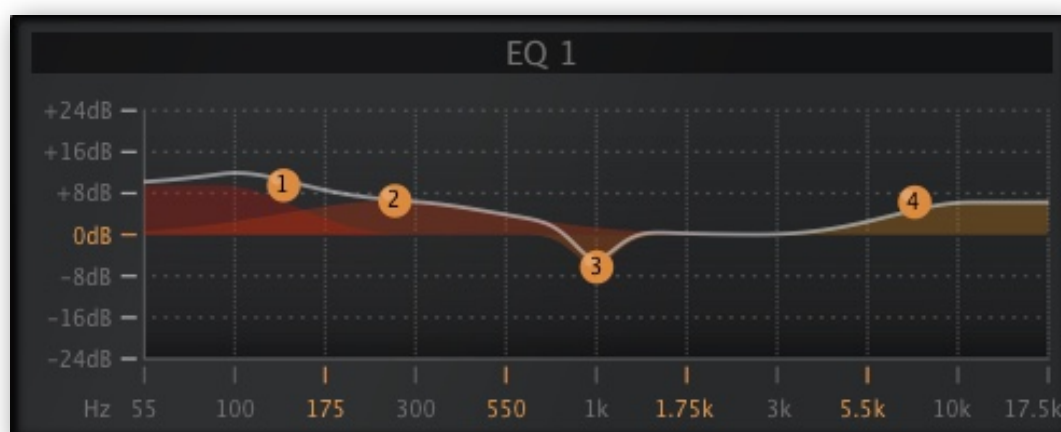
Adjusts the input level before the signal is compressed.

## Output

Adjusts the output level to compensate for gain differences caused by the compression.

## EQ1 / EQ2

This module is a 4-band parametric equalizer. Drag the handles to set frequency and gain. Right-click on a handle and drag vertically to adjust the Q (width/slope) of the band. Right-click in the background for basic editing functions: copy, paste, clear (flatten).



*Equalizer module, bass+treble boost, dip around 1.5 kHz*

Apart from compression, equalization is the audio engineer's "Swiss-army knife" used to ensure that tracks work well together in the context of the song.

In Zebra2, they are very useful for tweaking the final tonal character of a preset – make it generally brighter or duller, boost or cut certain frequencies...

Freq LowShelf
Q LowShelf
Gain LowShelf
<b>Freq Mid1</b>
Q Mid1
Gain Mid1
Freq Mid2
Q Mid2
Gain Mid2
Freq HiShelf
Q HiShelf
Gain HiShelf

All 12 parameters (frequency, gain, slope) of the EQ are available in the Matrix as modulation targets. The highlighted entry in the menu here is actually the horizontal position of Handle 2:

*Handle 1 = LowShelf*

*Handle 2 = Mid1*

*Handle 3 = Mid2*

*Handle 4 = HiShelf*

Example: To use the EQ arrangement in the above image as a swept band reject filter (which sounds a bit like phasing), you need to modulate handle number 3 – the modulation target is *Freq Mid2*.

## NuRev

New in Zebra version 2.8 – a smooth plate reverb with pre-delay. See also [Rev](#).



*The NuRev module*

### PreDelay

A delay before the reverb starts. Useful for retaining the presence of the dry signal while using lots of reverb. Or for slap-back effects with short Decay and small Size.

### Damp

A low pass filter in the feedback loop causes higher frequencies to fade faster than low frequencies, imitating the ‘warming’ effect of carpets, curtains etc. in a room,.

### Decay

Reflectivity of the room. Effectively how long it takes for the reverb tail to fade to silence.

### Size

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

### Tone

Strong ‘tilt’ equalizer. Use in combination with *Damp* to “colourize” the reverb.

### Width

Stereo spread of the reverb signal.

### Dry/Wet

Balance between the dry and processed signals. At maximum, the dry component is faded out completely, allowing NuRev to be used for colourful ‘guitar body’ type resonances: Try setting *PreDelay* to minimum, then fine-tune the *Size* around 5.00.

# Performance

## Arpeggiator / Sequencer Programming



*Arpeggiator settings used in the preset 'How Money More Times'*

If you would like to experiment with an existing arpeggio, load e.g. *How Money More Times* from the 'Lupins' folder and play with all the settings. Or follow this little tutorial...

### Quick insight tutorial

1. Right-click on the data display and select *init*.
2. Click below the OSC1 cell and add VCF1. The Synthesis window automatically opens.
3. Set VCF1 Cutoff to minimum, click on an assignable knob in the VCF and select Env1
4. Set the amount of 'Env1' cutoff modulation in the VCF to about 110, the Sustain of Envelope 1 to minimum, and Release to 50.
5. Click on the GLOBAL tab in the lower bar and select the *arpeggiator* voice MODE.
6. Play a low note. Set the GLOBAL Transpose to -12.
7. Change OSC1 mode to 'dual', and Detune it to taste.
8. Play a low note and adjust VCF1 Resonance to about 10 (or higher if you prefer).
9. We should now have a simple bass arpeggio, so click on the ARP/SEQ tab in the lower bar to open the arpeggiator...
10. Change Steps to 4. Change Transp of the 3rd step to 1, 4th step to 7. Play a note...
11. Change the leftmost triangle to a different icon... why is this an 8-note sequence now?  
Experiment – see what happens if you change one or two of the other triangles.
12. Play a chord... Change the first four 'Voices' to 6 (roll your mouse wheel to do this)
13. Play a high chord. If it distorts, turn down the volume in Lane 1.
14. Click on the remaining assignable knob in the VCF, select 'ArpMod' and set the amount to +20. Click on the +A button next to the SEQ button and move the first four 'A' sliders to different values. Play and listen.

Now try adjusting all Lengths, Gates etc.. Then add reverb and SB3, perhaps?

## Selectors

That block of controls on the left...



### SEQ, +A, +AB

At the top of the panel are 3 mutually exclusive “radio buttons”: Show the sequence only, or include step modulator A, or include both step modulators. As a modulation source, **modulator A** is called *ArpMod* and **modulator B** is *ArpMd2*.

### Sync

1/64 – 1/1 trip: The duration of the default ‘semiquaver’ step. See *Length* below.

### Steps

The number of steps used for the arpeggio. Note that a 3-step arpeggio (for instance) can create a 15-note sequence (or even 24 in *fb* or *bf* loop mode!) if you set Oct to 2 and play a 5 note chord.

### Order

Incoming notes are ordered within a **note buffer** in one of two ways. The buffer is then played back in the direction set by the *Loop* parameter (see below).

*by note*..... notes are reordered according to MIDI note number

*as played*..... the original order in which notes were played is retained

### Octave

0, 1 or 2 times: This switch sets how often the octave is shifted up after all notes in the buffer have been played back.

### Loop

The direction the **note buffer** is played back (see *Order* above). The *Loop* setting doesn’t affect the direction of the arpeggiator, which is always forwards as you can see, nor does it affect note transposition. See *Transp* on the next page. The options are:

*f* ==> forwards

*b* <== backwards

*fb* <=> forwards / backwards

*bf* >=< backwards / forwards

**Slide**





When this switch is *On*, any Glide/Glide2 set in the GLOBAL panel will only be applied to connected notes (see Gate below).

**Step parameters**

The main area of the panel shows the 16 steps, with 5 settings each:

**Step**





Specifies which note is retrieved from the buffer for this step.

-  play the **next** note
-  play the **same** note
-  play the **first** note (see Order above)
-  play the **last** note (see Order above)

Tip: For typical monophonic arpeggios, set all used steps to 'last'.

**Length**

Step lengths are defined as multiples of the *Arp Sync* value:

-  = 1 x
-  = 2 x
-  = 3 x
-  = 4 x

**Gate**

As arpeggiators automatically play / release notes, the gate times need to be defined:

- 0, 1, 2, 3, 4.....from very short to almost the length of *ArpSync*
- 5 (arrow)..... connected to the next step (see also *Slide* above)

The step following a '5' will not be retriggered (unless it uses more than one Voice).

**Voices**

The maximum number of notes that can be played simultaneously per step.

**Transp**

Pitches may be jumping about already, but the individual steps can also be transposed +/-12 semitones... unpredictability is therefore to be expected!

**Arp Modulators**

The optional bipolar sliders labelled **A** and **B** can be used to modulate any targets (e.g. VCF cutoff and Glide rate) in step with the arpeggiator. For reasons that shall remain a mystery, the corresponding modulation sources are called *ArpMod* and *ArpMod2*.

## XY Pad Programming

Click on the XY1 tab in the lower bar...



*XY programming panel*

Programming the PERFORM pads may seem daunting at first, but it really is quite easy. Especially after following this little tutorial:

### Quick insight

Don't enter the PERFORM page yet, stay in the SYNTHESIS page for now.

1. Load *initialize* from the Local root directory.
2. Right-click on OSC1's Tune knob and select assign to / X1.
3. Click on XY1 in the lower bar and see the new assignment appear there.
4. Click below OSC1 in the grid and select VCF1. Leave the Cutoff at maximum.
5. In the 'Y' area of the XY1 panel, right-click on the top 'none' and select Filter1 / Cutoff. Double-click **3 times** on that grey segmented bar to set the limit markers correctly.
6. Click on PERFORM, move the handle around the XY1 pad while playing. Watch the movement in the lower area until you understand what's happening there. Note that only the lower half of the Y axis affects cutoff...
7. ...so grab the righthand bar and move it to dead center. Double-click on it 3 times to reposition the limit markers.
8. Play a note and try out the XY1 pad again. Positive Y values also affect cutoff now because **you have just turned the cutoff knob down**. Open the SYNTHESIS window and see for yourself, then go back to the PERFORM window.
9. Double-click on 'XY1' above the pad, change the text to "PITCH & CUTOFF" and Apply. Double-click where it says 'xy1 not assigned' below the pad, and change the text to "X = pitch" and "Y = cutoff" on separate lines.
10. Try assigning XY2 to other targets e.g. filter resonance and oscillator vibrato. Adjust the triangular limit markers instead of double-clicking on the bars this time. You can assign up to 8 targets per axis, but you will only see targets for existing modules. So add more modules!

## Controls

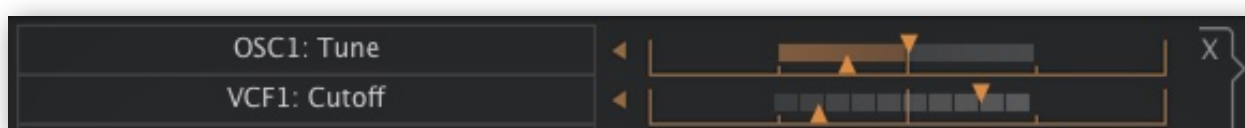
### X and Y knobs

The knobs in the centre mirror the X/Y controls pads in the PERFORM window: Moving a knob will also move the handle in the corresponding pad, and vice versa. Use them to MIDI-learn the X/Y pads for remote control, or for X/Y automation. See [MIDI Learn](#).

### Target Selectors and Range Controls

The main area of the XY programming panel is divided into two blocks – the left half is for the X-axis while the right half is for the Y-axis.

The 16 *Target Selectors* ('none' by default) open a nested menu containing everything that can be modulated in the current preset – more targets appear as more modules are added to the grids. Note that you can also use [drag & drop](#) here.



*target selectors*

*range bars (bipolar, unipolar), limit markers*

Targets can also be selected from the SYNTHESIS window or effects panels by right-clicking on a knob and choosing 'assign to / (X1...Y4)' from the context menu.

As soon as a target is selected, a Range Bar appears to the right, representing the full range of the target parameter, plus a pair of limit markers.

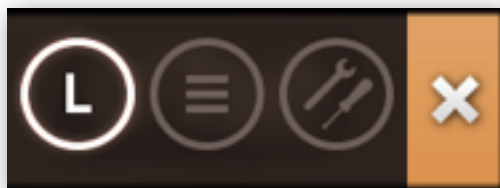
**Important:** In the dead centre of this area you will see a vertical line which represents the current value, so moving the Range Bar adjusts that value. Go to the SYNTHESIS window and watch the target parameter move in the opposite direction as you slide the Range Bar left and right. Or vice versa – adjust that knob and watch the Range Bar.

The two triangular *Limit Markers* set the minimum and maximum values. Note that you can invert the control by setting the upper marker to the left and the lower one to the right. Double-clicking on a Range Bar switches between three preset ranges: normal full range, inverted full range and zero range (at the current value).

# Configuration



Click on the cogwheel icon at the top righthand corner to open the global configuration pages where you can adjust the UI size and brightness as well as connect Zebra parameters to MIDI continuous controllers. A row of 4 buttons appears:



These are **MIDI Learn** (L), **MIDI Table** (≡), **Preferences** (“tools” symbol) and **Close** (X).  
Tip: Right-click anywhere within the row of buttons to set the current page as default.

## About MIDI CC

**CC**, which now officially stands for *Control Change* (no longer *Continuous Controller*) is a multi-purpose message format used for editing and performing presets. CC isn’t the only kind of MIDI performance data. For instance, there are different messages for note on/off (including velocity), pitch bend and two kinds of aftertouch.

Although the MIDI Manufacturers Association (MMA) was kind enough to leave most of the 128 CC numbers undefined, two of them have specific meanings that Zebra2 recognizes:

01 = modulation wheel  
64 = sustain pedal

Previous versions of Zebra2 also offered the CC controls *Breath* (CC 02) and *Expression* (CC 11). These two have been replaced by user definable CC sources *CtrlA* and *CtrlB*. See the [Preferences](#).

You don’t actually need a breath controller (for instance) or an expression pedal to make use of CC messages. Most of the names are purely convention these days – you can use anything that can send a definable CC e.g. a couple of knobs on your MIDI keyboard or a controller lane in your MIDI sequencer.

Later MMA revisions to the MIDI spec even included a bunch of esoteric CC definitions such as ‘Celeste Detune Depth’, probably at the request of a home organ manufacturer or two. We can safely ignore all such definitions!

## MIDI Learn



Zebra can be remote-controlled / automated via MIDI messages from a hardware controller unit or from your sequencer program. Click on the configuration button then the **L** to open this view...



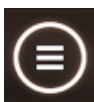
The overlay shows all MIDI-learnable elements as selectable outlines. Controls that are already assigned appear filled, like the OSC 1 'Wave', 'Tune' and 'Detune' controls in the above image. The currently active element i.e. the one waiting to be learned is highlighted – like OSC 2 'Wave' here.

Try it: Click on the OSC 1 'Tune' knob and send some MIDI CC data (move a knob or slider on your MIDI controller). The 'Tune' knob becomes opaque and remote-controllable.

The GUI switches (e.g. those in the lower bar) remain active so you can MIDI-learn all parameters without having to exit and switch over.

Tip: If you ever have problems with parameters magically resetting themselves, the usual reason is an *accidental MIDI learn!* Open the **MIDI Table** and have a look...

## MIDI Table



Click on the cogwheel and select the [≡] icon to open an editable list of all current MIDI CC assignments:

Parameter	Channel	Controller	Mode	Type	
1 Oscillator1:WaveWarp	1	8	normal	Continuous7bit	✕
2 Oscillator1:Tune	1	7	normal	Continuous7bit	✕
3 Oscillator1:Detune	1	6	normal	Continuous7bit	✕
4 -not assigned-	1	1	normal	Continuous7bit	✕

### Parameter

The first field displays/selects one of Zebra's many parameters, which are sorted into sub-menus. Click on the 'Add' button at the bottom and experiment with this option.

### Channel / Controller

The next two fields are for MIDI channel and CC number (see *About MIDI CC* above).

### Mode

Specifies the range and/or resolution of values:

*Normal*..... full range, continuous

*Integer*..... full range, whole numbers only

*Fine*..... 0.01 steps between the two integers closest to the current value

### Type

Specifies the output from knobs / sliders on your hardware controller. *Continuous 7bit* is by far the most common, but you should check your hardware specifications anyway:

*Encoder 127*..... unipolar encoder

*Encoder 64*..... bipolar encoder

*Continuous 7bit*..... 7-bit MIDI CC (normal resolution, common)

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

### Removing Assignments

To remove individual assignments, click on the [X] to the right of each line. To remove **all** assignments at once, click on the *Delete All* button at the bottom.

### Last Clicked (experimental feature)

Click on the 'Add' button. At the very bottom of the Parameter menu you will see two options called *Last Clicked Control* and *Last Clicked Control Fine*. Select *Last Clicked Control*, enter a suitable controller (MIDI CC) and exit the configuration pages. Whichever knobs or switches you click on now, the most recent one will respond to that CC! The *Fine* option is similar, but has a very narrow range so you can program a pair of knobs to remote-control anything "coarse" as well as "fine". Work in progress.

## Control A, Control B

Local versions of the Preference settings *Control A Default* and *Control B Default* (see below). These replace *Breath* and *Xpress* used in previous versions of Zebra2. Note: The assignments here are saved per instance with the project, not with presets.

## Preferences



Clicking on the cogwheel then the [TOOLS] icon will open the Preferences window, where you can specify various global settings...

## CONTROL

### Mouse Wheel Raster

If your mouse wheel is rastered (you can feel slight clicks as you roll it), switch this on – parameter values will then increment in ‘sensible steps’ e.g. integers.

## APPEARANCE

### Default Size

Sets the UI size for each new instance. Note that you can temporarily change the size by right-clicking in the background.

### Default Skin

Sets the skin for each new instance (you can temporarily change the skin by right-clicking in the background). The default is ‘DotEight’, but you might prefer ‘DarkEight’.

### Gamma

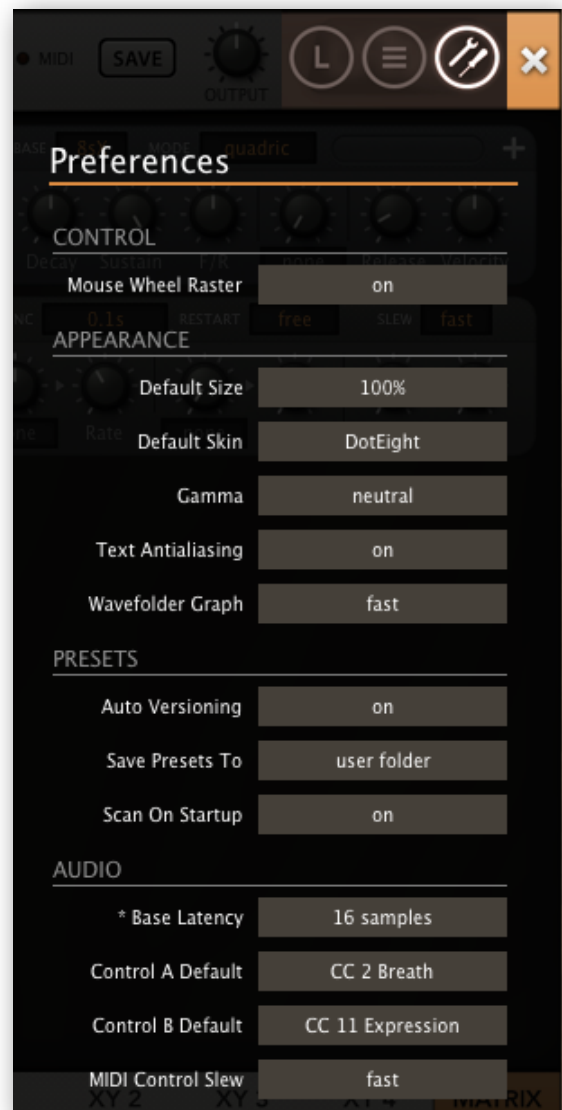
The default brightness.

### Text Antialiasing

Smoothing of all labels and values. Usually left on, in rare cases switching this option off can improve readability.

### Wavefolder Graph

Appearance of the FOLD module’s little graph. ‘eco’, ‘fast’ or ‘glow’, in order of CPU usage.



## PRESETS

### Auto Versioning

If this option is 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

Choosing 'user folder' here causes all saved presets to land in the *User* folder instead of the currently selected one.

### Scan On Startup

Whether the preset library should be scanned and the database recreated when the first instance of Zebra2 is started, e.g. when you reopen a project.

## AUDIO

### Base Latency

Only disable this option if you are 100% sure that your audio system – hardware as well as software – uses buffers that are a multiple of 16 samples. Otherwise you should leave it at '16 samples' to prevent crackles. Note that this setting only takes effect when the host allows e.g. on playback, after switching sample rates, or after reloading Zebra.

Note that a new Base Latency setting will only take effect when the host allows e.g. on playback or after switching the sample rate. Reloading Zebra2 will always work.

### ABOUT THOSE BUFFERS

Internally, Zebra processes audio in chunks of  $n \times 16$  samples. This so-called 'block processing' method significantly reduces CPU load and memory usage.

For instance, if the number of samples to be processed is 41, Zebra will process 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.

Note: The extra buffer is only necessary if either the host or the audio driver is processing "unusual" buffer sizes. In the many host applications that process buffers of 64, 128, 256 or 512 samples (all multiples of 16), try switching it off so that Zebra can process latency-free.

### Control A/B Default

The list of modulation sources in previous versions of Zebra2 included the fixed MIDI CC *Breath* (CC#02) and *Xpress* (expression pedal, CC#11). In version 2.8 we replaced these with a pair of user-definable CC sources called *CtrlA* and *CtrlB*, with *Breath* and *Expression* set as the respective default values to retain compatibility with older presets.

### MIDI Control Slew

The strength of parameter smoothing for all performance control sources: *PitchW* (pitch wheel), *ModWhl* (modulation wheel), *CtrlA*, *CtrlB* as well as *ATouch* (aftertouch i.e. channel pressure or poly pressure). The default setting is 'fast'.

# Tips & Tricks

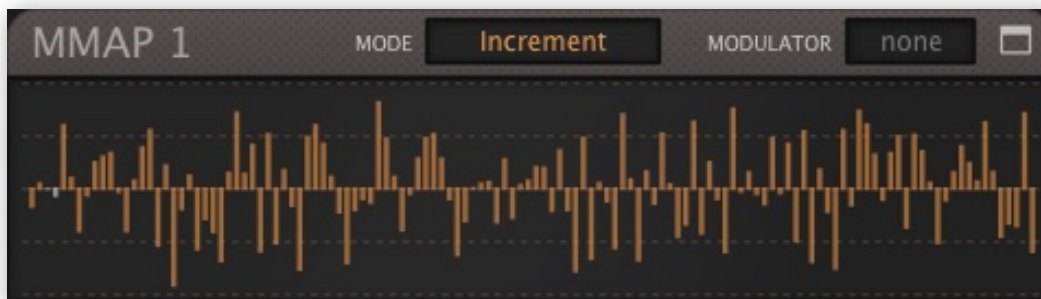
Here are just a few tricks that require some ‘thinking outside the box’. I’m sure that more will be discovered in time – Zebra2 certainly has enough fire-power!

## Motion viewer for modulators

Thanks to Brian Rzycki for this interesting tip...

Load *initialize* from the Local root directory then assign MMap1 as modulation source for something, e.g. Lane 1 Pan (the target doesn’t actually matter for this experiment).

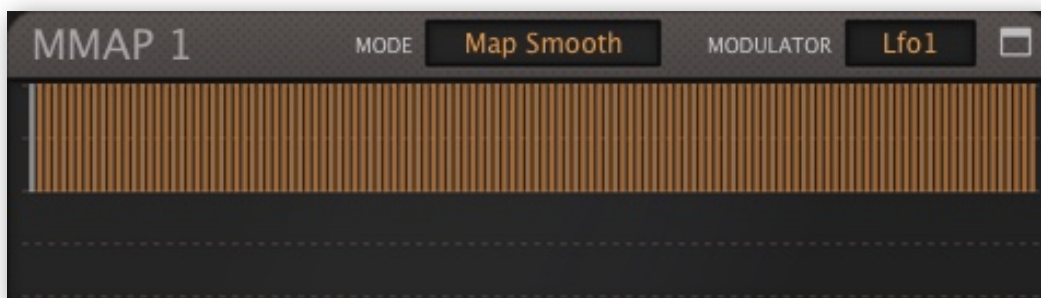
A ModMapper will appear in the modulators pane:



Click on Increment and change the MODE to Map Smooth. Select LFO1 as MODULATOR. It’s unfortunate that we can’t select MMix1 here!

Click on the window icon to expand the map, set the extreme left and right values both to maximum, right-click and select *straighten*. CLOSE the expanded map.

It should now look like this:



Play a note and turn down the LFO rate (this trick only works well if the modulator is relatively slow). Also works fine with envelopes or MIDI input such as aftertouch.

## More MSEG handles

If you really need more handles than the 33 available in each MSEG, try using a couple of MSEGs in series. Here’s how: Extend the very last segment of the first MSEG to the total length of the second MSEG, then extend the first segment of that MSEG to the length of the first MSEG minus that long segment. Add them together using a modulation mixer.

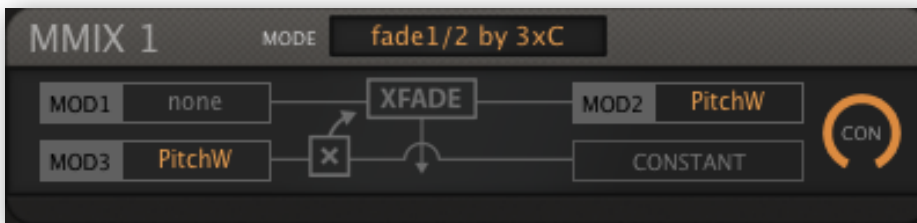
## Modulation inverter

It is sometimes necessary to invert unipolar modulation sources, for instance if you want to cross-fade between two lanes of the main grid. Here's how to do that:



Alternatively, a Mix module can cross-fade between two signals **at source** e.g. individual oscillator volumes. However, the solution here is generally more flexible as it can convert unipolar to bipolar and lets you create non-linear curves.

## Absolute value



This example always outputs positive pitch wheel values - a minus times a minus is a plus.

## Vibrato under control



When the mod-wheel is at minimum, output is all *ATouch*, and when at maximum, output is all *ModWhl* – so the sum of the sources always adds up to 100%.

Especially 'Prog-Rock' keyboard wizards will understand the reason for this one. It lets you add vibrato using either mod-wheel or aftertouch or any mixture of the two in the same preset, without letting vibrato get too deep. So you can take a solo using the mod-wheel, then get back to playing two keyboards at once using aftertouch instead.

# Zebrify

## Introduction

The 'effects' version of Zebra2. Zebrify includes several features that transcend what you would normally expect from an insert effect, for instance audio oscillators. With carefully programmed pitch-detection, Zebrify can be used as a powerful guitar synthesizer. Like the effects section in Zebra2, Zebrify is not polyphonic.



*Zebrify's Synthesis window, showing all generator and effect modules in a single grid*

Zebrify uses the main patching grid for all modules. It has fewer of these than Zebra2...

VCF (4)	Mix (2)	ModFX (2)	EQ (2)
FMO (2)	Ring (1)	Delay (2)	OSC (2)
Comb (2)	XMF (2)	Rev (1)	Noise (2)
Shape (2)	SB (2)	Comp (2)	Dist (1)

...but four additional modulation sources:

<b>EnvFol1</b>	<b>Pitchness</b>	<b>Essness</b>	<b>Transient</b>
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## MIDI

Click on the 'Midi' tab in Zebrify's lower bar to open this panel:



*Zebrify's MIDI panel, with KeySource menu*

Together with the Pitch Detector (see a few pages down), this panel is mainly concerned with Zebrify's own monophonic version of **KeyFol**, the key-follow modulation source.

**Important:** Several DAWs (e.g. Cubase and Reaper) automatically route MIDI into insert effects. Others, however, use more complicated methods – you might have to spend some time searching in the appropriate documentation for information on how to do this.

### Glide

Smooths KeyFol when *KeySource* is set to 'MIDI' (see below).

### KeySource

Determines how Zebrify derives its note data i.e. KeyFol and envelope gate.

*MIDI:* KeyFol uses incoming MIDI notes with last note priority, like in Zebra2's effects section. Envelopes and MSEGs can only be triggered in this mode.

*Input:* Detects the pitch, KeyFol is a continuous variable.

*In Qtz:* Detects the pitch, KeyFol is quantized to the nearest semitone.

### Output

Zebrify's main output level control.

### Keyboard

Displays detected or MIDI notes (see *KeySource* above). Notes derived from input signals with ambiguous pitch content (e.g. chords) can cause the keys to jump wildly.

The keyboard can also be used to trigger/gate envelopes and MSEGs manually (especially useful if your sequencer is incapable of routing MIDI data into effect plugins).

## Input

Click on the 'Input' tab in the lower bar. The input pane contains three panels: Input Mixer, Envelope Detector and Pitch Detector...

### Input Mixer

Zebrify's grid has four lanes, and each has its own input...



*Zebrify's Input Mixer panel*

#### Input1 ... Input4

Input levels. Input1 goes to the lefthand lane of the grid, Input2 to the next lane etc..

#### Input selectors

*Stereo*, *left*, *right* or *mono*-sum for each input. For instance, setting Input1 to 'left' and Input2 to 'right' lets you split the two channels of a stereo signal between lanes 1 and 2.

## Envelope Detector

The Envelope Detector continuously analyses the input signal level and outputs the modulation source **EnvFol1** (envelope follow). EnvFol1 can then be used to control targets that would typically be modulated by a standard envelope e.g. the output level of a lane in the grid. Note that envelope detection is independent of the Input Mixer settings.



*Zebrify's Envelope Detector panel*

**MODE**

*Follow:* EnvFol1 is an envelope follower i.e. it is proportional to input signal level

*AR Env:* EnvFol1 is a simple Attack-Release envelope triggered at the Threshold

**CURVE**

*linear:* EnvFol1 is linear – best option for modulating levels e.g. lane volumes

*exponential:* EnvFol1 is exponential – for modulating frequencies e.g. filter cutoff

**Attenuation**

Gain control for the envelope detector only, independent of Input Mixer levels. See also *Thresh* below.

**Attack**

Rise time after the signal level has reached the threshold (see *Thresh* below).

**Release**

Fall time after the signal level drops below the threshold.

**VU**

Input level display.

**LVL (level)**

Realtime display of EnvFol1 output level.

**Threshold**

This knob adjusts the level at which the envelope follower is 'on'. Use together with the *Attenuation* parameter (see above).

**Smooth**

Smooths both Attack and Release.

**FILTER TYPE**

Zebrify's envelope detector includes an input filter so it can be set up to react to certain frequencies only. See *Filter* below.

*signal:* No filter

*bandpass:* Isolate a particular frequency

*lowpass:* Isolate low frequencies e.g. bass drum

*highpass:* Isolate high frequencies e.g. hi-hat

**Filter**

Cutoff frequency of the envelope detector's input filter.

## Pitch Detector

Input signals with a strong fundamental can be used to control the pitch of Zebrify's oscillators. Patch up your own guitar synthesizer or voice-controlled 'Theremin'!



*Zebrify's Pitch Detector panel*

### MODE

*percussive*: for strong attack signals: acoustic guitar, tuned percussion etc.

*voiced*: for breathy / noisy signals: vocals, flutes etc.

*clear*: for mostly pure signals: monophonic synth lines etc.

### SOURCE

Input selector for pitch detection – *stereo*, *left*, *right* or *monosum*.

### Sense (Input)

The main input gain for all parts of the Pitch Detector, with an indicator that lights up whenever the signal is strong enough for pitch detection.

### TRANSIENT Decay

Controls how quickly **Transient** decays to zero.

### TRANSIENT Sense

This threshold determines the level at which transients (short-lived jumps in volume) will be recognized as such. The output of this section is the **Transient** modulation source...

### ESS on/off switch

Adds detected transients to the **Ess** modulation source. See ESS Sense.

### ESS Sense

Ess frequency cutoff, from 4 to 8 kHz ('esses' are sibilants, high-frequency noises with little or no pitch content). The output of this section is the **Essness** modulation source.

### PITCHNESS Sense

Pitchness is effectively the opposite of Essness i.e. it reacts to pitched signals. Set low values for meticulous but relatively slow pitch detection, and higher values for signals with clear pitch content. The output of this section is the **Pitchness** modulation source, practically a smooth gate that opens as long as pitch is detected.

### PITCH HiNote, LowNote

Limits pitch detection to a range of notes (standard MIDI note numbers).

# ZRev

Despite its austere appearance, ZRev is the mother of non-convolution reverb units. It is a tool for hand-tuning delay coefficients in feedback delay and allpass networks. Exactly how it works is a well-kept secret – to quote Urs Heckmann:

“Before tweaking any knob on Zrev one should google the following terms: *comb allpass filter*, *feedback delay network*, *jot householder matrix*, and *schroeder moorer reverb*.”



Assuming you didn't just spend hours searching those words, the following should help: The left section is a feedback delay network with damping, and the right section is two cascades of nested allpass filters with adjustable feedback for each set.

ZRev is a challenge. If enough people try enough different coefficients for a long enough time, somebody might just stumble upon a great-sounding set. The ZRev challenge should not be seen as a “chimps on typewriters” scenario – in theory, ZRev is capable of emulating any artificial reverb, and it's up to you to work out the best strategy! However...

The relative values affect the room quality – the more irregular, the better. Some claim that prime numbers or other special ratios are necessary, but so far the best tactic still appears to be simple trial-and-error. If you have a set of values that produces no metallic ringing at all, please contact [anybody@u-he.com](mailto:anybody@u-he.com) immediately.

Although ZRev itself has no Save button, you can save your settings in the native format of the host application – there should be a Save button somewhere at the top of the window.

# Modulation Target Lists

## Generators

Modules and target names are in alphabetical order, knob names are in **bold**, “modulation amount” means the degree to which another modulator affects its target.

Comb	
Damp	<b>Damp</b>
DampModDepth	(assignable) Damp modulation amount
Detune	<b>Detune</b>
Distortion	<b>Distortion</b>
Dry	<b>Dry</b>
FBModDepth	(assignable) Feedback modulation amount
Feedback	<b>Feedbk</b>
Flavour	<b>Flavour</b>
FlavourMod	(assignable) Flavour modulation amount
Input	<b>Input</b>
InputMod	(assignable) Input modulation amount
key scale	<b>KeyScale</b>
Pan	<b>Pan</b>
PanModDepth	(assignable) Pan modulation amount
PreFill	<b>PreFill</b>
Tone	<b>Tone</b>
ToneMod	(assignable) Tone modulation amount
Tune	<b>Tune</b> (semitones)
TuneModDepth	(assignable) Tune modulation amount
Vibrato	<b>Vibrato</b>
Volume	<b>Volume</b>
VolumeModDepth	(assignable) Volume modulation amount
Width	<b>Width</b>

FMO	
Detune	<b>Detune</b>
FM Depth	<b>FM</b> input
FM ModDepth	(assignable) FM modulation amount
key scale	<b>KeyScale</b> (lower panel)
Pan	<b>Pan</b>
PanModDepth	(assignable) Pan modulation amount
Tune	<b>Tune</b> in semitones
TuneModDepth	(assignable) Tune modulation amount
Vibrato	<b>Vibrato</b>
Volume	<b>Volume</b>
VolumeModDepth	(assignable) Volume modulation amount
Width	<b>Width</b>

Mix (ChannelMix)	
Mix	<b>Mix</b>
Pan	<b>Pan</b>
PanMod Depth	(assignable) Pan modulation amount

Noise	
F1 ModDepth	(assignable) Lowpass modulation amount
F2 ModDepth	(assignable) Highpass modulation amount
Filter1	<b>Filter1</b> (Lowpass)
Filter2	<b>Filter2</b> (Highpass)
Pan	<b>Pan</b>
PanModDepth	(assignable) Pan modulation amount
Volume	<b>Volume</b>
VolumeModDepth	(assignable) Volume modulation amount
Width	<b>Width</b>

OSC	
Detune	<b>Detune</b>
key scale	<b>key scale</b> (lower panel)
Normalize	<b>Normalize</b> (lower panel)
Pan	<b>Pan</b>
PanModDepth	(assignable) Pan modulation amount
Phase	<b>Phase</b>
PhaseModDepth	(assignable) Phase modulation amount
Poly Width	<b>Width</b> (for dual, quad, eleven)
Resolution	<b>Resolution</b> (lower panel)
SFX1ModDepth	(assignable) spectral effect 1 modulation amount
SFX2ModDepth	(assignable) spectral effect 2 modulation amount
SpectraFX1 Val	spectral effect 1 value
SpectraFX2 Val	spectral effect 2 value
SyncModDepth	(assignable) Sync modulation amount
SyncTune	<b>Sync</b>
Tune	<b>Tune</b> in semitones
TuneModDepth	(assignable) Tune modulation amount
Vibrato	<b>Vibrato</b>
Volume	<b>Volume</b>
VolumeModDepth	(assignable) Volume modulation amount
WarpModDepth	(assignable) Wave modulation amount
WaveWarp	<b>Wave</b> index

Shape	
D_modDepth	(assignable) Depth modulation amount
Depth	<b>Depth</b>
Edge	<b>Edge</b>
Edge ModDepth	(assignable) Edge modulation amount
HiOut	<b>HiOut</b>
Input	<b>Input</b>
Output	<b>Output</b>

VCF	
Cutoff	<b>Cutoff</b>
Drive	<b>Drive / Vowel / Split</b>
Gain	<b>Gain</b>
KeyFollow	<b>KeyF</b>
ModDepth1	(assignable) Cutoff modulation amount 1
ModDepth2	(assignable) Cutoff modulation amount 2
Resonance	<b>Res</b>

SB	
FModDepth	(assignable) Freq modulation amount
Frequency	<b>Freq</b>
Mix	<b>Mix</b>
MModDepth	(assignable) Mix modulation amount
Offset	<b>Offset</b>
OModDepth	(assignable) Offset modulation amount

XMF	
Bias	(visible but not implemented)
Click	<b>Click</b>
Cutoff	<b>Cutoff</b>
FilterFM	<b>FM</b>
Freq mod1	(assignable) Cutoff modulation amount 1
Freq mod2	(assignable) Cutoff modulation amount 2
FreqOffMod	(assignable) Offset modulation amount
FreqOffset	<b>Offset</b>
KeyFollow	<b>KeyF</b>
Overload	<b>Over</b>
Resonance	<b>Res</b>
XFMmod	(assignable) FilterFM modulation amount

Distortion	
Input	<b>Input</b>
Output	<b>Output</b>
Pre Tilt	<b>Pre Tilt</b>
Post Tilt	<b>Post Tilt</b>
Center Freq	<b>Center Freq</b>
Low	<b>Low</b>
High	<b>High</b>

## Voice

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Voice Mix	
Mod Depth(1-4)	(assignable) 'Mod' modulation depth (Vol) – lane mixer
Pan Mod Dpt(1-4)	(assignable) 'Mod' modulation depth (Pan) – lane mixer
Pan(1-4)	<b>Pan(1-4)</b> – lane mixer
Send1	<b>Send1</b> – output/FX
Send2	<b>Send2</b> – output/FX
SendDepth1	(assignable) Send1 modulation amount – output/FX
SendDepth2	(assignable) Send2 modulation amount – output/FX
Volume(1-4)	<b>Vol(1-4)</b> – lane mixer

Voice Circuit	
Portamento	<b>Glide</b>
Portamento2	<b>Glide2</b>

## Modulators

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Envelopes	
Init	(assignable) Initial level before the Attack stage
Attack	<b>Attack</b>
Decay	<b>Decay</b>
Sustain	<b>Sustain</b> level
Fall/Rise	<b>F/R</b>
Sustain2	(assignable) Sust2 level (if Sust2 is active)
Release	<b>Release</b>
Velocity	<b>Vel</b>
Vel2I	<b>Velocity Scale</b> initial level amount (if Init is active)
Vel2A	<b>Velocity Scale</b> to Attack amount
Vel2D	<b>Velocity Scale</b> to Decay amount
Vel2S	<b>Velocity Scale</b> to Sustain amount
Vel2FR	<b>Velocity Scale</b> to F/R amount
Vel2S2	<b>Velocity Scale</b> to Sust2 amount (if Sust2 is active)
Vel2R	<b>Velocity Scale</b> to Release amount
Key2I	<b>Key Scale</b> to initial level amount (if Init is active)
Key2A	<b>Key Scale</b> to Attack amount
Key2D	<b>Key Scale</b> to Decay amount
Key2S	<b>Key Scale</b> to Sustain amount
Key2FR	<b>Key Scale</b> to F/R amount
KeyS2	<b>Key Scale</b> to Sust2 amount (if Sust2 is active)
Key2R	<b>Key Scale</b> to release amount
Slope	Slope (if the envelope is in v-slope mode)

LFOG (LfoG)	
Amplitude	<b>Amp</b>
Phase	<b>Phase</b>
Rate	<b>Rate</b>

LFO	
Amplitude	<b>Amp</b>
Delay	<b>Delay</b>
DepthMod Dpt1	(assignable) Amp modulation amount
FreqMod Dpt	(assignable) Rate modulation amount
Phase	<b>Phase</b>
Rate	<b>Rate</b>

MMix	
Constant	<b>Constant</b>

MSEGs	
Velocity	<b>Velocity</b> amount
Attack	<b>Attack</b> time
Loop	<b>Loop</b> time
Release	<b>Release</b> time

## Effects

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Comp	
Attack	<b>Attack</b>
Compression	<b>Comp</b>
Input	<b>Input</b>
Output	<b>Output</b>
Release	<b>Release</b>
Threshold	<b>Thresh</b>

EQ	
Freq HiShelf	<b>(4)</b> horizontal position
Freq LowShelf	<b>(1)</b> horizontal position
Freq Mid1	<b>(2)</b> horizontal position
Freq Mid2	<b>(3)</b> horizontal position
Gain HiShelf	<b>(4)</b> vertical position
Gain LowShelf	<b>(1)</b> vertical position
Gain Mid1	<b>(2)</b> vertical position
Gain Mid2	<b>(3)</b> vertical position
Q HiShelf	<b>(4)</b> slope
Q LowShelf	<b>(1)</b> slope
Q Mid1	<b>(2)</b> slope
Q Mid2	<b>(3)</b> slope

Delay	
Drive	(unused)
Feedback	<b>Feedback</b>
Hipass	<b>Hipass</b>
Lowpass	<b>Lowpass</b>
Mix	<b>Mix</b>
Pan1 ... Pan4	<b>Pan1 ... Pan4</b>
Ratio1 ... Ratio4	<b>Ratio1 ... Ratio 4</b>
X-Back	<b>X-back</b>

Mix (ChannelMix)	
Mix	<b>Mix</b>
Pan	<b>Pan</b>
PanMod Depth	(assignable) Pan modulation amount

ModFX	
Center	<b>Center</b>
Depth	<b>Depth</b>
Feedback	<b>Feedbk</b>
HiCut Freq	<b>HiFreq</b>
High Boost dB	<b>Boost (high)</b>
Low Boost dB	<b>Boost (low)</b>
LowCut Freq	<b>LowFreq</b>
Mix	<b>Mix</b>
Quad	<b>Quad</b>
QuadPhase	<b>Q-Phase</b>
Speed	<b>Speed</b>
Stereo	<b>Stereo</b>

NuRev	
Pre-Delay	<b>PreDelay</b>
Damp	<b>Damp</b>
Decay	<b>Decay</b>
Size	<b>Size</b>
Tone	<b>Tone</b>
Width	<b>Width</b>
Dry/Wet Mix	<b>Dry/Wet</b>

Reverb	
Damp	<b>Damp</b>
Diff Feedback	<b>D-Feedb</b>
Diff Mix	<b>D-Mix</b>
Diff Mod	<b>D-Mod</b>
Diff Range	<b>D-Range</b>
Diff Speed	<b>D-Speed</b>
Dry	<b>Dry</b>
Feedback	<b>Feedback</b>
Modulation	<b>Modulation</b>
PreDelay	<b>PreDelay</b>
Range	<b>Range</b>
Speed	<b>Speed</b>
Wet	<b>Wet</b>

SB	
FModDepth	(assignable) Freq modulation amount
Frequency	<b>Freq</b>
Mix	<b>Mix</b>
MModDepth	(assignable) Mix modulation amount
Offset	<b>Offset</b>
OModDepth	(assignable) Offset modulation amount

Shape	
D_modDepth	(assignable) Depth modulation amount
Depth	<b>Depth</b>
Edge	<b>Edge</b>
Edge ModDepth	(assignable) Edge modulation amount
HiOut	<b>HiOut</b>
Input	<b>Input</b>
Output	<b>Output</b>

VCF	
Cutoff	<b>Cutoff</b>
Drive	<b>Drive / Vowel / Split</b>
Gain	<b>Gain</b>
KeyFollow	<b>KeyF</b>
ModDepth1	(assignable) Cutoff modulation amount 1
ModDepth2	(assignable) Cutoff modulation amount 2
Resonance	<b>Res</b>

# Troubleshooting

## Random Notes

### *Problem*

Zebra goes “out of tune” after 10 to 15 minutes.

### *Solution*

That’s Zebra’s demo-mode restriction! Reload the plug-in or purchase a license.

## Parameter Reset

### *Problem*

“I’m on [computer platform and OS version] using [DAW]. I load Zebra2 into a project, and whenever I play the song or try to record, it resets [parameter] to [value]”.

### *Solution*

That sounds like an unwanted MIDI learn – a controller has somehow been assigned to that parameter, and restarting the song resets all assigned controllers. Simply remove the offending connection from the [MIDI Table](#).

Note: MIDI Learn assignments are global for all presets in all instances of Zebra2, and are stored at the following locations (you might like to add an alias to your desktop):

**Win** ...\\VstPlugins\\u-he\\Zebra2.data\\Support\\com.u-he.Zebra2.midimap.txt

**Mac** ~/Library/Application Support/u-he/com.u-he.Zebra2.midimap.txt

If all else fails, there’s our online support at [www.u-he.com](http://www.u-he.com). Not open at weekends!

*The End*