BAZILLECM

MODULAR FM & PD SYNTHESIZER

USER GUIDE

7. August 2025

U-HE • HECKMANN AUDIO GMBH • BERLIN

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Introduction

Bazille vs BazilleCM

BazilleCM is a functionally reduced ‘magware’ version of Bazille, distributed by **Computer Music** magazine (see the link on the next page). Here are the main differences between the full version available from the u-he website, and BazilleCM:

	Bazille	BazillleCM
Oscillators	4	2
Filters	4	1
LFOs	2	1
Envelopes	4, with Fall / Rise range control	2, no F/R range
Ramp Generators	2	0
Modulation Mapper	2	1
Dual Lag Generators	2	1
Effects	Distortion, Delay, Phaser, Spring Reverb	Delay only
HQ mode	YES	NO
Multicore mode	YES	NO
Maximum polyphony	16	8
Stacking	up to 8 voices	NO
Microtuning	.TUN and MTS-ESP	MTS-ESP only
Preset Tagging	YES	NO
Preset Favourites	8 colour coded ‘Favourites’ smart folders	Favourite 1 only

Note: BazilleCM presets can be loaded into Bazille, but not the other way round.

Resources

musicradar / computer music

http://www.computermusic.co.uk

u-he online

For downloads, news articles and support, go to the u-he website
For lively discussions about u-he products, go to the u-he forum
For friendship and informal news updates, go to our facebook page
For video tutorials and more, go to our youtube channel

u-he team 2025 (Q4)

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GUI Components

Knobs and sliders

There are two types of controls: *unipolar* and *bipolar*. Unipolar knobs and sliders only allow positive values, while the *bipolar* knobs and sliders allow negative values, often within a range of -100 to +100. In the above image (the oscillator tuning controls) you can easily see that the *Tune* knob is unipolar (it starts at zero), while the *Modify* knob is bipolar. Note: while envelope sliders are unipolar, the sequencer sliders are bipolar.

All knobs and sliders react as follows:

- **Coarse control**: Click+hold with the left mouse button, then drag up or down.
- **Fine control**: For 0.01 steps, hold down one of the SHIFT keys beforehand.
- **Mouse wheel**: If your mouse has a scroll wheel, you can hover over the knob/slider and roll the wheel. For finer control, hold down a SHIFT key. If your mouse wheel has noticeable 'grains' when rolled, set the Mouse Wheel Raster option in the Configuration page to 'on'.
- **Reset to default value**: Double-clicking a knob reverts to a useful default value, often zero.

Selectors

The orange-on-black text fields contain a list of options. Click on a selector to open the list, or roll your mouse wheel to scroll through the values or options.

Sockets and cables

BazilleCM modules are connected together ('patched') using virtual cables. The sockets are colour-coded: inputs are grey while outputs are red – worth remembering!

To make a connection, drag and drop between an output and an input socket (either direction will work). Outputs will happily accommodate several cables, while inputs will accept just one – the new connection will simply replace the existing one.

As a rule, you can't connect two inputs together, but there's actually an exception: Dragging a cable from an unused input to another that is already in use creates a so-called 'daisy chain' – the source is patched to both inputs, the signal is passed on from one input to the next. Try it!

Click on a socket / the end of a cable for the following functions:

- **move inputs** – drag+drop from the used input to a different socket.
- **duplicate cable** – as above, but shift+drag+drop: creates a new cable from the same output.
- **move the output** – right-click on the output end, drag+drop onto a different output.
  Note: While dragging you will see a **straight line** connected to the original output sockets.
- **remove cables** – either double-click the input end, or drag+drop away from the input socket.
- **change cable colour** – click repeatedly (but slowly) on the input end until the cable has the colour you want. Take care not to double-click, as this will remove the connection.

Right-click on any input socket, even if it is unused, to change the opacity and style (thickness) of all cables. Note: These options are also available in the Preferences page.

Parameter locking

Lock any parameter by right-clicking on the knob / slider / selector.

Important: You can still adjust the value! The lock simply ensures that it won't change when you switch presets. To unlock again, right-click and untick 'Locked'.

While the current implementation of parameter locking is useful for retaining e.g. Microtuning or Fine tuning while changing presets, it is less suitable for values in the modulation sequencer, as locking each one individually means working with up to 8 x 16 = 128 locks!

GUI size

Right-clicking anywhere in the background opens a context menu containing the user interface size options as percentage and width x height in pixels. Please note, however, that setting the size here is only temporary: To specify a default GUI size for each new instance of BazilleCM, go to the Preferences.

Computer keyboard

The following modifier keys are used in the mapping generators and the patch browser:

Mac / macOS	PC / Windows
shift = shift, ⇧	**shift** = shift, ⇧
opt = option, ⌥, alt, alternate	**ctrl** = control
cmd = command, ⌘, apple…	**alt** = alternate

MIDI Specialities

Multichannel MIDI

This feature supports a growing class of expressive 'performance' instruments that can send each note via a separate MIDI channel. For BazilleCM to respond correctly, the host application needs to route multiple MIDI channels to a single instance of BazilleCM. Each voice will then react individually to the performance controls pitch bend, aftertouch, mod wheel, Control A and Control B.

While multichannel MIDI is being received, voice modes Poly, Mono and Legato are practically identical: BazilleCM behaves like (up to) 16 mono synths with the same sound. Note that the maximum number of Voices (see TWEAKS) still applies as voices can still be stolen across multiple channels. The Duo mode is not channel-aware i.e. all MIDI channels are merged. Single trigger modulation sources (e.g. LFOs with Phase mode set to 'single') will listen to the channel of the first voice being played.

Poly pressure (polyphonic aftertouch)

As well as regular **channel aftertouch**, BazilleCM also recognizes and reacts appropriately to polyphonic aftertouch – each note within a chord will receive separate aftertouch data.

MTS-ESP

BazilleCM now supports Oddsound MTS-ESP, a system for microtuning multiple plug-ins within a DAW environment. The freeware 'Mini' version is all you need to get started. In the full version of Bazille, MTS-ESP can be overridden by activating Bazille's own microtuning, for instance with the .tun file *Default Scale*.

The Control Bar

Along the top and in both side panels are several ‘global’ elements…

Page switches

In the lefthand side-panel are two vertical buttons used for selecting the following views:

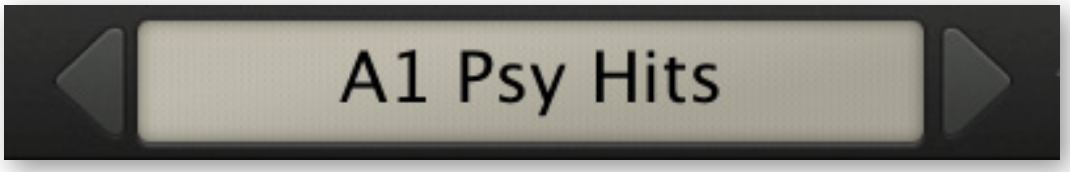
SYNTH .....for sound design, with access to all parameters on a single page
PRESETS.....for loading / marking / moving presets, and for selecting the ‘current folder’

Note: The words ‘patch’ and ‘preset’ mean practically the same thing in this user guide!

MIDI

At the top left is an indicator which flashes whenever MIDI data is received.

Data display



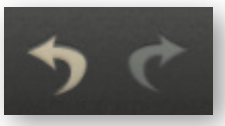
The data display has several duties: It normally shows the name of the current patch. Clicking on the triangles to the left and right steps backwards and forwards through all patches, and clicking on the middle of the display lets you select a patch from the current folder.

While BazilleCM is being edited, parameter names and values are displayed here. Whenever you stop editing for a few seconds, the patch name reappears.

Initialize

To load a simple template, right-click on the data display and select *init* (initialize). If you want to start from scratch every time you open an instance of BazilleCM, save this under the name *default* in the Local root directory.

Undo / redo



To the right is a pair of *undo* and *redo* buttons. Although the number of steps in the buffer is limited to 30, you can even undo a change of preset. Inadvertently switching presets doesn’t mean that your work is lost – simply ‘undo’ the change!

Save

See Save in the section about the preset browser (two pages down).

Output

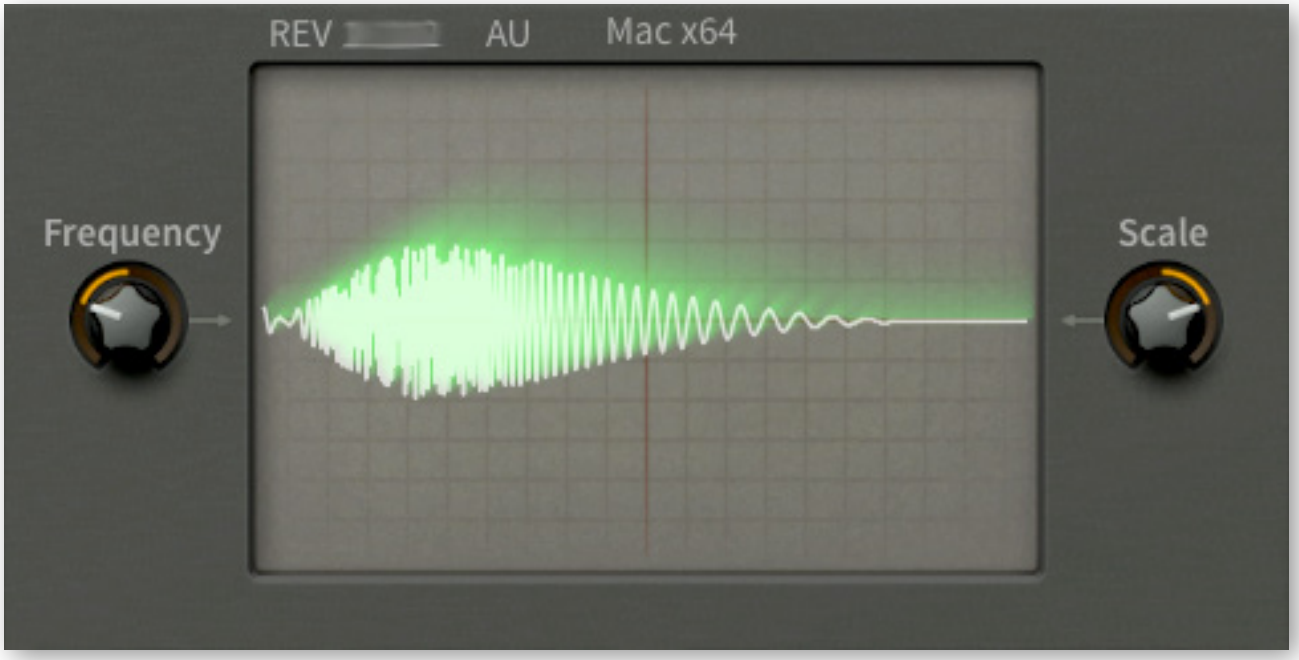
The main volume control and signal level / overload indicator. The indicator glows red if your output signal is too loud (causing unwanted digital distortion).

The u-he badge

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

The Oscilloscope

Check and adjust waveforms, monitor the effects of modulation or filtering, view envelope shapes etc.. Or just watch it for the entertainment value!



The scope displays a mono sum of the output, before the Delay effect. The *Frequency* knob on the left adjusts horizontal resolution, while the *Scale* knob on the right adjusts vertical resolution.

Right-click in the scope to select visual effects: *glow, fire* and *wind* add different fade-out effects at the cost of some extra CPU. These modes are also a bit more sluggish than *fast* or *eco*.

Preset Browser

Overview

You can load presets in the current folder by clicking on the data display and selecting from the menu, and step through them by clicking on the triangles next to the data display. However, BazilleCM also has a powerful browser – click the vertical [**PATCHES**] button on the far left…

Most of the GUI is replaced by a set of three connected panels: Folders appear on the left, presets in the centre and information about the currently active preset on the right. If you can't see the folders 01 to 10, click on the triangle to the left of *Local*. If you can't see the PRESET INFO pane at all, click on the [≡] button in the top right and activate *Show Preset Info*.

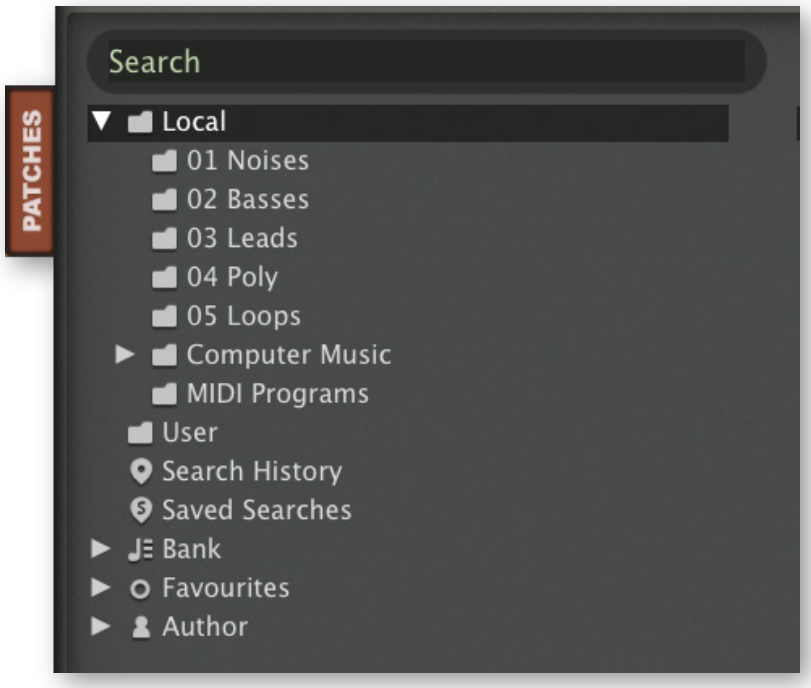
The Local root directory contains a representative selection of presets copied from the subfolders. Immediately after loading a preset (by clicking on its name) you can step through all the others using your computer's cursor keys.

Close the browser by clicking on the vertical [**SYNTH**] button on the far left.

Default preset

Whenever BazilleCM starts it checks whether the Local root contains a preset called *default*, which is then loaded instead of the demo sound. Note that *default* will not appear in the browser.

Directory Panel



Local

BazilleCM's factory presets are sorted into 5 category folders, plus a **Computer Music** folder containing patches created by CM authors. We recommend that you do not add to or remove any presets from *Local*, but save all your creations in the *User* folder (see below).

MIDI Programs

Local also contains a folder called 'MIDI Programs'. All presets (up to 128) present in this folder will be loaded into memory when the first instance of BazilleCM starts. MIDI Programs can then be switched via MIDI Program Change. As the MIDI Programs are accessed in alphabetical order, it's best to prefix each name with an index '000 rest-of-name' to '127 rest-of-name'.

Unlike regular presets, MIDI Programs cannot be added, removed or renamed on the fly. Changes will only take effect after the host application has been restarted.

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

When BazilleCM receives a program change it will display the bank and program numbers to the left of the preset name e.g. '0:0' for the first preset in the first bank (in certain hosts the first bank/preset is designated '1' instead of the correct '0').

To avoid another possible source of confusion: Make sure that there are no junked presets in the MIDI Programs folder. All files there will be adressed, even those that are hidden.

User

This is the best place for your own creations as well as third party soundsets. You can either select the 'User' folder immediately before saving the preset, or set a global preference which ensures that it will always be saved there – see the Preference *Save Presets To*.

Tip: To find out where the User folder resides on your computer, hold down option (Mac) or ctrl (Windows), right-click on the User folder and select *Show in Finder / Explorer.*

Smart Folders

The other folders do not contain files, but display the results of querying a database of presets. The content is therefore dynamic i.e. it will change whenever the underlying data changes.

> You can **drag & drop** any smart folder content onto e.g. 'User' or the desktop (see External Drag & Drop) to create folders containing real copies of those presets!

Search History

Click on this folder to display the results of past searches (maximum 10). If you want the search results to be more permanent, right-click and select *Save Search...* – see below. To remove all searches from the list, right-click on the 'Search History' folder and select *Clear*.

Saved Searches

This folder contains searches that have been saved via right click from the Search History. To remove individual saved searches, right-click on the search and select *Delete*.

Banks

These smart folders reference metadata about preset origin – the version of the factory library or the name of the soundset with which the preset was installed. See Preset Info a few pages down. Banks are (or will be) predefined for factory presets as well as u-he soundsets.

You can even create your own custom banks: Drag & drop one or more presets onto the 'Bank' folder then enter a suitable bank name into the dialogue box.

To remove Bank attributes from selected presets, either drag & drop them onto the 'no Bank' folder you will see at the bottom of the Bank list, or right-click on the Bank and select *Remove Presets from Bank*. Empty Banks will disappear.

Favourites

Presets dropped onto the 'Favourite 1' folder will be marked as such. The Favourite status can be removed from all presets by right-clicking on 'Favourite 1' and selecting *Remove All Favourite 1 Marks* – see Presets context menu a few pages down.

Junk

A smart folder pointing to *junked* presets (see 'Presets context menu' on the next page). Files dropped onto this folder will normally disappear from the browser, but you can select *Show Junk* in the Presets context menu.

Like Favourites, Junk can even be exported/imported (as *Junk.uhe-fav*).

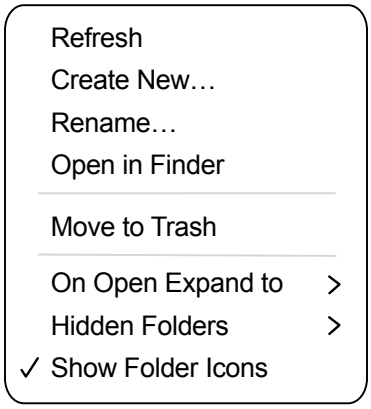
Junk marks can be removed globally by right-clicking on the Junk folder and selecting *Remove All Junk Marks*. If hidden, all junked presets will reappear in the browser.

Author

Smart folders for each Author. Tip: Instead of signing each of your creations, you could sign just one of them, then select them all and drag onto 'Author/(You)/'. As the process cannot be undone, please use this feature with caution! See also the section Internal Drag & Drop a few pages down.

Directory context menu

Right-click on any folder within ‘Local’ or ‘User’ to open this menu:



Refresh

Update the contents of the browser.

Create New…

Insert an empty subdirectory.

Rename…

Edit the folder name.

Open in Finder / Explorer:

Opens a system window for the currently selected folder. If you hold down the *option* key (Mac) or c*trl* key (Windows), this entry will change to *Show in Finder / Explorer* and the folder will be highlighted instead of opened.

Move to Trash / Recycle Bin

Moves the selected folder and all its contents to the trash.

On Open Expand to

The options here determine how deeply the browser will open any sub-directories whenever the GUI is opened or the *Refresh* function is called. The first option (*none*) collapses all folders, while the final option (*all levels*) reveals all nested folders.

Hidden Folders

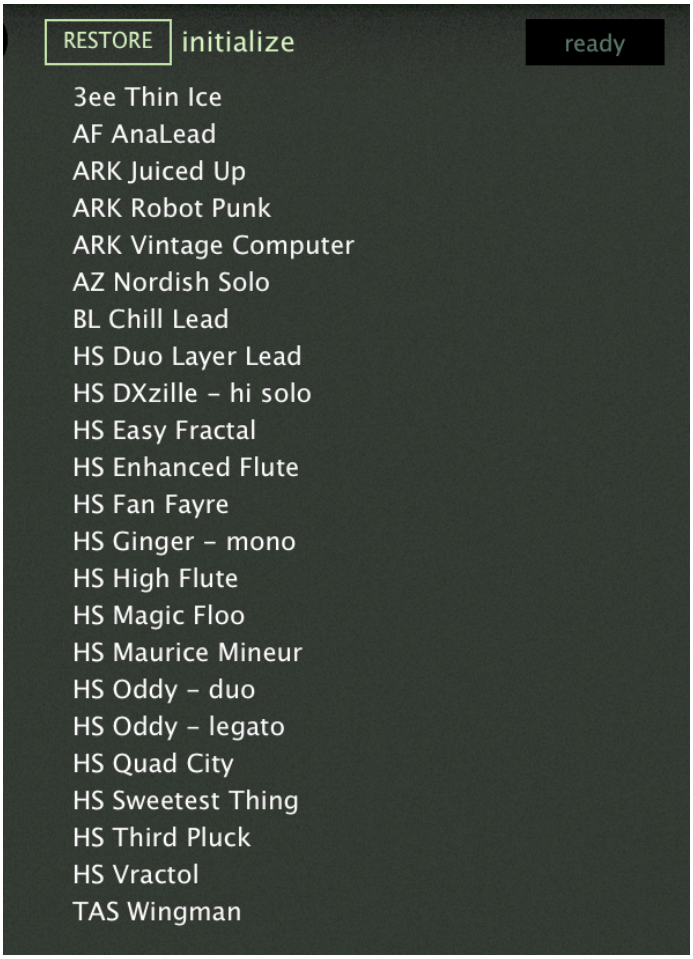
Select the smart folders you don't want to see.

Show Folder Icons

Unselecting this hides all icons in the directory except the Junk symbol.

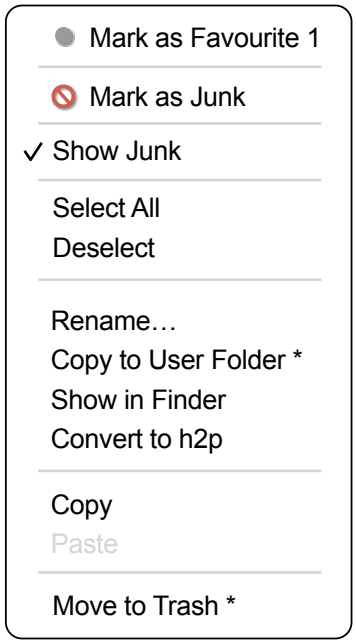
Presets Panel

The central area of the browser displays all presets in the current folder. Left-click to select.



Presets context menu

Right-click to open a menu containing functions that can be applied to individual presets.



Mark as Favourite 1

Choose as a ‘Favourite’. The entry will be replaced with *Unmark as Favourite*. The index ‘1’ is for compatibility with the full version of Bazille, which offers 8 colour-coded Favourite options.

Mark as Junk / Show Junk

Instead of deleting presets, you can mark them as ‘junk’ so that they disappear from the browser. Activate *Show Junk* to display junked files and mark them with a STOP symbol.

Select All, Deselect

See ‘Multiple Selection’ on the next page.

Rename…

Use this function to change the name of a preset.

Copy to User Folder / Duplicate

The entry here depends on the status of the Save Presets To preference as well as on the location of the source preset(s) i.e. whether they are in the Local or the User folder. Selected presets are copied with a number appended to the name, which increments (just like the *Auto Versioning* option) so that no preset can be overwritten by mistake.

Show in Finder / Explorer

Opens a system window for the right-clicked file. In smart folders only, holding down an option key (Mac) or ctrl key (Windows) replaces this entry with *Show in Browser*, which shows the currently selected file in its original location within BazilleCM’s browser.

Convert to native / h2p / h2p extended

This resaves selected presets in the format specified by right-clicking on the [SAVE] button.

Copy / Paste

Clipboard functions. Individual or multiple presets can be copied / pasted, even between BazillieCM's browser and system windows (Finder, Explorer).

Move to Trash / Recycle Bin

Immediately moves the selected preset(s) to the system trash.

Restore

While in the browser you can audition presets without losing track of the one that was previously loaded: Click the [RESTORE] button to get back to where you were before entering the browser.

Scan / ready

In the top right of the presets panel is a dark rectangle normally labelled ‘ready’. Whenever you use the refresh function (see the Directory context menu on the previous page), this turns into a progress indicator while the preset database is being refreshed. The process should only take a few seconds, even for a very large preset library.

Multiple selection

A block of adjacent presets can be selected via shift+click, and individual presets can be added to the selection via cmd+click (Mac) / alt+click (Windows). Presets can be moved to a different folder via drag & drop (see below). To deselect, either click on an unselected preset or choose *Deselect* from the context menu.

Drag & Drop

Internal

You can drag and drop single or multiple files from the preset panel onto any folders in the directory panel. Files dragged onto regular folders will be moved unless you hold an option (Mac) or ctrl (Windows) key, in which case they will be copied instead.

Files dropped onto smart folders will adopt the attribute of that folder: For instance, you can set the Author for several presets at once.

External

To manage your preset library externally you can drag presets and folders between BazilleCM's browser and your desktop or any system window.

On the Mac most Finder operations will automatically update the browser. Updating might not be immediate when using multiple formats or multiple host applications, but all it usually takes is a click on the GUI or in the directory tree (sets focus to the clicked instance of BazilleCM).

On Windows systems, a manual *Refresh* (see Directory context menu) will be required before changes to the contents of the browser appear.

Another little helper: If you drag a BazillleCM preset from e.g. your desktop and drop it onto the Data Display, it will be loaded but not automatically saved.

Exporting smart folders

Drag any smart folder onto the desktop to create a new folder containing those presets. Drag an entry from your Search History, or the Category 'Duo', Favourite 1 or one of the Authors.

Exporting favourite / junk status

You can export Favourites or Junk **status**: Shift+click and drag the 'Favourites' folder onto e.g. the desktop to create a file called *Favourites.uhe-fav.* Such files can then be imported into BazilleCM's browser on a different computer, via drag & drop onto the Favourites folder.

Note that importing *.uhe-fav* files from another computer will only work 100% correctly if all preset names and locations are **identical** on both computers.

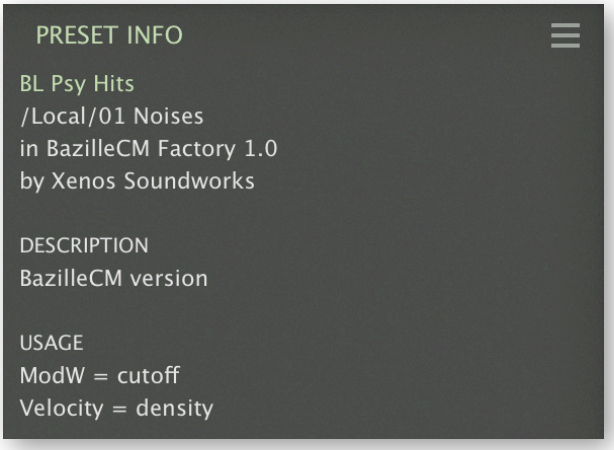
Note for Windows users

According to Microsoft, drag & drop will only work between applications with the same rights (i.e. both admin or both normal) for security reasons. If the host was started using the "run as admin" option, drag & drop functionality will be limited…

You can drag objects between plug-ins, or from the plugin into a system window or your desktop, but attempts to drag & drop anything into the plugin from outside the host will fail. This applies to presets, folders, favourites, *.uhe-soundset* files or indeed anything that can be dropped onto the plug-in GUI.

Preset Info

The panel to the right displays information about the selected preset. If you can't see this panel, click on the 'triple bar' [≡] button in the top right corner and tick *Show Preset Info*. If you prefer to see more presets and less information, hide the PRESET INFO panel.



Below the preset name you should see its path (from /Local or /User), the Bank and the Author (which also appear as Smart Folders). The DESCRIPTION and USAGE text is entered immediately before saving a patch.

Installing Soundsets

Any soundsets we distribute ourselves will be available in *.uhe-soundset* format. Third parties are also encouraged to use this package format for their own commercial soundsets (for details please contact our support team).

Standard Method

To install, drag & drop the *.uhe-soundset* file into BazilleCM – anywhere will work. The soundset should appear in the 'User' folder. If a soundset with the same name already exists in that location, any modified files will be backed up and the location of the backup file will be displayed.

Alternative Method

Soundsets in *.uhe-soundset* format can also be installed by clicking on the u-he badge, selecting *Install Soundset…* from the menu and navigating to the *.uhe-soundset* file. This option is especially useful for Linux, as the browser version for that platform does not support drag & drop.

Regular Folders

Folders containing BazilleCM presets can be manually copied or moved into the 'User' folder. You might have to refresh the browser (see Directory context menu) before they appear there. A refresh is generally necessary in Windows but not in macOS.

Note: As *.uhe-soundset* files are basically ZIP-compressed folders, you can rename them i.e. replace the long file extension with 'zip', then extract the presets as well as the accompanying documentation.

Search

The field at the top of the Directory panel lets you find presets according to a text string. The search normally looks into the preset name, author name, DESCRIPTION and USAGE (see the PRESET INFO panel). The search is not case-sensitive. Quotes are not required unless you need to include spaces. After entering some text, hit [Return].

To restrict the search to a particular **search path**, double-click that folder. This path will appear beneath the Search field instead of the preset folders, and you will only see smart folders. If the specified path contains sub-folders, these will also appear.

The [^] button to the left moves the search path up one level. The [X] button to the right sets the search path to the default Local plus User (i.e. all BazilleCM presets), and the preset folders become visible again. Alternatively, you can navigate to any higher level by right-clicking the search path, which opens a little menu.

Try this: 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 existed in the presets.

Scope

You can limit the scope of the search to just the preset name or specific parts of PRESET INFO by using *name* (preset name), *author*, *desc* (description) or *use* (usage) followed by a colon. For instance, *author:the* finds all presets by sound designers whose author names contain ‘the’. Similarly, *desc:space* will find all presets with the word space in the description.

Logic

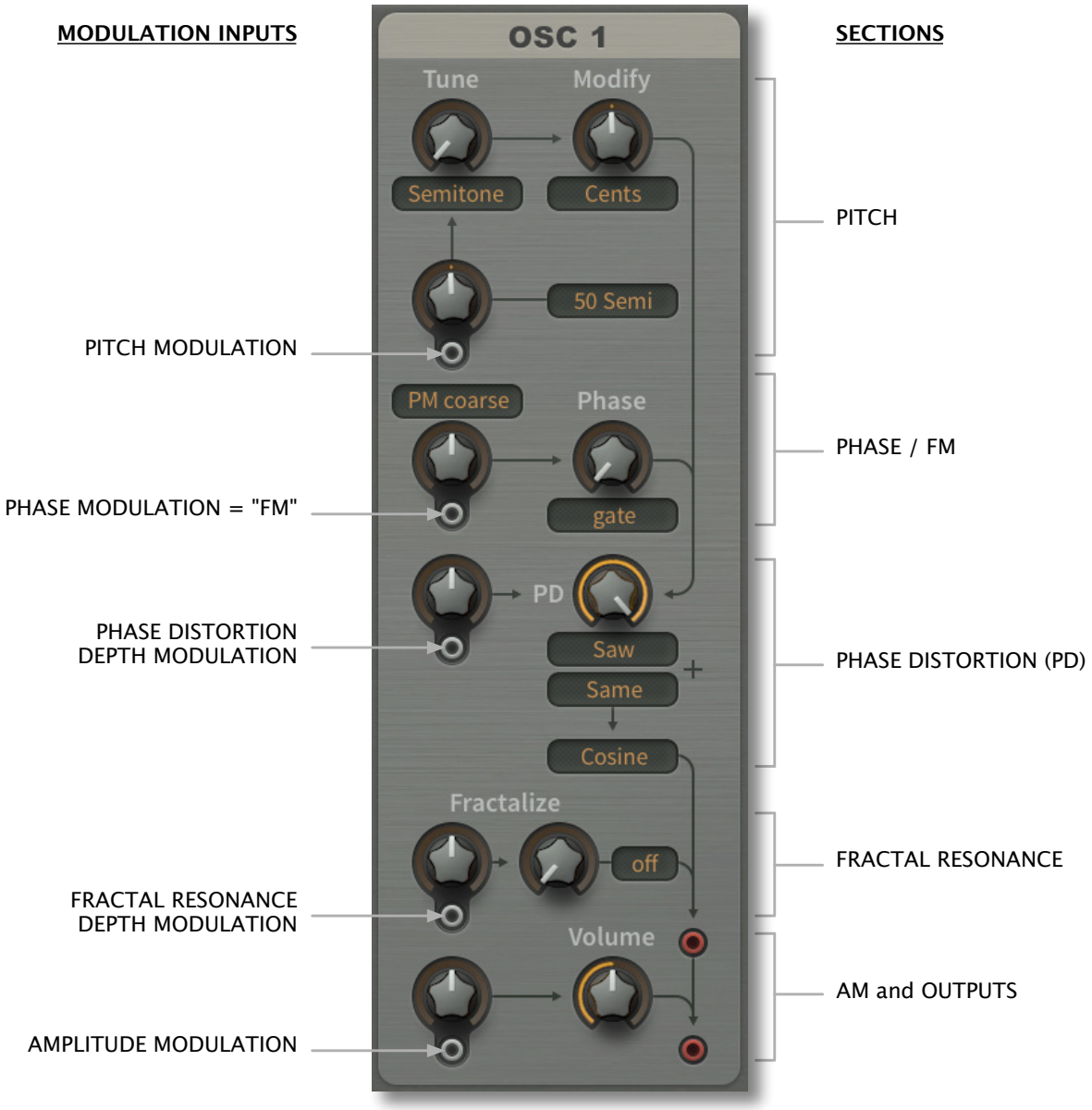
AND requires that presets contain both words. The AND is implicit, but can be written explicitly if you prefer: For example, entering ‘star AND wars’ is the same as entering ‘star wars’.

OR means that presets must contain at least one of the words.
NOT excludes the following word e.g. star NOT wars would find ‘star’ but not ‘star wars’.

Oscillators

Although the filters are traditional analogue models, the oscillators are unashamedly digital: They combine two technologies that made digital synthesis affordable in the 1980s – **FM** (frequency modulation, more correctly 'phase modulation') and **PD** (phase distortion).

Also included is another unusual process we call *Fractalize* (fractal resonance), which can create very 'cutting' sounds from relatively tame waveforms, with a similar result to the classic *sync* effect.



5 different types of modulation, one for each of the 5 sections

The main oscillators are very powerful signal generators which can even be used as LFOs as the frequency range starts at zero Hertz. It can take a while to get comfortable with them, but that's the price you pay for such flexibility!

The oscillator panel has five distinct sections, each with a modulation input. The next few pages deal with each of these sections separately – let's start at the top, with PITCH...

Pitch

Together, the knobs labeled *Tune* and *Modify* control the oscillator's basic pitch. Both have mode selectors that make the oscillators suitable for a wide variety of functions e.g. as FM operators, undertone generators or even as host-synchronized LFOs…

Tune

A value between 0.00 and 24.00 – the selector determines how this value is interpreted. The first 3 modes are for generating regular notes, as they automatically switch 'key follow' on:

Semitone .....maximum 24 semitones above standard pitch.

Overtone.....the first 24 harmonics in the overtone series. Note that octaves are not evenly spaced, they are at precisely 1.00, 3.00, 7.00 and 15.00.

Undertone .....the first 24 undertones (sometimes called 'subharmonics'). For further details, see the Wikipedia article about the undertone series.

In the last two modes, the frequency isn't affected by which MIDI notes you play, as 'key follow' is disabled. If you need an LFO with more modulation options, use oscillator 2 in either *Hertz* or *Clocked* mode instead of the regular LFO…

Hertz .....0 to max. 48Hz, but can be greatly extended via 'Multiply' – see modify below. Note that the rate is usually doubled (1.00 is 2Hz and 24.00 is 48Hz) if the second PD wave is the same as the first.

Clocked.....sync-to-host 'division factor'. 1.00 mean a whole note, 4.00 a quarter note etc.. For technical reasons the synchronization isn't 100% perfect, so you might have to retrigger the notes every now and again.

Modify

A value between -50.00 and 50.00. The selector specifies how this is interpreted. The *Modify* knob can affect oscillator tuning in one of four ways:

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

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

Beats.....similar to 5 Hz, but host-synced e.g. +4.00 = one extra cycle per quarter note.

Multiply.....multiply or divide by a constant (e.g. -8.00 will divide the frequency by 8). Values between -1.00 and -0.01 are interpreted as 1.00.

Tune modulation (unlabeled)

The amount of pitch modulation from a signal connected to the socket. The range of the modulation knob is selectable, with the following options:

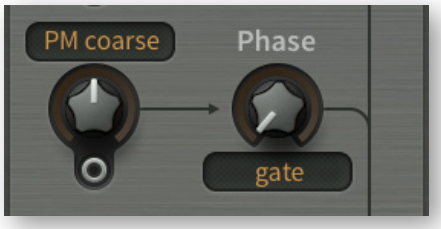
Cents .....+/- 50 x 2 cents i.e. plus or minus a semitone

5 Semi.....+/- 5 semitones

50 Semi.....+/- 50 semitones

Phase / FM

BazilleCM's oscillators are capable of all kinds of 'FM' sounds by plugging an audio-frequency source into the **phase** modulation input. 'FM synthesis' is a bit of a misnomer, as this technology was actually based on phase modulation (see Wiki articles about FM synthesis and Yamaha DX7).



With its 4 oscillators and 4 filters, the full version of Bazille is capable of 8-operator FM. BazilleCM's 2 oscillators plus single filter give you 3-op FM – enough for many typical FM sounds.

Phase

The righthand knob adjusts the basic phase position i.e. where in its cycle the waveform will start whenever a note is played. The range is usually 720° i.e. 2 cycles, but this is reduced to 360° when different waves are combined (the pitch drops an octave). The value of Phase is irrelevant when the mode is set to *random,* as in the above image.

The oscillators in most analogue synths are free running i.e. the phase is never reset. Because the oscillators in digital synths aren't computed until a note is played (otherwise the CPU would be busy computing inaudible sounds), the initial phase needs to be defined:

random .....Resets the oscillator to a random phase each time a note is played.
gate .....Resets to the value of Phase each time a note is played so that all notes start with the same phase (assuming Phase isn't being modulated).
catch.....Each oscillator gets its phase from where the most recent voice left off – for a better 'free running' effect despite voice rotation ('round robin').

Phase modulation (with mode selector)

The bipolar knob on the left adjusts the amount of phase modulation (or frequency modulation, depending on the modes) from a signal connected to the socket. Connect another audio-rate oscillator here for classic 'FM' sounds (both should be sine waves).

The first 3 options are for regular phase modulation with different depth ranges. As modulation in these modes only affects **phase**, the overall pitch of the oscillator is preserved:

PM fine .....for subtle phase modulation
PM medium .....for typical 'FM' uses, including self-modulation ('operator feedback')
PM coarse .....for maximum phase modulation

The next two options offer linear FM in two frequency ranges. With linear FM, modulation **adds** to the frequency – the overall pitch is only preserved if the modulating waveform is symmetrical:

lin 100Hz .....linear FM, 0 to 100Hz
lin 1kHz.....linear FM, 0 to 1000Hz

The last two options offer relative FM. In this mode, modulation **multiplies** the frequency. Again, the overall pitch is only preserved if the modulating waveform is symmetrical:

rel fine.....relative FM: oscillator frequency * (1 +/- 0.5 * modulation)
rel coarse.....relative FM: oscillator frequency * (1 +/- 5 * modulation)

The linear and relative modes are unusual in that they offer 'through-zero FM'. If a 100Hz oscillator is linear frequency modulated with -1000Hz, it will run 'backwards' at 900Hz.

Phase Distortion

Like FM, **Phase Distortion** (PD) is another method of skewing sine waves developed during the 1980s. If you're interested in the technical details, you could start by reading these articles:

http://en.wikipedia.org/wiki/Phase_distortion_synthesis
http://en.wikipedia.org/wiki/Casio_CZ_synthesizers

Whenever you start a fresh instance of BazilleCM, the *initialize* patch is automatically loaded. In this patch, oscillator 1 is already connected to one of the outputs so you can at least hear a sound. Oscillator 1's PD knob is set to maximum, resulting in a bright sawtooth-like wave. Try turning this all the way down for a pure sine wave, then modulate the phase distortion amount by connecting e.g. envelope 2 to the socket and turning the amount up.

PD / PD modulation

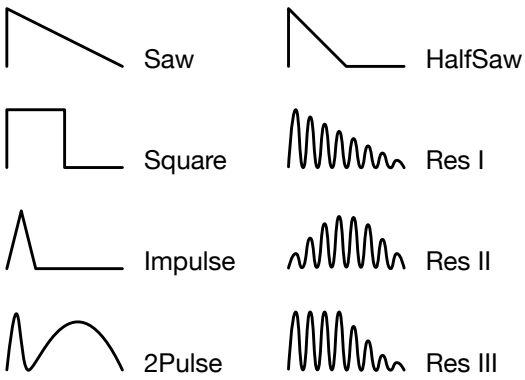
The PD knob controls the basic amount of phase distortion. The bipolar knob to the left adjusts the modulation depth from any signal connected to the socket.

PD waves (upper 2 selectors)

The selectors below the PD knob specify a pair of alternating non-linear phase functions.

The first five modes (*Saw, Square, Impulse, 2pulse, Halfsaw*) are simple, they need no explanation.

In the three 'Res' modes, multiple sine waves are packed into one of 3 differently-shaped 'windows'. The number of cycles in the window is controlled by the *PD* parameter.



Here are two of the many possible combinations:

Saw + Square *Impulse + Res 2*

Shape (lower selector)

Sets the basic oscillator waveform before phase distortion:

Cosine .....for regular phase distortion i.e. the above waves
TapMap1.....the mapping generator as waveform – note that low notes can get gritty due to the lower resolution compared with *Cosine*, and high notes can alias more

Fractal Resonance

Fractal resonance is similar to *Res* (see *Wave Selectors* above), but acts on the composite wave.

Multiple cycles of the waveform are ‘packed’ into another wave (specified by the selector) which serves as a ‘window’. Watch the effect of fractal resonance in BazilleCM’s oscilloscope. For example, here is a square wave packed into a triangular window:

Fractalize

The righthand knob controls the number of cycles (of the original wave) in the window. The selector to the right specifies the shape of the window. *Off, Saw, Tri* or *Max* roughly correspond to none, Res1, Res2 and Res3 respectively (see the previous page).

Fractalize modulation (unlabeled)

The bipolar knob on the left sets the modulation depth of a signal connected to the socket.

Outputs

There are two signal outputs at the bottom of the oscillator. The upper one is always at full volume, while the lower one can be attenuated and modulated...

Volume

The righthand *Volume* knob controls the nominal level of the lower output, before modulation...

Volume modulation (unlabeled)

The bipolar knob controls the modulation depth of a signal connected to the socket.

LFO

The low frequency oscillator has 3 parallel outputs, and is also responsible for vibrato.

Unipolar (+)

Activating the button at the top left causes the LFO's waveform to be shifted upwards so that it only delivers positive values instead of oscillating around zero. LFO amplitude is halved. Tip: If you are using the LFO for typical vibrato, you would usually want this switched off.

Rate

A value between -5.00 and 5.00 – the selector specifies how this value is interpreted. The first 3 options are absolute times measured in seconds (0.1, 1 or 10), all the others are synced to host tempo. The five options with 'dot' in the name are *dotted* (50% is added to the cycle length), and those with 'trip' in the name have *triplet* length (3 cycles occupy the space of 2).

0.1s to 10s.....absolute times: 1/10th, 1 or 10 seconds at Rate = 0.00.
1/64 to 8/1.....synchronized to host tempo

Note that the Rate control is exponential. The simplest way to set up a typical 5Hz vibrato, for instance, is to use '0.1s' mode with Rate at -1.00.

Rate Mod

The depth of rate modulation from a source chosen in the selector. Tip: To make the triangle and pulse waves less 'perfect', set this to *LFO random* and turn it up very slightly e.g. 0.10.

Wave

This knob affects the basic LFO waveforms in the following ways:

triangle.....from falling saw though triangle to rising saw
pulse.....pulse width from 1% through 50% to 99% (approximate values)
random.....smoothness control

For more LFO waveforms, try self-modulating the LFO's amplitude.

Phase

This adjusts the phase position at which the waveform will start whenever a note is played. The options in the selector are:

sync.....no restart, the LFOs for all voices remain in phase unless modulated apart
gate.....restarts to the value of *Phase* whenever a new note is played
single.....like sync, but restarts whenever a non-legato note is played
random.....restarts at a random phase whenever a new note is played

Delay

Fades the LFO in from zero, with ramp times ranging from immediately to about 20 seconds.

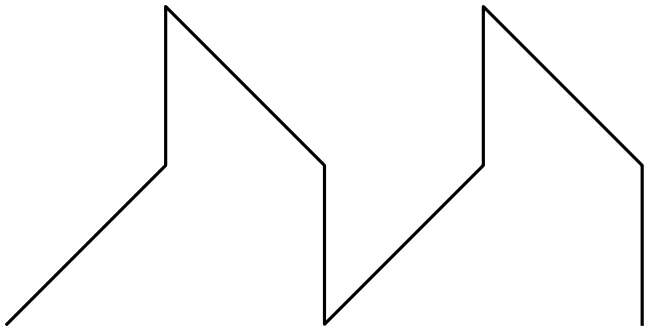
Amp Mod

This knob adjusts the amount of LFO level modulation from a source specified in the selector.

That higher values result in lower LFO output may seem counterintuitive, but please remember that Amp Mod is an **attenuation depth** parameter: Whatever the modulation source, you will always get maximum output from the LFO when *Amp Mod* is set to minimum. If you ever need to lower the overall LFO output, set the source to 'none' and turn the Amp Mod amount up.

Outputs (Triangle, Pulse, Random)

All three LFO output sockets can be used in parallel – try mixing them together in a multiplex before patching the sum to a modulation target or two.



equal mixture of Triangle and Pulse LFO ouputs, with Wave set to 50.00

Filter

BazilleCM's filters have several properties normally associated with analogue hardware. Close to where self-oscillation starts (50 to 55), there are surprising opportunities for weird-and-wonderful sound design. Note that all filter types are resonant and can self-oscillate.

Inputs / Gain

Like the main OUT, the filter has two audio inputs which are simply summed. The *Gain* knob controls the input level (negative values) as well as overdrive amount (positive values).

Cutoff

Cutoff frequency is measured in semitones from 0.00 to 150.00 for a total range of about 12 octaves. The modulation range is also +/-150 semitones.

Cutoff modulation (unlabeled)

The filter has a pair of general-purpose cutoff modulation inputs and amount controls. A typical use would be to patch an envelope to one and an LFO to the other, but remember that you can even use audio-rate sources in BazilleCM: Try everything, experiment!

Key Follow

Key follow causes the cutoff to track MIDI notes, with a variable amount.

Resonance

The resonance range is 0.00 to 100.00. Although self-oscillation can start around 50.00, the actual amount of resonance depends on the *Gain* setting (see *gain* above), so quite a generous range above that amount was necessary.

Below the Resonance control is another knob with input socket for Resonance modulation.

Outputs

There are six filter outputs, all of which can be used at the same time:

LP24.....24dB per octave (4-pole) lowpass
LP12.....12dB per octave (2-pole) lowpass
LP6.....6dB per octave (1-pole) lowpass
LP18.....18dB per octave (3-pole) lowpass
BP6.....6dB per octave (1-pole) bandpass
HP12.....12dB per octave (2-pole) highpass with low shelf via *Gain*

Envelopes

BazilleCM has 2 identical envelope generators that can be selected as “amp envelope” in the output modules and/or connected to any parameter that can be modulated.

A D S R

BazilleCM’s envelopes are based on the familiar ADSR type i.e. they have the standard parameters **A**ttack time, **D**ecay time, **S**ustain level and **R**elease time. Of course there are a few interesting extras under the hood…

Rate Mod

Overall speed modulation. For instance, if you select KeyFollow as modulation source and set a negative value, the envelopes of the higher notes will be shorter (typical of plucked acoustic instruments). Note that envelopes can even modulate their own rates and amplitudes – try using ‘recursive modulation’ to create unusual envelope shapes.

Fall/Rise

This parameter causes the normally flat sustain stage to either fall (negative values) or rise (positive values). Values closer to the centre mean a slower rate.

Amp Mod

The amount that the envelope’s output is modulated by a source chosen in the selector.

Velocity

This knob scales the envelope level via MIDI velocity, so lower velocities result in lower levels.

Trigger

Envelopes can be triggered by MIDI notes, LFO, or sections of the modulation sequencer:

Gate.....triggered by MIDI notes
Loop.....like *Gate*, but also restarts immediately after release
LFO.....triggered by the LFO
ModSeq1/2.....triggered by the sequencer. *ModSeq1* is the leftmost used tap, *ModSeq2* is the **next used tap** to its right. See how to trigger envelopes.

Snappy

This makes the Decay and Release more exponential, resulting in a more percussive effect.

Outputs

At the end of the synthesis chain there's always an amplifier unit (otherwise you wouldn't hear much). Large analogue modular synthesizers usually have separate VCA (voltage controlled amplifier) modules, while those in polyphonic synths are integrated into 'amp envelopes'.

Being a polyphonic stereo modular system, BazilleCM offers what is practically an intermediate solution: two output channels with selectable envelopes and pan controls…

Parallel inputs

Each output channel has a pair of signal inputs which are summed together. Like in the filter, the dual inputs save the multiplex units for more worthy tasks.

Volume

A level control with envelope selector. Choose one of the envelope generators or the Gate – a simple 'maximum sustain' envelope with very fast attack and release. Note that the final volume control is the lonely *Output* knob in the upper control bar.

Pan

If the modulation source in the selector is set to *none* (as in the above image), this bipolar knob controls the absolute stereo pan position, from extreme left to extreme right. If a pan modulation source is selected (i.e. anything except *none*), it controls the amount of modulation instead.

Processors

The panel immediately below the LFO contains various signal processors. They accept any kind of signal, whether control or audio rate:

The processor panel

Quantizer

Signals are effectively forced towards discrete, equally-spaced steps. The central knob controls the number of those steps. Tip: Experiment with fairly low values first.

Sample & Hold

Each time the signal at the *Trig* (trigger) input crosses zero in the positive direction, a 'sample' is taken of the input signal, and this value is held until the next trigger arrives. Of course you should immediately patch noise to the input, an LFO to the trigger, and the output to either oscillator pitch modulation or filter cutoff or both!

Inverter

Simply inverts the phase of the input signal. The modulation wheel and aftertouch go negative instead of positive, a sawtooth becomes a ramp etc..

Rectifier

Full wave rectification: all negative values become positive.

Lag Generators

Similar to *Glide*, the lag generators can be used for smoothing out any signal. The shared attack (A) and release (R) knobs give you independent control over positive and negative transitions. To familiarize yourself with these controls, try processing a square LFO modulating oscillator pitch. You can also use a lag generator as a primitive lowpass filter.

Voice, Pitch and Glide

On the far right is an area divided into three sub-panels…

Voice

The upper panel contains five options that affect the creation of each voice:

Drift

Causes all voices to be slightly detuned against each other for e.g. less static-sounding chords.

Soft Attack

Softens the first few milliseconds of both envelopes in order to minimize clicks. Depending on your envelope settings, switching Soft Attack on can give your patch more (!) punch.

Mode

poly .....polyphonic
mono .....monophonic, each new note retriggers the envelopes
legato .....like *Mono*, but doesn't retrigger until a space is left between consecutive notes
duo .....duophonic, oscillator 1 is 'lowest' *Priority, oscillator* 2 is 'highest' priority…

Priority

This parameter applies to Mono and Legato modes only, and is otherwise ignored:

last .....plays the most recent note (typical of digitally controlled synthesizers)
lowest.....plays the lowest note (most classic US American mono synthesizers)
highest.....plays the highest note (EMS and most classic Japanese mono synthesizers)

Voices

Sets the maximum number (2-8) of voices before note-stealing occurs. Mainly used to guard against audio glitches while playing CPU-intensive patches. Note that in practice, the maximum number of playable voices is less when the amp envelopes have longer release times.

Pitch

The middle panel specifies pitchbend ranges, vibrato depth and global transposition:

PB up / down

Most MIDI keyboards include a performance control called a 'pitch bender' (often a centre-sprung wheel) which is used for bending the overall pitch up and down. BazilleCM's *PB up* and *down* selectors specify the up and down ranges independently, from 0 to 24 semitones.

In the MIDI & MORE panel as well as in the modulation source menus for LFOs, envelopes and mapping generators, this control is called *PitchW* (the W stands for 'wheel').

Transpose

This selector shifts the overall pitch in semitone steps with a range of +/- 24. *Transpose* does not work in real time, it is only updated when the next note is played.

Fine

The *Fine* knob adjusts the overall pitch within a range of +/- 1 semitone. *Fine* does not work in real time, it is only updated when the next note is played.

Vibrato (LFO1)

Adjusts the amount that the LFO pitch-modulates both oscillators. For typical performed vibrato, set the LFO amp modulation source to *ModWheel*, and turn its depth up to maximum.

Glide

The lower panel controls Glide (also known as 'portamento') – the slurring of oscillator pitch and filter cutoff between consecutive notes:

Mode

time.....the glide always takes the same time, whatever the distance between notes

rate.....the glide is proportionally longer when notes are further apart, and shorter when they are closer together

Amount

Sets the basic glide rate for anything that uses key follow e.g. the oscillators and filter.

Offset

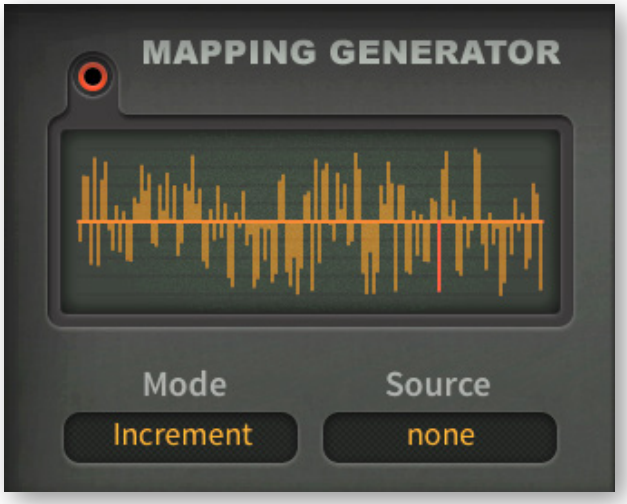
The value is added to oscillator 2 as well as to the modulation source *Key2* (*KeyFollow2*). This means you can set up two different glide amounts, depending on which modules you choose. To make the glide faster for oscillator 2 than for oscillator 1, turn *Amount* up and *Offset* down.

Range

Glide 'strength', a u-he speciality. Lower values shift the start of each glide closer to the target note, which can cause unusual or subtle intonation effects.

Mapping Generator

BazilleCM's mapping generator is a list of up to 128 values which can process modulation sources or even serve as an oscillator waveform via the TapMap option.



Mode

The *Mode* selector specifies the basic function:

Key ..... 128 MIDI notes, like a programmable key follow. Short maps will repeat e.g. use only 12 values for consistent offsets across all octaves.
Map Smooth ..... modulator values interpolated for smooth transitions
Map Quantize ..... modulator values, no interpolation for more immediate transitions
Increment ..... consecutive notes step through the map

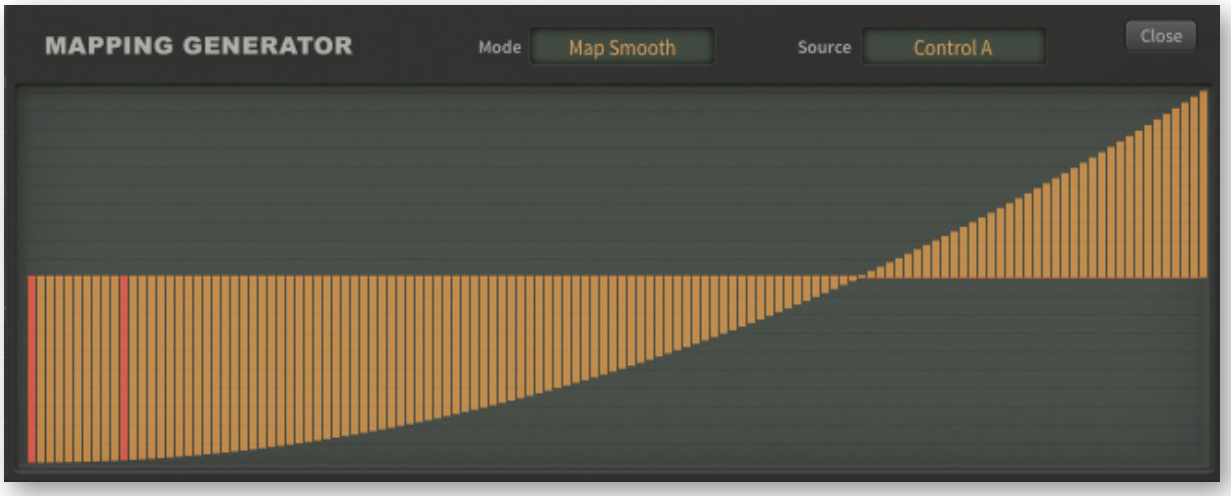
Note: The two *Map* modes aren't active until you define a modulation source…

Source

The Source selector specifies the modulator to be processed in one of the *Map* modes. This setting is ignored in *Key* or *Increment* mode.

Zoom

Clicking on the miniature graphic opens the map editing window (you can click again to close):



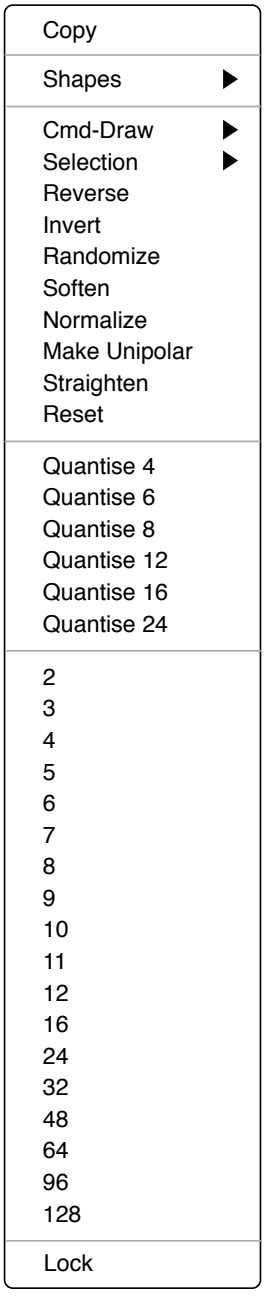
Drawing and Selection

To edit a map, draw in the window by clicking and dragging. If you want to draw straight lines, hold down **ctrl** (Win) or **alt** (Mac) beforehand.

To select a region, hold down the **SHIFT** key and draw. The functions (see below) are applied to the selection if one exists, otherwise to all steps. To deselect everything, either click in the background away from the selection, or choose *deselect* from the *selection* sub-menu.

Context menu

Right-click on the Mapping Generator's window to open a long list of editing tools. The current implementation is rather 'geeky': Future versions might use selector fields and buttons instead. For now, just remember that **shift** is used for selection and **alt** (Windows) or **cmd** (Mac) is for applying the selected draw option.



Copy / Paste .....copies the current map to the clipboard, or replaces the current map with a previously copied one.

Shapes.....creates a preset *Ramp*, *Triangle*, *Sine*, *Cosine*, *Root* or *Quadric* curve, or transforms the map data into an additive waveform via *Spectralize* (see below).

Alt / Cmd-Draw....sets the draw mode to *erase*, *scale* (multiply), *shift* (move) or *warp* (bend). To apply the function, hold down **alt** (Windows) or **cmd** (Mac) before clicking in the edit window.

Selection .....applies functions to the current selection: *Invert, Shift Left, Shift Right, Select every 2nd / 3rd / 4th.* If nothing is currently selected, only the latter three options will appear in the submenu.

Reverse .....flips the current selection horizontally

Invert.....flips the current selection vertically

Randomize .....adds a random offset to all selected values

Soften.....removes abrupt transitions

Normalize.....expands vertically to minimum / maximum

Make Unipolar.....shifts all values into the positive, rescaling if necessary

Straighten .....draws a straight line for the selection / window

Reset.....sets all values in the map to zero

Quantize.....adjusts values to an equal-spaced grid. Tip: Select 12 here and use the map for pitch modulation (also set the modulation depth in the oscillator to 12)

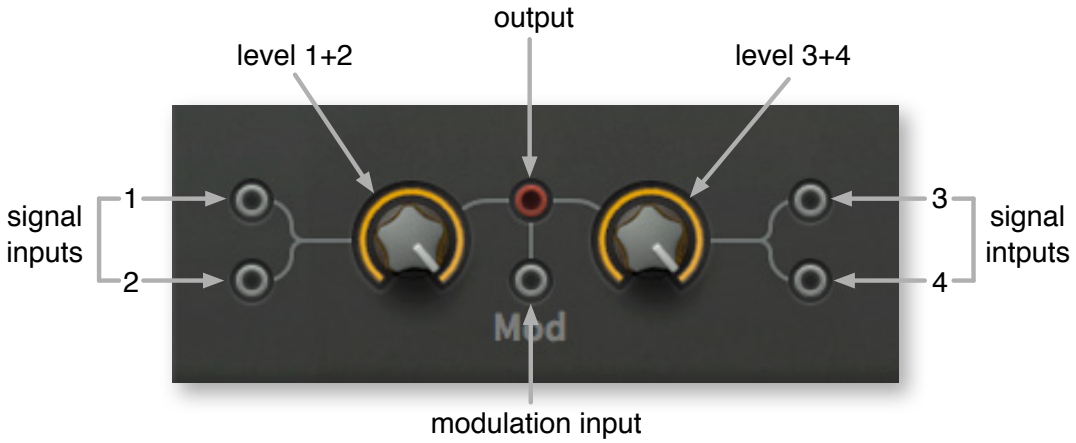
2–128 .....sets the number of values used in the map

Spectralize

Especially useful for TapMap, the *Spectralize* function (in the shapes sub-menu) interprets the map data as levels of partials in the harmonic series. With random phases set per partial, these are transformed into the corresponding waveform and the number of values automatically set to maximum (128). See the additive synthesis tip towards the end of this user guide.

Multiplex

The little ‘multiple’ modules in most analogue modular systems are simple mix/split devices, often just four sockets bridged together. As most modular synths have a very limited number of inputs and outputs per module, multiples are very important – without them it would be difficult to modulate more than one parameter at a time from e.g. an envelope generator, or plug more than one or two audio signals into a filter. As BazilleCM’s output sockets can accommodate several cables, the humble multiple underwent a serious redesign at u-he, emerging as something so flexible that we had to rename it MULTIPLEX.



Here are a few examples of what you can do with a *Multiplex*:

Simple mixing / attenuation

The most obvious use of a multiplex is to mix up to four signals. It acts like a regular 4-socket multiple, but with a level control for each pair… and as many outputs as you like, of course.

Ring modulation (RM) / fade in

Ring modulation (as an audio effect) is traditionally used for bell-like sounds, robot voices etc.. In the above example, the signal connected to input 1 is being ring modulated (multiplied) with the signal connected to the *Mod* (modulation) input. Note: In this case, swapping the regular input signal with the Mod signal will make no audible difference.

Whenever a cable is connected to the *Mod* input, the lefthand knob crossfades from the ‘dry’ sum of inputs 1 and 2 to the RM signal. In our example, the lefthand knob is at maximum, meaning that the output (the red cable) carries the ring modulated signal only. The value of the righthand knob is irrelevant here, as inputs 3 and 4 are not being used.

As RM is simple multiplication, this configuration can be used for fading signals in. Whatever is connected to the lefthand inputs can be faded in by whatever is connected to the *Mod* input.

Amplitude modulation (AM) / fade out

Another classic synthesizer effect like RM – use inputs 3 and 4 instead of 1 and 2. In addition to the RM sidebands, the AM output also contains the amplitude-modulated original signal. The knob on the right crossfades from the original to the AM signal.

RM can be written as $y = a * mod$, and AM as $y = a * (1 + mod)$. In BazilleCM's multiplex, however, AM is actually $y = a * (1 - mod)$. There's a good reason for that 'minus' sign...

Like in RM, the level of one signal is controlled by another, but in this case it is inverted – the 'minus' symbol in $y = a * (1 - mod)$. The upshot is that this configuration can be used for fading signals out. Whatever you connect to the righthand inputs can be faded out by whatever you connect to the *Mod* input.

Unipolar crossfade

crossfade using a unipolar modulation source

In this example, the modulation signal (green) controls the mix between inputs 1 and 3. If e.g. the modulation wheel is connected there, it will crossfade smoothly between inputs 1 and 3, with complete separation at the extreme values.

Bipolar crossfade

crossfade using a bipolar modulation source

Using bipolar modulation signals (e.g. oscillator 2) for crossfading is less straightforward. To get 100% separation at extreme values, set the lefthand knob to 50.00 and bridge the inputs via 'daisy-chain' (as in the above image) to double the level.

MIDI & More

This panel contains nothing but sockets – it includes noise sources, MIDI control sources etc..

White / Pink

Two differently coloured noise sources: *White* is a full-range random audio signal suitable for bright percussion or 'steam' sounds etc..

ModW / PitchW / Breath / Xpress / Velo / Press

As well as generating MIDI note messages (which include *Velocity*), most MIDI keyboards also have a *pitch bender* (PitchW) and a general-purpose *modulation* control (ModW). These two are usually implemented as a pair of wheels, but some keyboards have joysticks, touch ribbons etc. instead. More fully-featured MIDI keyboards also send aftertouch i.e. *channel pressure or poly-pressure* (Press), *breath control* (Breath) and *expression pedal* (Xpress) data.

Random

A (single) random value for each played voice.

Alt

Flips ('alternates') between +5V and -5V for each successive note.

+5V

A constant 'voltage'. For instance, you can use *+5V* to create DC offsets (which can affect filter distortion characteristics), or to push parameters beyond their normal ranges.

Gate

A simple organ-type square envelope with very fast attack and release.

KeyF 1 / KeyF 2

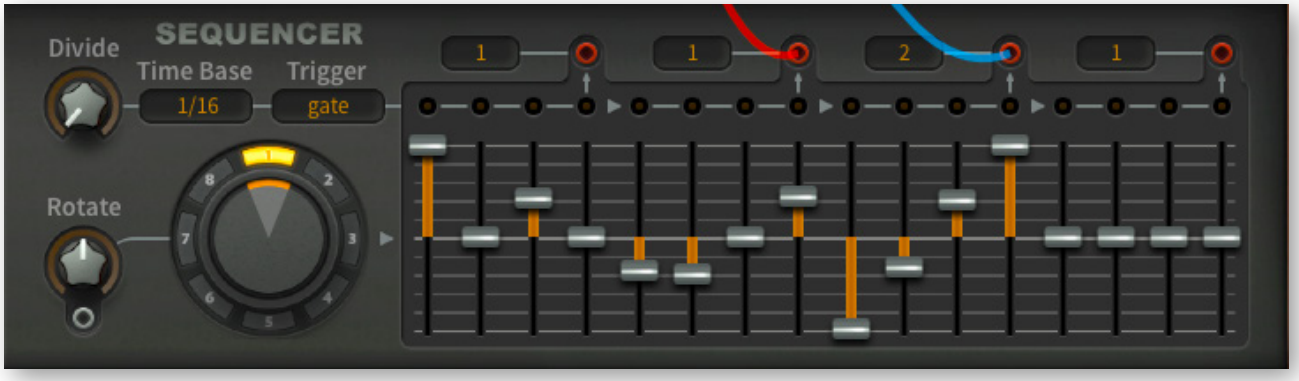
Multi-purpose 'key follow' modulation sources – MIDI note number plus pitchbend and glide. BazilleCM has two of these so you can offset the glide rate for anything you like.

CV Inputs

Although control-rate modulation targets (LFO and envelope rates / levels, pan) would normally only accept control-rate sources, BazilleCM includes a pair of inputs that inject any signal you like into the modulation source drop-down menus. The CV inputs are particularly useful for pre-processed (e.g. added, multiplied, lagged etc.) control rate sources. Patching audio-rate signals into a CV can also lead to interesting results, but please keep in mind that the CV path is updated much more slowly than audio-rate.

Modulation Sequencer

At the bottom centre of BazilleCM's window is a panel containing a dial and 16 sliders. It's a good old step sequencer, isn't it? Well, not quite – though it can be made to behave like one...

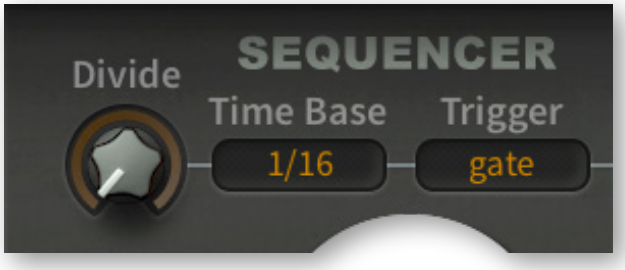


the control sequencer, with two of the outputs ('taps') in use

BazilleCM's sequencer is quite different from the usual step sequencer. Firstly, it is polyphonic i.e. each played note can trigger its own instance of the sequence. Secondly, it was conceived as a complex source of cyclic modulation, so it doesn't trigger envelopes directly (see the instructions on how to trigger envelopes).

Divide, Time and Trigger

The controls in the top left of the panel determine the speed, and how the sequencer is triggered:



Divide

The *Divide* knob accelerates the sequencer by dividing the *Time* by up to 16.

Time Base

Specifies the basic speed – like in the LFO but offering only the 1/16, 1/1 and 1s options.

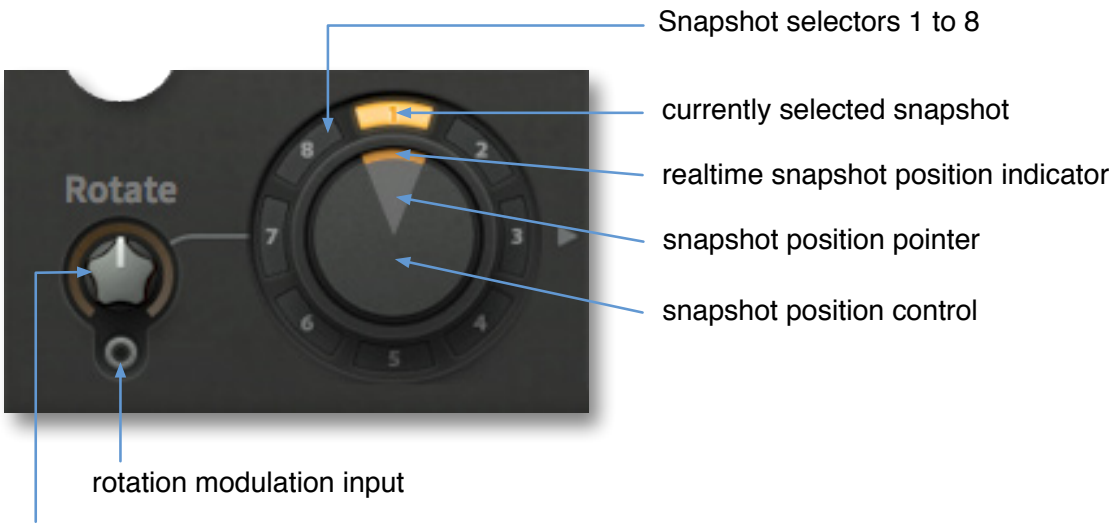
Trigger

This parameter specifies how sequences are triggered:

free.....the sequence is started at a (somewhat) random position for each played note
sync.....the sequence is synchronized to host tempo – chords will be played in 'lockstep'
retrigger.....the sequence is restarted for each played note – broken chords remain 'broken'

Snapshot Dial / Rotate

The large dial is the ‘snapshot control center’. It combines several functions and indicators:



Clicking on one of the 8 **snapshot selectors** in the outer rim activates that snapshot for editing via the 16 sliders. Double-clicking on a snapshot selector also moves the current snapshot position.

Snapshot context menus

Right-click on a snapshot selector for the following:

copy.....copies (reads) a snapshot
paste.....pastes (writes) a previously copied snapshot
interpolate.....fills in all snapshots between the right-clicked one and the currently selected one, interpolating the slider values (→ means interpolate clockwise and ← means interpolate anti-clockwise). If you want to copy snapshot 1 to all the others, *copy* from 1, *paste* to 2, right-click on 2 again and *interpolate* →.

Right-clicking in the middle of the dial gives you an *Autoselect* option: When this is switched on, moving the snapshot position control also selects the closest snapshot.

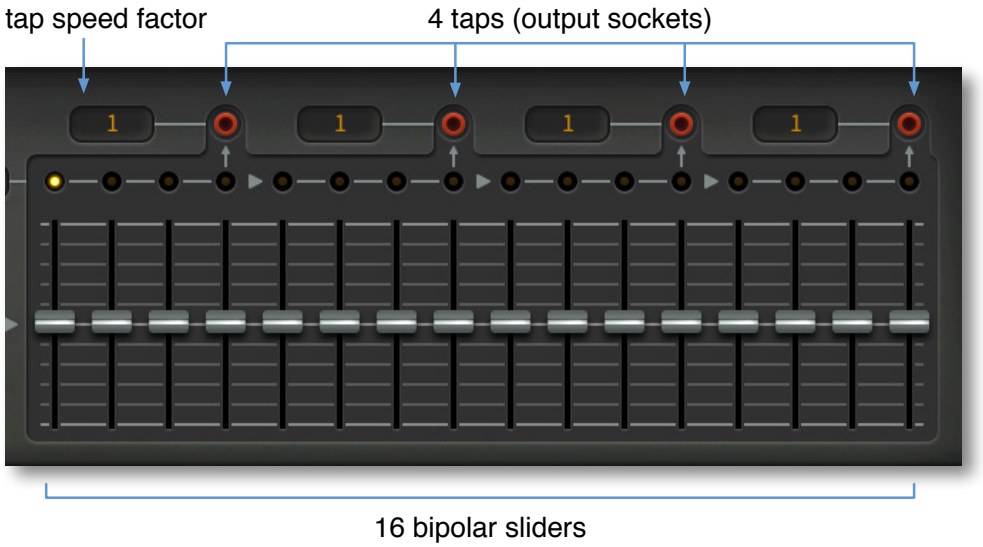
Rotate

Rotate lets you morph through the 8 snapshots in one of two ways. If a signal is connected to the socket it will cause the dial to rotate, and the *Rotate* value specifies by how much.

If the socket is left empty, however, the snapshot position will rotate **automatically**, and the *Rotate* knob will control the speed (relative to host tempo) of rotation instead. 1.00 here means 1 snapshot every 2 bars, and 8.00 means 8 snapshots every 2 bars. For anti-clockwise rotation, use negative values.

Snapshot Values

To the right of the dial are 16 sliders used for editing the contents of each snapshot:



16 sliders

Select a snapshot with the dial, then edit its values using the sliders. Tip: The easiest way to use the sequencer for precise semitones is to set the oscillator pitch modulation amount to 50.00 and the sliders to double the transposition you want – up a tone would be +4, up a fifth (7 semitones) would be +14, up an octave would be +24 etc..

4 tap outputs

The four output sockets let you divide the sequencer into shorter sections, which can then be used to modulate different target parameters. Each section can run at a different speed...

4 tap speed factors

The lengths of steps in each tap can be multiplied by setting this number higher than 1. Note that the speed factors of unused taps are simply ignored. To compensate for doubling the speed factor you can also double the value of Divide.

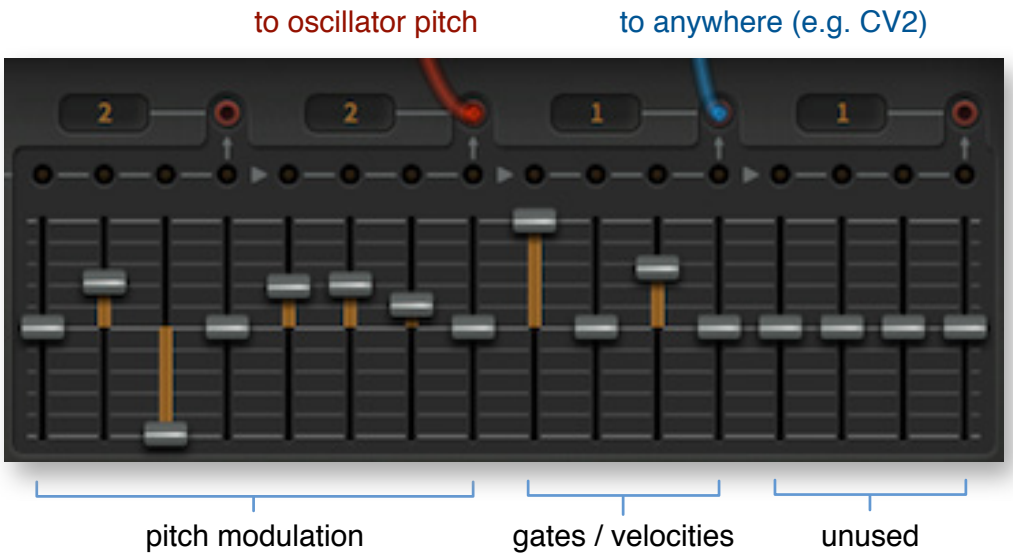
How to Trigger Envelopes

Although the sequencer was conceived primarily as a complex modulation source, it would have been a shame not to have allowed it to trigger envelopes **somehow**... here's how:

ModSeq

The list of envelope *Trigger* options includes two *ModSeq* entries: ModSeq1 means the first used tap, ModSeq2 means the next used tap. If an envelope is set to one of these options, the slider values are interpreted as gates / velocities.

Here's an example of how the mod sequencer could appear while triggering envelopes:



The first 8 values control oscillator pitch via the red cable, while the blue cable is connected to CV2 (for instance). Even if the signal is not used, this second tap **must be connected** to something (anything), otherwise *ModSeq2* would remain undefined.

Gates and velocities

When envelopes use the *ModSeq* option, positive values are interpreted as GATE ON with velocity, while zero and below are interpreted as GATE OFF without velocity. Note that envelope *Velocity* now comes from the sequencer instead of from MIDI notes. Regular MIDI note velocity is still available in the MIDI & MORE panel.

As gates need to be closed as well as opened, the "ModSeq" part of the pattern will usually be set at least twice as fast as the rest. See those tap speed factors in the image above? The final value in the section used for pitch modulation is set to 2, while in the gate / velocity pattern it is set to 1 (twice as fast).

Again: If you need to compensate for halving the speed, simply double the value of Divide.

Delay

BazilleCM only has one of the four effects available to Bazille, but it's probably the most useful one: A host-synchronized stereo delay with 'tape wow' and filtered feedback…

Center / Left / Right

Delay times relative to host tempo, separate for each stereo channel. Precise integer values are semiquavers (16ths).

Center defines the overall Feedback time. This is an unusual feature – it means that you can set a repeat rate without actually hearing that particular 'tap'. Simply turn *Center Vol* down to zero.

Wow

Emulates slow tape 'wobble', ranging from subtle / spacey to 'almost seasick'.

Volume

Output level controls for the center tap and for the left / right taps (together).

HP / LP

Separate cutoff controls for the highpass and lowpass filters within the feedback path. For the damping effects typical of tape delays, turn HP up and LP down.

Feedback

The amount of regeneration within the delay circuit. 100.00 will give you an infinite loop if HP is set to minimum and LP to maximum.

Dry

The level of the unprocessed signal.

Configuration

Click on the cogwheel icon at the top right to open the global configuration pages where you can adjust the UI size and brightness as well as connect BazilleCM parameters to MIDI controllers (CC).

A column of 4 buttons will appear: Close [X], MIDI Learn [L], MIDI Table [≡] and Preferences [tools]. Right-click within the row of buttons to set the current page as default.

MIDI Control

MIDI Learn

BazilleCM can be remote-controlled / automated via MIDI messages from a hardware controller unit and/or from the host applöication. Click on the cogwheel and select the ‘L’ MIDI icon…

The MIDI Learn window is an overlay with all MIDI-learnable elements appearing as selectable outlines. Controls that are already assigned appear filled (like the cutoff and resonance controls in this image), and the currently active control is highlighted (like the output 1 volume knob here).

Try it: Click on Filter cutoff and send BazilleCM some MIDI CC data (move a knob or slider on your MIDI controller) — the connection is made instantly, and applies to all instances of BazilleCM.

About MIDI CC

CC stands for **c**ontrol **c**hange (or **c**ontinuous **c**ontroller), a multi-purpose message format used for editing and performing presets. Please avoid using controllers 120 to 127 as these are reserved for channel mode messages. More information here: https://www.midi.org/specifications.

MIDI Table

Click on the configuration button and select the triple bar ≡ MIDI icon to open an editable list of all current MIDI CC assignments:

Parameter

The first field displays/selects one of BazilleCM's many parameters. Click on the 'Add' button at the bottom and experiment with this option. Delete any unwanted assignments by clicking on the small [X] to the right of each line.

Channel / Controller

The next two fields are for MIDI channel and CC number.

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 type of hardware (by far the most common is Continuous 7-bit).

Encoder 127.....'relative mode' endless rotary controls that repeatedly send the CC value 1 when turned in the positive direction, or 127 (interpreted as -1) when turned in the negative direction

Encoder 64.....'relative mode' endless rotary controls that repeatedly send the CC value 65 when turned in the positive direction, or 63 when turned in the negative direction

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

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

Removing Assignments

To remove assignments again, click on the [x] to the right of each line. To remove all assignments, click on the Delete All button at the bottom of the MIDI Table window.

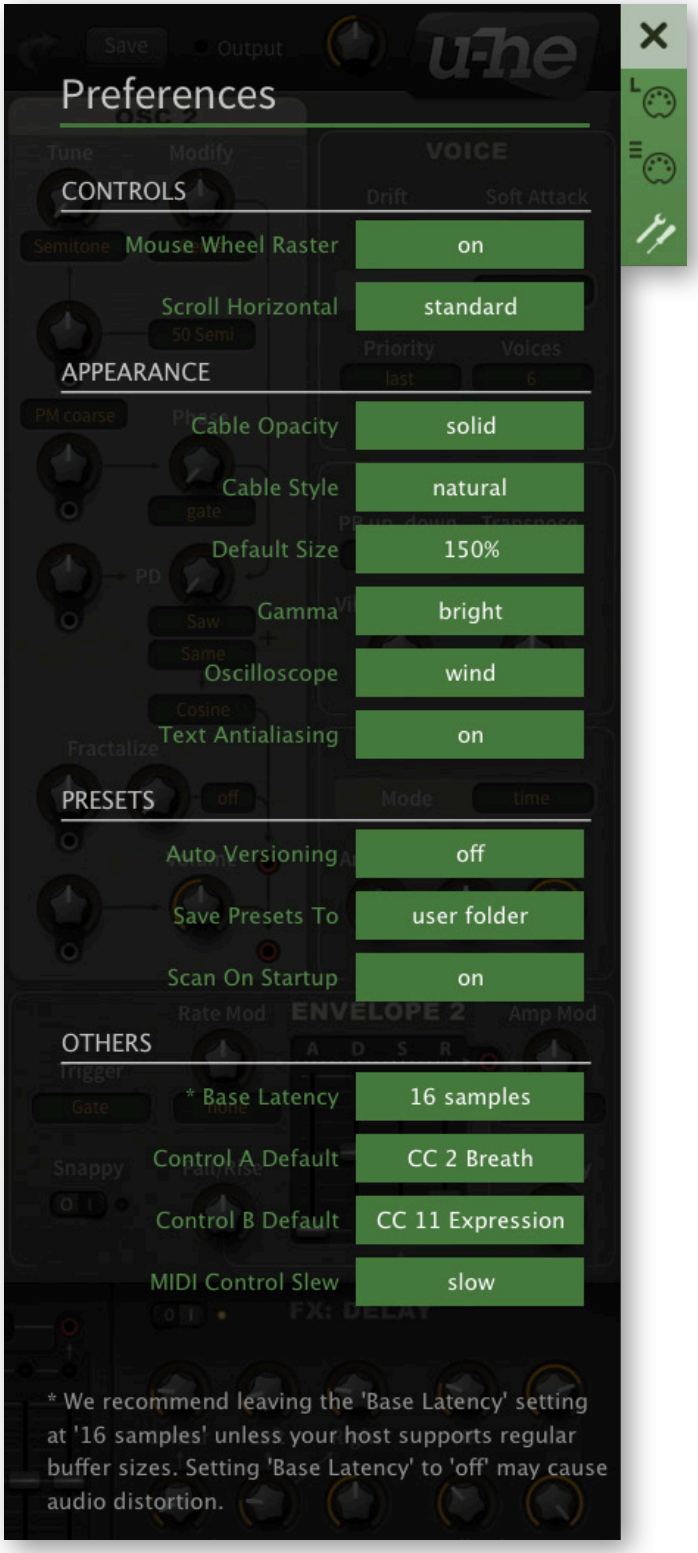
Per Instance Control

Below the MIDI Table is a panel containing local versions (i.e. for this instance only) of the Control A and B Default settings in the OTHERS section of the *Preferences* page.

These settings override the global versions, so they are useful for performance control over multiple instances of BazilleCM at the same time

Preferences

Click on the cogwheel then the ‘tools’ icon to open the Preferences window:



CONTROLS

Mouse Wheel Raster

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

Scroll Horizontal

Any preset folders that contain more files than can be displayed in the window can be scrolled pagewise via mousewheel etc.. Opinions differed as to which wheel direction should move to the bottom of the list, so we made this optional!

APPEARANCE

Cable Opacity

solid, *see-thru*, *x-ray* and *ghosted*

Cable Style

the *thick*, *slim*, *line*, *hair* or *natural*

Default Size

The GUI size for each new instance. Note that you can temporarily change the GUI size without having to enter the *Preferences* page – just right-click in the background.

Gamma

Controls overall brightness.

Oscilloscope

Sets *eco*, *fast*, *glow*, *fire* or *wind* as default. See Oscilloscope.

Text Antialiasing

Smoothing of labels and values. In rare cases, switching this off can improve readability.

PRESETS

Auto-Versioning

If this option is switched on, a numeric index is appended to the preset name and automatically incremented each time you save under the same name.

Save Presets To

Choosing the user folder option 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 BazilleCM is started, e.g. when you reopen a project.

OTHERS

Base Latency

If you are certain that your audio system – hardware as well as software – uses buffers that are a multiple of 16 samples in size (please refer to the respective documentation), you can safely disable BazilleCM's base latency here. Otherwise leave it at '16 samples' to prevent crackles.

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 BazilleCM will always work.

Internally, BazilleCM processes audio in chuncks of n x 16 samples. This so-called 'block processing' method significantly reduces the CPU load and memory usage of all our plug-ins.

For example. if the number of samples to be processed is 41, BazilleCM will process the first 32 and keep the remaining 9 in a small buffer (16 samples is big enough). Those 9 samples are then processed at the start of the next call... and so on.

The extra buffer is only necessary if either the host or the the audio driver processes '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 BazilleCM can process latency-free.

Control A/B Default

The list of modulation sources in the previous BazilleCM version included two more fixed MIDI controls: Breath (CC#02) and Xpress (CC#11). While retaining backwards compatibility, we replaced these with user-definable Control A and Control B sources.

MIDI Control Slew

This option lets you change the strength of performance control smoothing applied to pitch bend, modulation wheel, Control A, Control B and Pressure. The default setting is 'fast'.

Tips & Tricks

General Tips

Less CPU

Go easy on your CPU, use *legato* or *mono* mode unless you really need polyphony, or e.g. set *Voices* to only 4. Keeping the maximum polyphony low also means you can set longer envelope release times without overtaxing your system.

Need another LFO?

Try oscillator 2 in Hertz or clocked mode, envelope 2 in loop mode or the modulation sequencer through a Lag Generator.

Experiment!

It's all too easy to limit your options by basing your patches on typical 'fixed architecture' synth signal flow by default. So why not try connecting an almost-self-resonating bandpass filter into an oscillator's phase modulation input, use that oscillator to modulate the resonance of said filter while a sampled & held triangle wave from the pressure-driven mapping generator modulates the rate of the LFO multiplied with the oscillator's output? Or something ;-)

Unlike Bazille, you have to remain fairly 'economical' in BazilleCM. With a bit of thought, however, you can still achieve seemingly impossible tasks.

Oscillator Tricks

DX-type 'FM'

Load '--INIT--' and switch both oscillator Tune modes (currently *Semitone*) to *Overtone*. Patch the lower OSC 2 output to OSC 1 phase modulation input (*PM Course*) and turn the amount up to about 50. You should hear a very bright 'digital' wave. Turn the *PD* knob in OSC 1 to minimum for a pure sine wave carrier – the tone becomes less bright, more hollow.

Patch envelope 2 into OSC 2 volume modulation input, turn the knob up to about 50 and take the Volume all the way down. In envelope 2, drag the sustain (S) slider all the way down and turn Velocity up to maximum. The patch should sound a bit like a simple DX piano already. Adjust both envelope release times to taste and experiment with different overtone relationships by adjusting *Tune* in both oscillators.

Sub-oscillators

It's very easy to add a phase-locked 'sub-oscillator' in BazilleCM: Select *Saw* as your fractal wave, but leave the amount at zero. Note: *Tri* delivers great bass, and *Max* is, perhaps surprisingly, the most subtle option when applied to a sawtooth (turn the amount up a tiny bit for some 'grit'). Here's an alternative: Use the second PD waveform.

PWM etc

The classic 'Minimoog™' method requires both oscillators set to sawtooth, one of them inverted and detuned. Instead of (or as well as) detuning, you can use phase modulation for a wide variety of PWM-type effects. If you don't want the start of each note to sound exactly the same, make sure that at least one oscillator's Phase mode is set to either *random* or *catch*.

The following 'FM' method works by audio-rate phase modulation: Take a square wave and patch a sine of the same pitch into its phase modulation input. Your 'pulse width' control is the level of the sine wave, which you can modulate with e.g. an LFO.

The following 'PD' method only uses one oscillator:

- Load *init*
- Restrict the m*ap* to 64 values, create a ramp (/shape/ramp), then set it back to 128 values.
- Switch oscillator 1 shape from *Cosine* to *TapMap1*
- Patch the LFO to the PD socket, set both the modulation amount and PD amount to 40
- Also try *2pulse* PD instead of *Saw* – sounds like a sync effect!

Oscillator as waveshaper

For more gnarly and different oscillator waves, try the following: Set an oscillator's Modify mode to *Multiply* and double-click on the knob (the 0.00 value stops the oscillator completely). Set the phase mode to *Gate*, connect the other oscillator to the phase modulation input with the mode set to *PM course* or *Lin 1kHz.* Turn up the phase modulation amount, play and listen...

Filter Tricks

Self-oscillation

You can play notes just using filters by setting the Resonance and Key Follow both to maximum, and Cutoff fairly low e.g. 0.00 or +12.00. Experiment with all filter types. Caution: self-resonating filters can get very loud, so it's best to turn the volume down first!

Especially the lower notes are slow to self-resonate, and a short impulse is often necessary to kickstart the resonance – patch +5V into the filter's input and turn the Gain down to about 30.00.

With careful Gain and Resonance settings, you can get the filter to 'ping'. This can result in interesting tuned percussion sounds, especially if you also modulate the cutoff with an audio signal. Note: the 'ping' decay also depends on input gain and cutoff.

Filter FM

Remember that you can also patch audio signals into the cutoff modulation sockets, not only the envelopes and LFO etc.. You can even use the very same signal you are feeding into the filter, or e.g. the bandpass (BP) output of the same filter for interesting instabilities…

Notch filter

Try this for a polyphonic phasing effect: Mix a dry signal with a BP-filtered, inverted version of the same signal. Frequencies within the band are removed from the original, resulting in 'notch filtering''. The filter can't really make use of Gain or Resonance, it isn't quite as versatile as a parametric EQ's notch, but it looks like a fairly tight 24db attenuation at the cutoff point.

Mapping Tricks

2-step maps

Even tiny maps can be useful. For instance, if you want the output of your modulation wheel to suddenly jump in the middle of its throw, set 2 steps, switch the mode to *Map Quantize* and the source to *ModWheel*.

12-step maps

To keep key offsets the same in all octaves, select *Key* mode and a 12-step map.

MapGen bit-crusher (tip by 3ee)

Choose *TapMap* as your oscillator waveform, set the PD value to minimum, right-click the map and select shapes / triangle (for example). Right-click again and select *quantise 8*... enjoy your 8-bit triangle wave! Also try *make unipolar*, then *Quantize 4* instead. If you want to 'bit-crush' regular waves, select the cosine instead of the triangle.

Additive synthesis (the Spectralize function)

Load *init*, set OSC1 to 'TapMap', then right-click in Mapping Generator 1 and select *Reset*. Right-click again and select e.g. '9'. Raise just two or three of the values (e.g. 2, 5 and 9). Right-click once more and select *Shapes* / *Spectralize…*

The *Spectralize* function interprets the map as the levels of partials in the harmonic series and transforms them into the corresponding waveform!

Processor Tricks

Quantizer bit-crusher (tip by 3ee)

As well as making control-rate signals steppy, the *Quantizer* can also be used as a 'bit-crusher' effect for audio signals. Use low values, but note that 1.00 will generally result in silence.

Quantizer octave transpose

The Quantizer can be used to keep oscillator pitches within a certain range across the entire keyboard – here's how: Connect *KeyF 1* to the Quantizer, set the quantization to 4.00. Connect the Quantizer to a frequency modulation input set to *50 semi* mode, with amount -48.00. An octave transposition will occur every 16 semitones.

Invert/Lag DC removal

As an alternative to high-pass filtering, you can remove the DC (direct current) component from a control signal by mixing the original signal with an inverted and lag-processed version of itself.

Double triangle

Rectifying a triangle wave doubles the frequency but doesn't alter the shape.

Smoother when faster (trick by 3ee)

If you want your LFO modulation to be smoother and shallower as you increase the speed, send the LFO (e.g. squarewave) through a Lag Generator and experiment with the attack and release values.

A similar trick also works for audio signals. Keep the attack and/or release values low – anything above 2.00 is probably too high. Such a primitive lowpass filter is good enough to tame the higher frequencies of signals used as modulators (for e.g. FM or fractal resonance) or to add some fundamental back in to a bandpassed bass.

1-shot envelope

As the +5V modulation source is restarted for each MIDI note but does not release, you can use the attack of a lag processor to turn it into a 1-shot ramp. The same applies to 'Velo', which gives you a velocity-sensitive 1-shot envelope.

Multiplex Tricks

See the multiplex section of this manual for some less exotic uses.

Extra inverter (tip by urs)

If you have already used up the inverter but still have a free multiplex, try this: Connect +5V to the *Mod* input, and the signal you want to invert to one of the righthand inputs.

Multiplex gain (tip by justin3am)

To boost weaker signals, try feeding the output of a multiplex back into one side, with the signal you want to boost connected to the other side. Be careful with the feedback level, as things can get out of control very suddenly!

Half-wave rectification (tip by justin3am)

Mixing a rectified signal 50/50 with the original gives you the top half of the wave only. Tip: Half-wave rectified sine can sound like a mellow organ.

Balancing two modulators

This trick lets you add vibrato via modulation wheel and/or pressure, but without increasing the vibrato depth when you happen to apply both at the same time.

It works by using one of the two mod sources to crossfade between the other source and itself. In this example, Pressure is connected to one of the 4 regular inputs AND to the Mod socket.

Sequencer Tricks

See also How to Trigger Envelopes.

Precise pitches

When you are using the sequencer for conventionally tuned patterns, getting all the steps tuned correctly can be tricky at best, and downright tedious at worst. The following method (already mentioned in the chapter about the sequencer) ensures that you only need to integers...

Set the pitch modulation amount in the oscillators to +50.00, and only use **even** integer values for each step of the sequencer – simply double the transposition you want. A few examples:

minor third (3 semitones)	= *6.00*
major third (4 semitones)	= *8.00*
fourth (5 semitones)	= *10.00*
fifth (7 semitones)	= *14.00*
octave (12 semitones)	= *24.00*
octave+fifth (19 semitones)	= *38.00 etc..*

Jump rotation

If you want the sequencer to jump between snapshots, use either the Quantizer or the Mapping Generator to process your rotation modulator:

Using the Quantizer

Load *init*, drag a cable from *ModW* to the *Quantizer*, and another from the *Quantizer* to *Rotate*. Set the *Rotate* and *Quantizer* values both to precisely 7.00. Play and hold a note, move your modulation wheel and watch how the realtime position indicator moves. Now try the LFO instead of the modulation wheel... tricky, isn't it?

Using the Mapping Generator

This method has the advantage that you can jump between snapshots in any order you like: Load *initialize*, drag a cable from the Mapping Generator to the *Rotate* input and set the Rotate value to 7.00. Right-click in the Mapping Generator editor and reduce the map size to 8 values.

Right-click again and select *ramp* from the *shapes* sub-menu. Right-click once more and select *make unipolar*. Set the source to *ModWheel* (the mapping mode is already set to *Map Quantize*). Hold down a note, push the mod wheel and watch how the dial moves through all 8 snapshots!

What was that about jumping around any order you like? Try this: Expand the map to 32 steps, edit the values, *make unipolar* and *Quantize 8.* Set *Rotate* to 8.00. After trying the modulation wheel, select *LFO Tri* as your map source. Slow the LFO down to 8/1 (If it needs to be slower, change the rate to -1.00, -2.00 etc..) and set its *Wave* parameter to maximum. The sequence should repeat after jumping 32 times.

Jump rotation - sequencer section

You can even use a section of the sequencer itself as a source of rotation. As you can imagine, this technique can (and probably will) get crazy-complicated if snapshots have different patterns in the section you use for the rotation…