

# Diwa



## USER GUIDE

VERSION 1.4

●	<b>Introduction</b>	<b>3</b>
	the spirit of analogue .....	4
	size .....	5
	patches window .....	5
	save .....	7
	control bar .....	8
	editing .....	8
	programming 101 .....	9
●	<b>Upper Panels</b>	<b>10</b>
	oscillators .....	10
	high-pass filters / feedback .....	18
	main filters .....	19
	envelopes .....	24
●	<b>Lower Panels</b>	<b>26</b>
	LFOs .....	26
	effects .....	27
	tuning .....	30
	amplifier & pan .....	30
	voice .....	31
	clock & arpeggiator .....	32
	modifications .....	33
	trimmers .....	34
	scope .....	35
●	<b>Configuration</b>	<b>36</b>
	MIDI control .....	36
	preferences .....	38
●	<b>MIDI Specialities</b>	<b>40</b>
●	<b>Tips and Tricks</b>	<b>41</b>
●	<b>Troubleshooting</b>	<b>44</b>
●	<b>List of Modulation Sources</b>	<b>45</b>

# Introduction

## To get the most out of Diva, you will need a powerful computer

Diva is rather demanding in *divine* mode, but that's the price we pay to hear her wonderful voice in top form. If your computer stutters while trying out presets, switch the accuracy mode to *great*, *fast* or even *draft*. You will soon learn which one your system can handle. Monophonic presets without voice stacking should be no problem, even on older computers. If your computer is fairly new, try the *multicore* option which distributes voices between the CPU cores. You should generally render tracks to audio in the highest possible quality, which means setting *OfflineAcc* to *best*.

This manual assumes you know the basics of subtractive synthesis. If you have questions or would like to discuss Diva and other u-he products, feel free to post a message in our [user forum](#).

## install / uninstall

Go to the [Diva page](#), grab the appropriate installer for your computer system, double-click on the downloaded file and follow the instructions. Diva is fully functional in demo mode except for an intermittent crackling which disappears as soon as the product is registered. To register, right-click on Diva's data display and select the first entry.

To uninstall, delete the plugin itself plus associated files from the following file locations (assuming you confirmed the default paths during installation):

Windows presets	...\\VstPlugins\\u-he\\Diva.data\\Presets\\Diva\\
Windows preferences	...\\VstPlugins\\u-he\\Diva.data\\Support\\ (*.txt files)
Windows themes	...\\VstPlugins\\u-he\\Diva.data\\Support\\Themes\\
Mac presets	MacHD/Library/Audio/Presets/u-he/Diva/
Mac presets (User)	[you]/Library/Audio/Presets/u-he/Diva/
Mac preferences	[you]/Library/Application Support/u-he/com.u-he.Diva... (*. * files)
Mac resources	MacHD/Library/Application Support/u-he/ (Diva/ and Themes/)

## online resources

For Diva support and other u-he products, go to the [u-he website](#)

For a lively discussion about u-he products, go to our [forum](#) at KVR

For video tutorials and more, go to our [youtube channel](#)

For thousands of u-he presets (commercial and free), go to the [patch library](#)

## the u-he team

- Urs Heckmann (code, strategy)
- Sascha Eversmeier (more code)
- Sebastian Greger (GUI design, 3D)
- Rob Clifton-Harvey (support, databases)
- Michael Dühr (QA, demo tracks)
- Howard Scarr (presets, manuals, grump)
- Jan Storm (yet more code, framework)
- Michael Pettit (videos, marketing)
- Viktor Weimer (more support, the voice)
- Oddvar Manlig (everything else!)

with special thanks to...

- Clemens Heppner for Diva code
- Vadim Zavalishin and Andy Simper for invaluable insights into zero delay feedback methods
- Alexander Hacke and Hans Zimmer for lending us some very special old analogue synths!
- The beta-testers and everybody who contributed presets (over 1200 using only the public beta)
- Brian “you can call me Brian” Rzycki for keeping [PatchLib](#) up and running
- Nathaniel Reeves of <http://nkurence.com/> for kindly polishing the Diva logo

# the spirit of analogue

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Diva captures the spirit of various analogue synthesizers by letting the user select from a variety of alternative modules. The oscillators, filters and envelopes closely model components found in some of the greatest monophonic and polyphonic synthesizers of yesteryear.

But what sets DIVA apart from other emulations is the sheer authenticity of the analogue sound. This comes at the cost of quite a high CPU-hit, but we think it was worth it: Diva is the first native software synth that applies methods from industrial circuit simulators (e.g. PSpice) in realtime. The behaviour of our zero-delay-feedback filters when pushed to the limit clearly demonstrates the advantages of this groundbreaking approach.

## about zero delay feedback filters

Most filters in old analogue synthesizers have one or more feedback paths. The input signal passes through a series of controlled resistors and condensers, and the output is fed back into the input (or to another point within the signal path). The classic Moog™ ladder filter has four simple lowpass filter stages and a resonance control that determines how much of the signal is fed back into the input. This feedback loop doesn't introduce any delay, feedback is practically instantaneous...

Digital models try to reproduce this behaviour by calculating the result of applying four simple lowpass filters to an input sample. Feedback means repeating the current calculation using the results of the previous one.

While real circuitry can process a signal within a few nanoseconds, digital models calculate per sample, adding about a million times as much latency to each iteration. The cumulative effect of feedback latency in digital emulations is very noticeable. Oversampling and higher sample rates help reduce the latency, but conventional digital filters always “smear” at high resonance levels.

Methods of addressing the latency problem have been available for many years, but such implementations either don't model the complex distortion inherent in real circuitry, or they aren't suitable for realtime processing. Common to all methods is that they **predict** output values and use that prediction in the current calculation.

Of course we can't see into the future either, but our routines are fast enough to deliver at least a few voices in realtime. We calculate the filter with a few test samples and look at the deviation between the prediction and the result, then we use that deviation to calculate a better prediction. The goal, of course, is to close the gap as quickly as possible!

Diva applies a classic trial-and-error principle but includes a rather intelligent way (or so we like to think) of learning from mistakes. As a rule of thumb, Diva's filters only need to be calculated once or twice in succession. However, it can take up to 15 cycles if e.g. the resonance is very high and the input is very complex e.g. includes noise.

## accuracy

Click on the MAIN button at the bottom of the window. In the panel above the button are two selectors called **Accuracy** and **OfflineAcc**. These are global parameters i.e. they remain fixed across all presets, per loaded instance:

*draft*.....CPU-friendly, but FM will sound rough and resonance is primitive i.e. not 'zero delay'  
*fast*.....Fine for older computers and/or when you need more polyphony in acceptable quality  
*great*.....The best compromise between quality and polyphony on high-power computers  
*divine*.....Top-quality zero delay feedback filters – but can your computer can handle it?

**OfflineAcc** is the resolution at which Diva tracks will be rendered offline. It offers two options: *same* or *best*. Note that while some host applications have trouble rendering to audio at the selected accuracy, the better hosts include an “inform plug-ins of offline rendering status” or similarly named option.



## size

To change the size of Diva's user interface, right-click in the background and select from the list. The size given in percentages and pixels (width x height)...

70% - 840 x 469  
 80% - 960 x 536  
 90% - 1080 x 603  
 100% - 1200 x 670  
 110% - 1320 x 737  
 120% - 1440 x 804  
 130% - 1560 x 870  
 140% - 1680 x 938  
 150% - 1800 x 1005  
 160% - 1920 x 1072  
 170% - 2040 x 1139  
 180% - 2160 x 1206  
 190% - 2280 x 1273  
 200% - 2400 x 1340

Note: This option is temporary – to set the size permanently, go to the [Preferences](#) window and change the *Default UI Size* parameter.

## patches window

Click on the **PATCHES** radio button at the bottom right of Diva's window...



Select a folder from the bottom left panel, then choose presets from the main area.

## factory presets

The *Local* folder is Diva's root directory containing a small selection of presets copied from the category folders. Note that a solid square next to a folder name means that the folder is currently in its collapsed state. If you can't see the category folders (BASS, LEAD etc.), expand *Local* by clicking on that square.

### BASS to TEMPLATES

The first seven folders contain the main factory presets sorted according to categories. The eighth folder, TEMPLATES, contains some very basic presets for whenever you want to start designing your own sounds from scratch.

### THIRD PARTY

This folder contains banks of presets kindly submitted by various sound designers, plus a folder called TREASURE TROVE containing hundreds more sounds (including several true gems)!

Tip: If there's a preset called **default** in the local root folder, it will be loaded instead of the regular demo sound. Try this: Go to the **08 Templates** folder and load **INIT Minimono**, open the Local folder, save it under the name 'default' and start a new instance of Diva.

## MIDI Programs

*Local* also contains a special folder called *MIDI Programs*. If you put a bunch of presets (up to 128) into this folder, they will **all** be loaded into memory when the first instance of Diva starts.

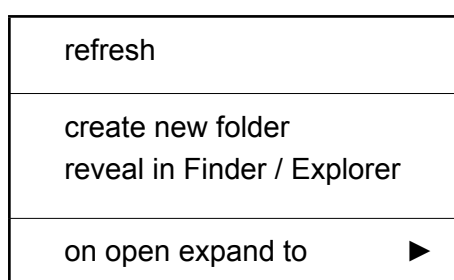
Note: Changes only take affect after restarting your host. *MIDI Program* patches can't be added, removed or renamed on the fly.

Individual *MIDI Programs* patches are selected via *MIDI Program Change* messages. As they are accessed in alphabetical order, it's a good idea to put a number at the beginning of each name e.g. '000 rest-of-name' to '127 rest-of-name' or similar.

Banks: *MIDI Programs* can contain up to 127 sub-folders (of 128 patches each), switchable via *MIDI Bank Select* messages. The MIDI bank select message is CC#0 (Diva only interprets the MSB) – send this value, then a Program Change.

## context menu – folders panel

Right-clicking in the bottom lefthand (folders) panel reveals the following functions:



### refresh

Whenever you need to refresh the list (which is always necessary after folders or patches have been added or moved using Explorer / Finder), right-click in the folder list and select the first entry from the menu. Clicking on any folder name will also refresh the list.

### create new folder

Does exactly that – creates a new folder.

## reveal in Finder / Explorer

Diva's browser is used mainly for loading patches, but is otherwise fairly limited. Right-click and select *Reveal in Finder* (Mac) or *Reveal in Explorer* (Win). Selecting *Reveal in...* opens a system window highlighting the current folder, so you can use the OS file functions instead. Remember to *refresh* (see above) after making changes to the contents of any Diva folders!

## on open expand to

Sets how deeply the browser will open sub-directories whenever the GUI is opened or *Refresh* (see below) is activated. Note: The branch containing the current patch will always be visible.

## context menu – presets panel

Right-clicking on a preset in the upper panel reveals the following functions:

### make favourite / mark as junk / show junk

You can classify presets as *favourite* or *junk*. Favourites are marked with a bright star. Junk will disappear immediately, but can be made visible by selecting *show junk* from the same menu. Junk files appear with a 'Stop' symbol next to the name.

### select all / deselect

Select or deselect all presets in the current folder.

## reveal in Finder / Explorer

The *Reveal* function opens Apple Finder / Windows Explorer and highlights the clicked preset (whether it is selected or not). Remember to *refresh* (see above) if you change anything!

## selection, drag & drop functions

Files can be moved from one folder to another via drag & drop. Use the SHIFT etc. keys on your computer keyboard to highlight the files you want to move, then click and drag them from the files area onto a different folder. To deselect, either click on a patch or choose "deselect" from the context menu. Diva's browser allows multiple selection: Shift+click selects a region, cmd+click (Mac) / ctrl+click (PC) selects or deselects individual presets.

Tip: Moving files around is easier and safer using your operating system's own windows – see *Reveal in Finder / Explorer* above.

## patch information

The bottom righthand area of the *Patches* window contains information the sound designer wrote before saving the preset e.g. a description, how best to play it, which controllers are used etc..

## save

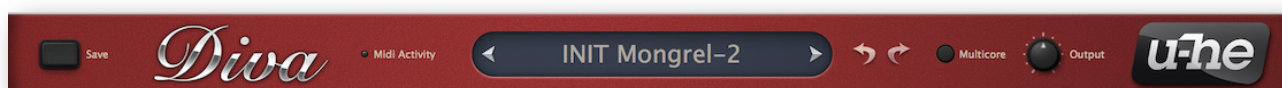
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Of course you will want to save your own creations...

**Important:** Make sure that the folder where you want to store your patch is already selected in the browser – if not, click on it first.

Click on the *Save* button at the top left, give your patch a name and enter any other details. Preset description, playing tips etc. – anything you would like to appear under *Patch Information* (the pane at the bottom right of the browser). Confirm by clicking on the *apply* button.

## control bar



### save

Described on the previous page.

### midi activity

Small indicator which flashes whenever MIDI data is received.

### data display

Primarily, the central display shows the name of the selected patch or the current value of any element being edited. Clicking on the areas either side of the display steps through patches. Clicking in the middle opens a drop-down list containing all the patches in the current directory.

### undo/redo

The two curved arrow symbols call Diva's *undo* and *redo* functions – you can step backwards (or forwards again) through an unlimited number of edit points.

### multicore

Push this button to distribute voices between all available CPU cores so you can play more notes without 'smoking' your CPU. *Multicore* works well on recent processors such as the i5 and i7, but please note that performance can even be reduced if your CPU is older!

Note: Some hosts already offer multicore support, and this can lead to poorer performance for Diva. In such cases, please switch one of them off (either Diva's or the host's multicore option).

### output

The final volume control for the patch. As this control doesn't affect the tone, use *Output* (in preference to amp *Volume*) to balance the levels between patches.

### 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.

## editing

### knobs

Values are adjusted via the usual click-and-drag, often allowing finer resolution via the SHIFT key on your computer. Knobs can be reset to their default values via double-click, and remote-controlled / automated via right-click (the [MidiLearn](#) function). Tip for wheel-mouse users: 'mouseover' and roll the wheel to edit values or scroll through a list (use SHIFT for fine tuning).

### parameter locking



Clicking with the righthand mouse button on any knob or switch opens a context menu in which you can select *Lock*. A locked parameter can still be adjusted, but the value doesn't change when you switch presets. To unlock again, right-click and untick 'Locked'.

### modification symbol

Wherever this symbol appears, it means that the neighbouring parameter is being modulated from within the [Modifications](#) panel.

# programming 101

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Although Diva ships with a whole bunch of presets, she is meant to be tweaked – that's why the interface is festooned with all those controls! Here's a quick and easy tutorial to get you started.

1. Click on the *Patches* button at the bottom of the window, select the **TEMPLATES** folder and load the preset called **INIT June-60**. Click on the *Scope* button – this gives you access to the module panels AND Diva's oscilloscope.
2. Play a fairly low note (you do have a MIDI keyboard attached, right?). The shape you can see in Diva's oscilloscope is moving in time with the *tone* of what you are hearing...
3. Find the Transpose knob in the lefthand (DCO) panel, and change it to 16' (it was 8'). The oscillator is now an octave lower (play that keyboard).
4. To the left of the Transpose knob are two faders. Double-click on the one labelled LFO2. The value of that fader (which controls pulse width modulation depth) is reset to the centre and the sound has become static. Move the leftmost fader up and down while playing a low note. Watch how the shape changes, then leave it at minimum.
5. What you hear (and see) is a 50-50 mixture of 50% PULSE (i.e. square) and SAWTOOTH. Click on the first SAWTOOTH option (the straight line i.e. silence) to isolate the pulse wave. Try the different HPF values, then leave it at 0.
6. Double-click on the PW fader (resets it to 50 i.e. 25% pulse) and take the other fader (pulse width modulation depth from LFO2) up to maximum. Go to the bottom left of the window, change LFO2's Waveform to *saw up* and change Sync to 1/4. Keep playing that keyboard!
7. Go to the VCF panel and try the CUTOFF and RESONANCE faders. Then double-click on both to reset them. Still in the filter panel, take the second cutoff modulation knob (currently labelled LFO 2) down to about -30.00. You now have a rhythmic sound that will cycle through the notes in a chord if you play them at different times. Try adjusting DETUNE...
8. Activate the two effects (Chorus and Delay) at the bottom right of the window by clicking on the small round buttons (they will light up). If you like, experiment with the effects parameters for a while, especially the Delay controls. Add some NOISE from the DCO panel!
9. Go back to LFO 2, click on the lower righthand button and select *ModWheel* (or *default*). Turn up the Depth Mod knob to maximum. Now the level of LFO 2 is controlled via the modulation wheel/stick on your keyboard. Turn Depth Mod down to minimum again so that the modulation wheel has no effect.
10. Swap the oscillator type: Click on the DCO label and select DUAL VCO. Click both Sawtooth icons to switch them off, and activate both pulse waves instead. Turn MIX to the centre. Click on the NO MOD label and select LFO 2 instead. Change the value of that knob to -20. Similarly, replace the VCF CASCADE with VCF BITE. Experiment with the filter controls until you get a nicely grungy, resonant pulsating sound (note that Rev 2 sounds fuller).



# Upper Panels

While checking out the presets you must have noticed that the main modules can be swapped out. Simply click on the label at the bottom of each module, then select from the list. You don't have to click on the grey triangle – anywhere on the label will do.

Some smaller labels within each panel also have grey triangles. Click on these labels to replace default modulation sources. Selected sources other than the default appear as *Dymo™* tape – call us crazy, but we rather like the retro-look of sticky labels on custom-modified hardware!

## oscillators

Diva offers five different oscillator types: **Triple VCO** (morphing oscillators with FM, sync and filter feedback), **Dual VCO** (multi-wave oscillators with sync, PWM and cross mod), **DCO** (single two-wave oscillator with PWM and flexible sub-osc), **Dual VCO Eco** (CPU-friendly, pulse width, ring modulation) and the newer **Digital** ('megasaw' and much more). All models include a noise source. Some parameters, although practically the same, have different names in different models.

Note: The output levels of oscillators can have a significant effect on the tonal quality of the filters. The models that don't allow complete control over volume might get that in future versions – or the filters will include input gain controls (yet to be decided).

### TRIPLE VCO

The most CPU-hungry oscillator model, Triple VCO stretches across two panels:



The **upper switches** on the left activate pitch (tune) modulation for each oscillator. To specify a modulation source other than the ENV2, click on that label and select from the drop-down list.



In this example, *modulation wheel* is controlling oscillator 2 pitch only, as only the middle switch is active (indicated by the white dot).

**TUNE MOD** specifies the amount of pitch modulation. This control is bipolar i.e. the amount of modulation can be either negative or positive.

Similarly, the **lower switches** activate waveform (shape) modulation – see WAVEFORM below. To specify a modulation source other than LFO2, click on the label and select from the list.



In this example, *envelope* 2 is modulating the waveforms of oscillator 1 and oscillator 2, but not oscillator 3.

**SHAPE MOD** specifies the amount of waveform modulation. This knob is also bipolar i.e. the amount of modulation can be negative.



**FM 1->2/3** sets the amount that oscillator 1 frequency-modulates oscillator 2 and oscillator 3 (both equally). Frequency modulation is useful for complex, dissonant or even bell-like sounds.

Note: FM 1->2/3 can be modulated from within the [Modifications](#) panel.



The octave switches (**32' to 2'**) and **DETUNE** (oscillators 2 and 3 only) determine the oscillators' pitches. These controls are self-explanatory except for one special feature: The DETUNE knob acts like a 5-turn potentiometer that can also flip the octave over – try turning it beyond 5 or -5 and see for yourself!



The **SYNC** switches enable hard-sync for oscillators 2 and 3 (they both synchronize to oscillator 1). The pitch of a synchronized oscillator should normally be higher than oscillator 1, or at least modulated upwards via TUNE MOD.

Tip: For the maximum range of sync sounds, set osc 1 to 32' and [Transpose](#) to 24.



Unlike in e.g. the Minimoog™, the **WAVEFORM** controls are not rotary switches. They are continuously variable – from ramp through triangle and sawtooth to square, followed by narrower pulse waves. For maximum PWM (pulse width modulation), set the waveform to 8.00 (25% pulse), switch on shape modulation (see above) for the oscillator and set the SHAPE MOD level to 10.00.



The **MIXER** panel contains volume controls for each oscillator as well as for the **NOISE** generator. Below the NOISE volume knob is a tone switch: **PINK** noise contains mostly low frequencies, while **WHITE** noise is full-range.

The **FEEDBACK** knob controls the amount of signal taken from behind the filter and fed back into the mixer – like the age-old trick of connecting the extra output on the Minimoog™ back into its audio input. Relatively low feedback values cause a subtle bass boost, higher values can create subharmonics or even wild howling noises. A natural side-effect of higher feedback is lower resonance, so you might have to compensate for that.

Although the mixer panel is an integral part of the *Triple* oscillator module, Feedback is also available for all the other oscillator types, as an alternative to high pass filtering – see [there](#).

Note: The Feedback amount can be modulated from within the [Modifications](#) panel.

## DUAL VCO

A slightly simpler model than Triple VCO, but with the advantage of independent (split) pitch control as well as multiple waveforms within each oscillator...



The **two faders** to the left both affect the width of pulse waves. **PW** sets the nominal width from very narrow through 50% to 100% (silence). The other fader adjusts the depth of pulse width modulation from the selected source (LFO2 by default), with zero in the centre. The switch below applies these settings to either VCO1 only or to both oscillators at the same time.

The octave switches (**32'** to **2'**) and **DETUNE** knob (oscillators 2 only) determine the oscillator pitches. Again, DETUNE acts like a 5-turn potentiometer which can also affect the octave range.

The central **SYNC** button synchronizes VCO2 to VCO1. When switched on, the pitch of VCO2 should be set higher than VCO1 (or at least modulated upwards). Tip: For the maximum 'sync sweep' range, set VCO1 to 32' and [Transpose](#) to 24.

The 4-way switch (**1 / BOTH / 2 / SPLIT**) specifies pitch modulation targets for a pair of sources (ENV2 and LFO2 by default). To modulate VCO1 and VCO2 independently, select SPLIT here.

The two vertical rows of buttons select **waveforms**: Triangle, Saw, Pulse/PWM, Noise (VCO1) and Sine (VCO 2). Note that selecting multiple waveforms retains the overall volume.



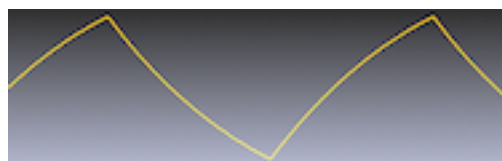
**CROSS MOD** (cross modulation) is similar to *FM 1->2/3* in the Triple VCO module (see the previous pages). The main difference here is that the cross-modulation amount can be modulated directly from within the oscillator panel.

In this example, the amount of cross modulation is being (positively) controlled from the modulation wheel.

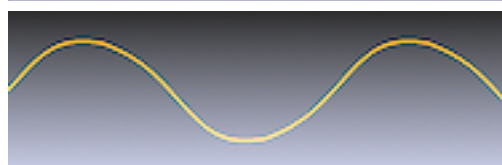


**MIX** balances the volumes of VCO1 and VCO2. Note: As VCO1 includes a noise generator, it made sense to allow MIX to be modulated in the [Modifications](#) panel (via *Noise & Dual VCO Mix*). This means you can use e.g. an envelope or LFO to crossfade between the two VCOs.

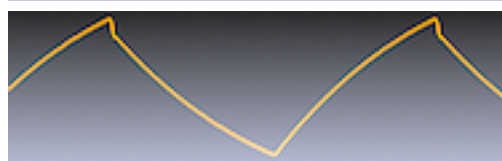
**SHAPE** gives you a choice of three Dual VCO ‘hardware revisions’. Although this switch affects the sound of all waveforms, it is most noticeable with triangles:



*ideal (the sweetest triangle)*



*analog1 (looks like a sine, sounds more like a triangle)*



*analog2 (brighter – like ‘ideal’ but with a ‘tooth’)*

Note: These screenshots were made while playing the note C2. Like real analogue oscillators, however, the shapes of waves in Diva are not 100% the same at all pitches!



## DCO

A single oscillator model (with sub-oscillator and noise), DCO delivers a more complex, brighter sound than the other analogue types...



The left half of this panel is the same as the Dual VCO but without the switches for VCO2. Cross-modulation is not possible without that second oscillator, but this lack is tempered by the DCO's ability to add perfectly synchronized waveforms together.

The output is the sum of four sources: **PULSE**, **SAWTOOTH**, **SUBOSCILLATOR** (each offering a choice of different shapes) plus **NOISE**. Even without noise, the result can be quite complex:



In the PULSE and SAWTOOTH selectors, the straight line means silence/off, and the 4th option from the top (in each case) is the one that reacts to pulse width settings:



*these two are the only waveforms that react to pulse width settings*

Similarly, the SUB-OSCILLATOR offers six different waveforms, all based on pulse waves. The top four are all one octave below the main oscillator, the others are both two octaves down.

At the top right of the DCO panel are two faders that control sub-oscillator and noise levels.



## DUAL VCO ECO

This one is fairly primitive because it emulates primitive hardware. There is no PWM or FM here but, as its name suggests, ECO has the lowest CPU-hit...

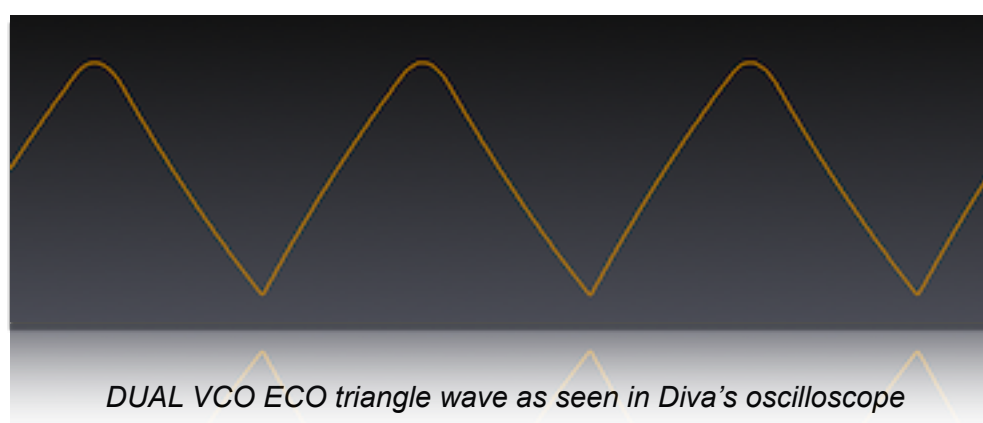


When switched to **RING**, the regular VCO2 output is replaced by *ring modulation* between the selected VCO1 wave and the VCO2 square wave.

Although the two oscillators can be tuned independently, both TUNE MOD sources (ENV2 and LFO2 by default) are applied to the overall pitch.

Because VCO1 includes noise, its volume can be modulated via *Noise & Dual VCO Mix* in the [Modifications](#) panel.

One more thing: the shape of the triangle wave is rather interesting...



## DIGITAL

This model emulates a well-loved but unashamedly **digital**-sounding oscillator (including all the dirt and aliasing of the original) – plus a few extras:



**Multisaw** mode is 7 stacked sawtooth waves. DETUNE adjusts tuning spread, MULTI is the balance between the original wave and the detuned waves. Multisaw is great for fuzzy dance music sounds or for exceedingly rich pads.

**TriWrap** is a wrapped triangle wave – positive peaks appear at the bottom of the wave and negative peaks appear at the top. WRAP adjusts the threshold for the wrap function, BEND adjusts the horizontal symmetry.

**Noise** is 'digital' white noise with a resonant lowpass filter. TUNE adjusts cutoff, Q adds resonance (with significant loss of low frequencies). Tip: For pitched noise, modulate TUNE with KeyFollow, amount = 24.00.

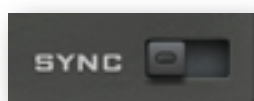
**Feedback** is a sawtooth sent through a short delay with feedback, creating tones similar to an electric guitar. TUNE adjusts the length of the delay, FEEDBACK sets the amount of feedback (also adds lots of digital distortion).

**Pulse** is a square/pulse mixture. PW adjusts the pulse width while SPIKE UP first turns the wave into a saw (at 3.00 already), then multiplies the saw for a complex 'pseudo-sync' effect. SPIKE UP can create some *serious* aliasing.

**Sawtooth** is a sawtooth wave plus synchronized sine. HARMONICS adjusts the level and polarity of the sine wave (set 50.00 for a 'pure' sawtooth with no sine component), BEND continuously shifts the sine up an octave.

**Triangle** is a triangle plus synchronized sine an octave higher. HARMONICS adjusts the level of the sine, while BEND adjusts horizontal symmetry. You might like to watch what happens to the waveform in the 'scope'.

The **OCTAVE** rotary switch adjusts the pitch of oscillator 1 in octave steps. The **TUNE** parameter in oscillator 2 lets you adjust its pitch precisely within a range of +/- 30 semitones (for very fine tuning, hold down a SHIFT key on your computer keyboard).



The **SYNC** switch at the bottom of oscillator 2 activates hard-sync (oscillator 2 is synchronized to oscillator 1). To hear the effect, turn up both MIX and TUNE. Note: In Multisaw mode, sync is only applied to the 'original' wave, and has no effect at all in Noise mode.



The **central panel** specifies the modulation sources and amounts for each oscillator. Both oscillators share common modulation sources (so you can't modulate the two pitches independently, for instance).

Example: In this image, the pitch of oscillator 2 is being negatively modulated by pressure, the second parameter in oscillator 1 is being positively modulated by KeyFollow, and the third parameter in oscillator 2 is being positively modulated by LFO2.

Along the bottom are five more controls:



**TUNE MOD** lets you modulate the pitch of both oscillators at the same time.

**CROSS** (cross modulation) adjusts the amount that oscillator 1 frequency-modulates oscillator 2.

**RING** replaces oscillator 2 output with the result of *ring modulation* between the two oscillators (like in the DUAL VCO ECO oscillator model).

**MIX** adjusts the relative levels of the two oscillators.

**HIGH QUALITY** reduces aliasing artifacts at the cost of (usually) a bit more CPU...

On the subject of CPU usage: Please note that automating the Digital oscillator's WAVE switches (see previous page) can cause massive spikes and is best avoided if possible.

## high-pass filters / feedback

While the Triple VCO oscillator includes a mixer, all other oscillator models allow the central panel to be swapped out. There is a choice of filter feedback or one of three high-pass filter models...



*all four feedback / HPF panel options*

### NO HPF (just feedback)

The same as integrated into the TRIPLE VCO oscillator model (see [there](#)). The single knob controls the amount of signal taken post-filter and fed back into the mixer. Effects range from mild bass boost to subharmonics / low-frequency howling.

### HPF | POST

Although located to the left of the main filter, this model actually comes *after* the main filter in the signal path. It doesn't affect the tone of the main filter by changing its input levels, but either boosts the bass (BOOST setting) or removes low frequencies from the already filtered signal.

### HPF | PRE

A high-pass filter *before* the main filter, with continuous frequency control. HPF | PRE can affect the tone of the main filter by sending it fewer low-frequencies to work with. Use this model e.g. to tame the output of the DCO oscillator, or to thin out a noise source etc..

### HPF | BITE

A complete high pass filter before the main filter, with cutoff modulation and resonance control. Unlike the similar-looking ECO oscillator, this is actually the *most* CPU-hungry option – so you can expect some powerful tonal shaping. Note: The resonance control is called PEAK here.

Two REV (revision) models are available, with different characteristics. But be warned: either of them can BITE...



## main filters

This is where a lot of Diva's magic happens. The current version offers five main filter models, each based on a classic hardware filter (or two): *Ladder*, *Cascade*, *Multimode*, *Bite* and *Uhbie*...

### VCF | LADDER



Classic 24dB per octave ladder filter based on the behaviour of a specific piece of monophonic hardware (the word on the street is that each unit that left the factory sounded at least slightly different – the one we borrowed is certainly special).

Either side of the **Cutoff** and **Emphasis** (resonance) knobs are three cutoff modulation sources with bipolar controls: Two user-definable (ENV 2 and LFO 2 by default) plus key-follow (KYBD).

In addition to the original specifications, VCF | LADDER offers bipolar **filter-FM** from oscillator 1 and a 12dB per octave (2-pole) option.

Note: Emphasis (resonance) and FM amount can be modulated from the [Modifications](#) panel.



## VCF | CASCADE

A cleaner sounding filter than Ladder, CASCADE offers a very similar set of controls...



Purely in terms of available features, the only difference between Ladder and Cascade is the **Rough/Clean** switch. Apart from altering the overall tonal character, it has a noticeable effect on the amount of resonance at the top end of its range.

Cascade is an all-rounder, and is particularly good for big smooth pads without generating too much grunge when input signal levels are high.

The **12dB** per octave switch (click on the button) removes two of the four poles, resulting in a brighter sound while still retaining the overall character.

## VCF I MULTIMODE

Featuring extra high-pass and band-pass options, the multimode model is based on the filter in yet another classic polyphonic synthesizer or two...



All controls except the switch in the middle should already be familiar (assuming you have been reading about the other filter models above).

**LP4** is a 4-pole low pass model, **LP2** is a brighter 2-pole alternative.

**HP** is a high-pass (removes low frequencies) and **BP** a band-pass (removes both high AND low frequencies i.e. allows only a band of frequencies around the cutoff point to pass through).

## VCF | BITE

Although VCF | BITE appears to have no distinguishing features compared to the other models, it actually sounds **very** different...



The tone is highly dependent on input signal levels, the selected revision (REV) and the value of PEAK i.e. resonance. Like the corresponding [high-pass](#) module, the lowpass BITE filter is a real character, able to deliver anything from solid 2-pole to screaming mayhem.

Tip: If you want to hear a lot of resonance (“Peak”), try low oscillator volumes! Even as little as 10% can be just right.

## VCF | UHBIE

Another classic, but a latecomer to Diva: **Uhbie**, a silky smooth 2-pole state variable filter with crossfade between three different types (low-pass through notch or bandpass, to high-pass):



*the Uhbie filter panel*

Again, most of the controls should already be familiar (they are the same as in other models): We have Cutoff with two modulation sources/knobs on the left, resonance and key-follow in the middle, and the amount of FM from oscillator 1 at the bottom right.

The switch and pair of controls at the top right are what make Uhbie special:

**BR / BP** switches the central position of MIX to either bandreject (notch) or bandpass...

**MIX** crossfades from lowpass through bandreject / bandpass to highpass. The source selector and amount knob are used for modulating the mixture, as indicated by the arrow.



## envelopes

The righthand panel comprises two envelopes one above the other, each with its own model selector. Note that the curves of envelopes *within the same hardware synth* (i.e. those used for amplifiers vs those used for filters etc.) often differ. This important but often overlooked detail has also been carefully modeled in Diva.

### ADS

Simplified ADSR with shared decay and release times. The Release stage can be switched off so that even a long decay will stop as soon as the note is released.



This envelope was modeled on that same “specific piece of monophonic hardware” mentioned above, but adapted for polyphonic use.

Tip: Before switching RELEASE on in envelope 1, make sure that DECAY is set to a value that is also a suitable release time.

**VEL** (velocity) determines how much the envelope level is modulated (scaled) by MIDI velocity.

**KYBD** (keyboard follow) scales the attack, decay and release times according to the MIDI note number. This makes the envelope of high notes shorter and low notes longer.

### ANALOGUE



ADSR type modeled on the envelope of another famous but unnamed analogue synthesizer...

## DIGITAL

Digital ADSR type modeled on a later (and significantly cheaper) successor to the above. The DIGITAL envelope contains two extra buttons labeled **Q** and **C**:



**Q** (quantize) gives you a slightly steppy sound (think e.g. Alpha Juno, Matrix 1000 envelopes).

**C** (curve) affects the overall curvature, giving the envelope more of an 'S' form...



*DIGITAL envelope without / with **C** (curve) switched on*

# Lower Panels

## LFOs

At the bottom left of all windows except *Patches*, you will see a pair of *low frequency oscillators*:



LFO 1 is also used as the direct source of vibrato, and LFO 2 is connected by default to several parameters in Diva's other modules (hence the labels in brackets).

The **Waveform** selector opens a list of all available LFO shapes:

*sine* .....typical sine wave  
*triangle* .....typical triangle wave  
*saw up* .....rising sawtooth  
*saw down* .....falling sawtooth  
*sqr hi-lo* .....square wave that starts positive / high when *Phase* is at minimum  
*sqr lo-hi* .....square wave that starts negative / low when *Phase* is at minimum  
*rand hold* .....steppy random wave  
*rand glide* .....smooth random wave

The **Restart** selector has four options specifying when the LFOs will be restarted:

*sync* .....never restarts. LFOs for all notes are in phase unless modulated apart  
*gate* .....restarts per note at the specified *Phase* (see below)  
*single* .....similar to *sync*, but restarts at the next note after all notes are released  
*random* .....restarts at a random phase per note

**Phase** adjusts where (within its cycle) the LFO waveform will be restarted whenever a note is played. Ignored when Restart is set to *random*.

**Delay** fades the LFO in, with a range from 'immediate' to about 20 seconds.

**Rate** knob offsets LFO speed (negatively or positively) from the *Sync* value.

**Rate Mod** controls the amount of rate modulation from a source specified in the neighbouring selector (*none* in the above image – try e.g. *ModWheel* or *KeyFollow* here).

**Polarity**: Diva's LFOs are normally bipolar, but when this switch is enabled, they become unipolar – the entire waveform is shifted upwards so that only positive values are possible.

**Sync** is the rate / synchronization mode: 3 absolute times, plus 24 synchronized to song tempo.

**Depth Mod** controls the amount of LFO level modulation from a source specified in the neighbouring selector (set to *ModWheel* in the above image). Tip: If the depth modulation source is set to *none*, you can use the knob to reduce the overall LFO level.

## effects

At the bottom right of all windows except *Patches* you will see a pair of stereo effects. The upper selector specifies the kind of effect, and the square button at the top left is an **on/off** switch.

The two effects are arranged in series. This means that you can even set up two reverbs one after the other (e.g. one for complex early reflections and the other for the main reverb tail).

### chorus



**Type** *Classic*, *Dramatic*, *Ensemble* are based on real hardware effects. *Ensemble* is especially rich – it can turn a raw VCO into a classic ‘string machine’ sound.

**Rate** is the modulation speed. Use low values for slow stereo effects.

**Depth** is the modulation amount. Set to zero (with *Classic* or *Dramatic*) for static colouration.

**Wet** is dry/wet mix. Subtle Chorus can add stereo width without making the sound too “washy”.

### phaser



**Type** *Stoned* or *Flanged* – also based on real hardware effects. The *Flanged* type is more resonant, and is particularly interesting when applied to bright sounds.

**Feedback** is the resonance amount control.

**Sync** synchronize the Phaser’s LFO to song tempo. See *Rate* below.

**Stereo** is a bipolar stereo width control. Note that with the *Stoned* type, maximum stereo width is at +/- 25.00 (especially obvious if you turn *Feedback* up).

**Rate** controls the modulation speed. If *Sync* (see above) is switched on, the value is measured in beats (i.e. quarter notes) so the rate actually gets slower as values increase. Example: For one cycle every 3 bars in 4/4 time, set this to 12.00 (3 times 4).

**Phase** controls phase offset, from 0° to 360°.



## plate (reverb)



**PreDelay** is a simple delay before the reverb starts. This is especially useful for retaining the ‘closeness’ of the original signal.

**Diffusion** adds a subtle chaos to the reverb, thus reducing metallic resonances.

**Damp** causes higher frequencies to fade more quickly than low frequencies. Damping emulates the ‘warming’ effect of carpets, curtains, wood etc. in a room.

**Decay** controls the time it takes for the reverb to fade out

**Size** ranges from tiny bathroom to huge cathedral. Tip: It is well worth experimenting with all combinations of *Decay* and *Size*!

**Dry / Wet** are level controls for the untreated and effect signals.

## delay



**Left / Center / Right** delay times across the stereo field, always relative to host tempo (BPM). Integer values are exact semiquavers (quarter-beats), and *Center* defines the Feedback time. This configuration is unusual – it lets you set a repeat rate without hearing that particular “tap” (simply turn down *Center Vol* to zero).

**Dry** is the level of the unprocessed signal.

**Center Vol / Side Vol** are separate levels controls for the center tap and the stereo (L/R) taps.

**Wow** emulates slow tape ‘wobble’, ranging from subtle/spacey to almost seasick.

**Feedback** is the regeneration amount. 100.00 will give you an infinite loop if HP is set to minimum and LP to maximum... well worth trying out!

**HP / LP** are cutoff controls for highpass and lowpass filters within the feedback path. Lower the value of LP for typical damping, increase HP to reduce the bass and mid frequencies.

## rotary

A realistic rotary cabinet i.e. Leslie™ emulation, with tube-like distortion.



**Mix** is a dry/wet balance control

**Out** attenuates or boosts the output level (whatever the *Mix* value)

**Stereo** controls stereo width (you could call this “microphone separation”)

**Balance** controls the relative volumes of the horn and bass speakers

**Mode** (unlabeled) selects **Normal**, **SyncBass** or **NoBass**. In *Normal* mode, the horn and bass speakers rotate independently, in *SyncBass* mode they are phase-locked. *NoBass* mode switches the bass speaker off – you might have to reduce *Mix* a little to bring back the bass

**Controller** determines which of the available modulation source (mod wheel, breath, expression pedal or pressure) will be used to control the speed

**RiseTime** adds a variable lag to the selected controller

**Slow** sets the *Slow* speed, with a range from about 10 seconds to 0.2 seconds

**Fast** sets the *Fast* speed, also with a range from about 10 seconds to 0.2 seconds

**Drive** is the amount of distortion. Note that distortion is also highly dependent upon the input level – if there is still too much distortion in the signal when *Drive* is set to minimum, turn down *Volume* in the *Amplifier & Pan* section, then turn up *Out* (see above)

*Note: The following panels are switched via the 'radio' buttons at the bottom of Diva's window...*

## tuning

This panel is visible when either **Main** or **Patches** is selected:



**Vibrato** controls the amount that oscillators are pitch-modulated from LFO1 (remember that LFO levels also depend on the value of *Depth Mod*).

**Glide** sets the basic portamento rate. **Glide2** is a bipolar offset applied to VCO2 (Dual VCOs and Triple VCO) as well as VCO3 (Triple VCO). **Range** is the portamento "strength", a u-he speciality. Lower values shift the beginning of the slur closer to the target note, which is great for sloppy intonation effects! **GlideMode** has two options:

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

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

**Fine** (fine tune) shifts the pitch over a range of +/- 1 semitone and **Transpose** shifts the pitch in semitone steps over a range of +/- 24 semitones. **Up** and **Down** set the pitch bend ranges, from 0 to 24 semitones

**Microtuning**: Diva supports the .tun microtuning format. Hundreds of tables are available online, most of them free. Put all your .tun files into the following folder:

WIN ...\\Diva.data\\Tunefiles (specifically for Diva)

MAC MacHD/Library/Application Support/u-he/Tunefiles/ (global for all u-he plugins)

After loading a microtuning file, switch it on by clicking the button.

## amplifier & pan

This panel is visible when either **Main** or **Patches** is selected

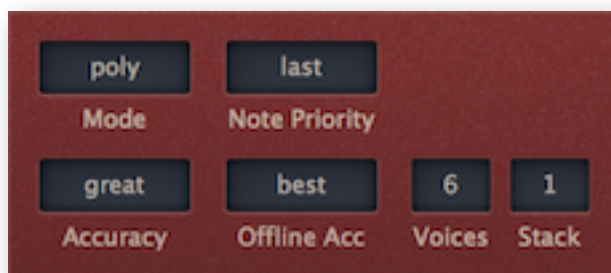


**VCA** selection: either envelope 1 or a simple gate (thus freeing up Env1 for other purposes!)

**Volume** is a bipolar gain control. Positive values can subtly overdrive the amplifier **Vol Mod** is for gain modulation (via the neighbouring modulation source). **Pan** (panorama) shifts the voice(s) towards the left or right channel. **Pan Mod** modulates pan position. To pan stacked voices apart, use *StackIndex* here.

## voice

This (unlabeled) panel is visible while the **Main** or **Patches** tabs are selected:



**Mode** has five options:

*Poly*.....normal polyphonic

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

*Legato*.....monophonic, doesn't retrigger until a space is left between consecutive notes

*Duo*.....duophonic i.e. split voices. Osc 2 follows the highest note, Note Priority is ignored

*Poly2*.....a variant of Poly in which voices in their release stages are stolen before new ones

**Note Priority** only applies to *Mono* and *Legato* modes. The options are:

*last*.....plays the most recent note (digitally controlled synthesizers)

*lowest*.....plays the lowest note (most classic USA mono-synths)

*highest*.....plays the highest note (EMS as well as most Japanese mono-synths)

**Accuracy** is a very important global parameter, as it determines CPU-hit vs realtime audio quality (especially resonance). See page 4 for details.

**Offline Acc** determines the accuracy for offline audio rendering, and is also a global parameter.

**Voices** sets the maximum number (2-16) of voices before note-stealing occurs. Mostly used to guard against audio glitches while running CPU-intensive patches.

**Stack** sets the number of unison voices. Use *Stack Tuning* and/or the *StackIndex* modulation source to offset voices against each other. Note that stacking will eat up CPU!



# clock & arpeggiator

This (unlabeled) panel is visible whenever the **MAIN** or **PATCHES** tabs are selected:



## Clock

**Clock** selects a clock interval for the arpeggiator (and perhaps future additional features). Note that Diva's clock is always synchronized to host tempo, there are no absolute times.

**Multiply** scales the clock interval from 0.50 (half as long) to 2.00 (twice as long).

**Swing** factor, 50% = 2:1 (triplet time), 100% = 3:1 (dotted note / strongest shuffle).

## Arpeggiator

**Arp** switches the arpeggiator on/off.

### Mode

*played* .....in the order the notes were originally played

*up* .....from lowest to highest

*down* .....from highest to lowest

*up+dn 1* .....normal up & down

*up+dn 2* .....up & down, repeating the top and bottom notes

*random* .....chaotic order

**Progression** determines when the arpeggio will proceed to the next octave:

*serial* .....plays all notes, then jumps octaves up (set *Octaves* to 2 or more)

*round* .....same as *serial*, but also jumps octaves down again (set *Octaves* to 3 or 4)

*leap* .....plays a note, jumps octave up for next note etc. (set *Octaves* to 2 or more)

*repeat* .....like *leap*, but repeats the same note for all octaves before playing the next one

**Octaves** (1 to 4) transposes the arpeggio according to the *Progression* setting (see above). The current octave is indicated by the vertical row of LEDs.

**Restart** (*none*, 4 – 10, 12, 14, 16, 24, 32): This sets the number of notes the arpeggiator will play before it starts from the beginning again, as indicated by the bottom LED in the row. The idea is to help keep arpeggios musically 'in meter' e.g. 4/4 time.

Experiment with the setting '8' first. Note that setting low values here can cause the arpeggiator to restart before all your notes have been played.

Note that the results of arpeggiation depends on the selected **voice mode**: multiple overlapping release phases (*poly*), single overlapping release phase (*poly2*), single retriggering of the same voice (*mono*) or single trigger i.e. no retrigger (*legato* as well as *duo*).

## modifications

Many synth enthusiasts like experimenting for hours (or even days) on end with the more esoteric features of their chosen instruments. Diva doesn't disappoint here – click on the **MODIFICATIONS** tab to open this panel:



The upper half includes options that aren't available in the module panels (for instance resonance modulation), plus a few that are only available in certain modules. The lower half contains a bunch of simple modulation processors with input selectors – see below for details.

### VCO

**FM & Cross Mod Depth** lets you modulate the *FM amount* in the TRIPLE VCO (and perhaps future oscillator models) from the selected modulation source. Note that this feature mirrors the extra *Cross Mod* parameters in the DUAL OSC model.

**Noise & Dual VCO Mix** lets you modulate the level of *Noise* (or the oscillator also responsible for noise) in all oscillator models, from the selected modulation source. For the *Triple VCO* and *DCO* models, this is easy because the noise generator is a separate audio source in both cases. In *Dual VCO* and *Eco* models, however, it modulates VCO1 level because noise is an integral part of VCO1. In the *Dual VCO* (not *ECO*) model, it does this by modulating *Mix* – great for cross-fading between the two oscillators. For the sake of consistency, *Mix* is also modulated in the DIGITAL model – although both oscillators are capable of generating noise.

### filter

**Resonance Mod** lets you modulate *Resonance* / *Emphasis* / *Peak* from the selected modulation source. There is no equivalent within the main oscillator panels.

**Filter FM Mod** lets you modulate the amount of filter *FM* (OSC1) from the selected mod source.

### feedback

**Feedback Mod** lets you modulate the amount of *Feedback* from the selected source. This only applies if the oscillator model is *Triple VCO*, or *Feedback* is selected as the central module.



### parameters modulated here

This isn't a button or knob, but a reminder that wherever the (M) symbol appears in the main panels, the neighbouring parameter is being modulated from within *this* panel.

## modulation processors

**rectify** converts all negative values in a modulation source to positive values

**invert** turns a modulation source upside-down – negative becomes positive, and vice versa

**quantize** creates discrete steps – the value is a division factor: the lowest value 2.00 means two steps if the input is unipolar (e.g. envelope), and four steps if it is bipolar (e.g. LFO)

**lag** slows down abrupt changes in the source e.g. makes square waves more rounded

**multiply** outputs the product of two modulation sources

**add** outputs the sum of two modulation sources

There are a few practical examples of how to use these functions in [Tips and Tricks](#).

## trimmers



The TRIMMERS panels let you detune voices, add a variable degree of ‘slop’ to cutoff frequencies, envelope times, pulse width and glide times – and more.

**OSCILLATOR VOICE DETUNE** lets you detune voices (per oscillator!). Double-click to reset. LEDs indicate which voices are currently being played. They are arranged in pairs (01/09, 02/10, 03/11, 04/12 etc.)

**Voice Map Modulator** specifies values for the modulation source *VoiceMap*. Use *VoiceMap* for any offsets you like, e.g. panning, cutoff, resonance.

Note: The Oscillator Voice Detune and the Voice Map Modulator have 8 knobs (per row) for all 16 available voices. Presets with more voices than 8 ‘reuse’ those values.

**Detune Amt** (amount) is a scaling factor for all the OSCILLATOR VOICE DETUNE knobs. Keep this low for “good tuning”!

**Voice Drift** is a slow wavering of the overall pitch. Again, keep values low for “good tuning”

**Voices** and **Stack** are the same as in the Main / [Voice](#) panel. They are included here for your convenience while adjusting STACK TUNE.

**VARIANCE** applies random offsets ('slop') to cutoff, envelope times, pulse widths and glide times. Similar to OSCILLATOR VOICE DETUNE (see above), but instead of having individual knobs per voice, each parameter has an associated button which randomizes the 8 values.

LED Colour determines the colour of all indicator lights in Diva. An automatable parameter!

**RESET PHASE** only works if *Transient Mode* (see below) is set to *osc reset*. The 3 knobs set the phases at which the 3 oscillators will be reset every time a note is played. This feature is particularly useful for sounds in which the attacks need to be very consistent. Tip: the most percussive setting is seldom zero – you will need to experiment!

**Transient Mode** offers four options affecting how the first few milliseconds of new voices are handled in all voice modes except *Legato*. The effect is seldom obvious, but when attack times are set to minimum, choosing a different transient mode can make all the difference between *punchy* and *clicky*.

**Bipolar Noise** is best left switched on. Included for reasons of compatibility with early presets.

**STACK TUNE** sets the pitch of each stacked voice within a range of +/- 2 octaves. Set *Stack* (see above) to a number other than 1, and use these knobs to create 'megasaws' (set all values very close to 0.00), one-finger chords etc..

## scope

Every synth needs an oscilloscope...



**Frequency** controls horizontal resolution

**Scale** controls vertical resolution

Note that Diva's 'scope takes its signal from *before* the effects.

### context menu

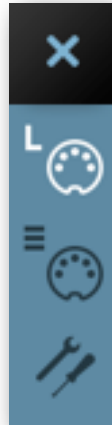
Right-clicking in the oscilloscope window lets you switch the drawing mode: *glow*, *fire* and *wind* add different fade-out effects at the cost of extra CPU. These modes are also a bit more sluggish than *eco* or *fast*. Tip: If you need to keep CPU-usage down to an absolute minimum, select the *eco* (economy) option.



# Configuration



Clicking on the cogwheel icon opens the global configuration pages where you can adjust the window size and brightness and connect Diva parameters to MIDI continuous controllers.



The 4 buttons are Close [X], MIDI Learn [L], MIDI Table [≡] and Preferences [tools].

Tip: Right-click within the button area to set the currently selected page as default!

## MIDI control

### MIDI Learn

The MIDI Learn page is where you can connect MIDI CC to Diva parameters. The CC data can be generated by knobs or sliders on your hardware controller, or by a track in your host sequencer etc.. Click on the configuration button and select the 'L' MIDI icon:



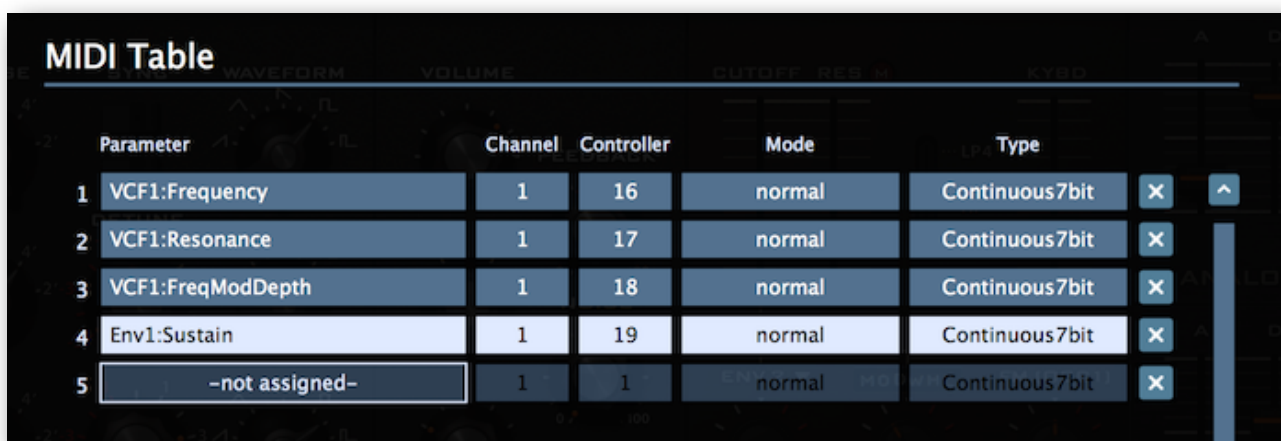
The MIDI Learn window is a translucent overlay, with MIDI-learnable elements shown as selectable outlines. Controls that are already connected appear filled (like 3 sliders and a knob in the image). The outline of the currently active control is highlighted, as is the Digital oscillator 'Mix' above.

You can still select MAIN, MODIFICATIONS etc. here, but not the module panels. As 'Digital' has a very different parameter set than 'Triple VCO' (as an extreme example), to MIDI learn everything in Diva you will need to exit configuration mode and switch modules several times.

Try this: Click on the **CUTOFF** knob/slider and send Diva some MIDI CC data e.g. move a knob or slider on your hardware MIDI controller. Then switch to the MIDI Table and check the list...

## MIDI table

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



The screenshot shows the 'MIDI Table' window with a list of 5 MIDI CC assignments. The table has columns for Parameter, Channel, Controller, Mode, and Type. Each row has a delete button (X) and an up arrow button (^).

	Parameter	Channel	Controller	Mode	Type	
1	VCF1:Frequency	1	16	normal	Continuous7bit	X ^
2	VCF1:Resonance	1	17	normal	Continuous7bit	X
3	VCF1:FreqModDepth	1	18	normal	Continuous7bit	X
4	Env1:Sustain	1	19	normal	Continuous7bit	X
5	-not assigned-	1	1	normal	Continuous7bit	X

### Parameter

The first field displays/selects one of Diva's many parameters, which are sorted into sub-menus according to module. Click on the 'ADD' button at the bottom left and experiment with this field, then delete the assignment again by clicking on the [X] to the right of the line you just created.

### Channel / Controller

The next two fields are for MIDI channel and CC number. Diva is channel-sensitive, you can map up to 16 channels of controller assignments.

### Mode

Specifies the range and/or resolution of values.

<i>Normal</i>	full range, continuous
<i>Integer</i>	full range, whole numbers only
<i>Fine</i>	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.

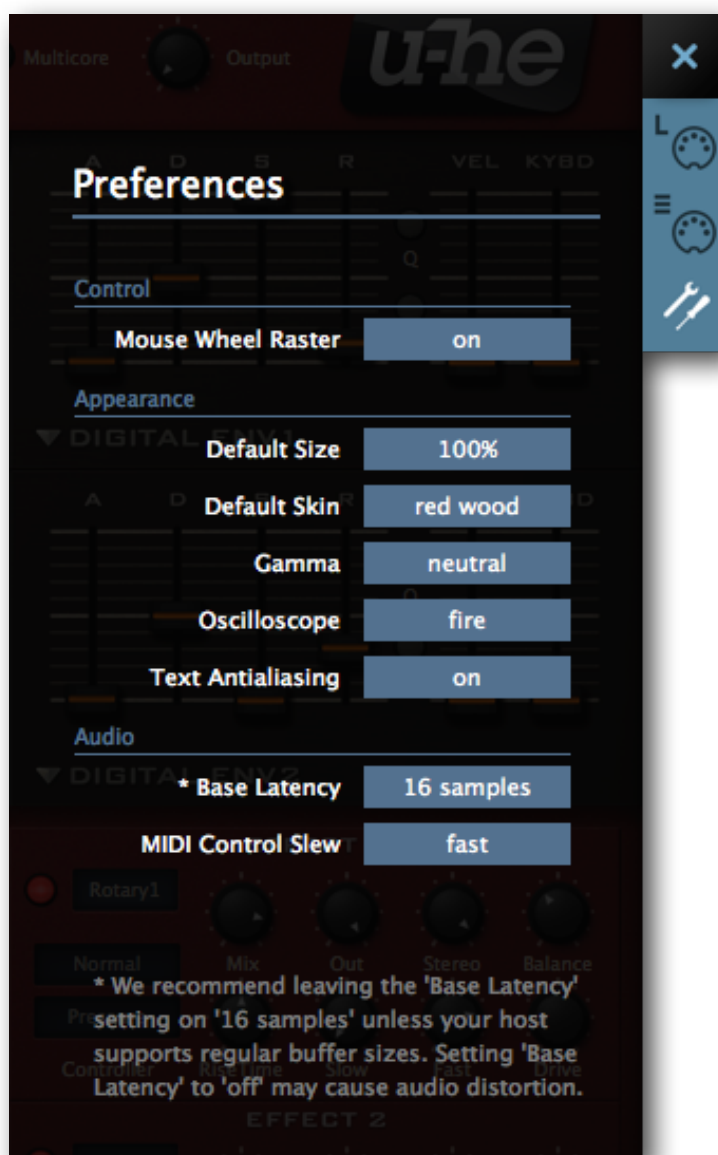
<i>Encoder 127</i>	unipolar encoder
<i>Encoder 64</i>	bipolar encoder
<i>Continuous 7-bit</i>	7-bit MIDI CC (standard resolution)
<i>Continuous 14-bit</i>	14-bit MIDI CC (high resolution, rare)

### Remove

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

# preferences

Clicking on the 'tools' icon open the Preferences window, in which you can set several global defaults to suit your computer mouse and monitor:



## Control

### Mouse Wheel Raster

If the wheel on your mouse is rastered (you can feel notches as you roll it), activate this option. Each notch should then increment any parameter in Diva by a fairly 'sensible' step.

## Appearance

### Default Size

The GUI size for each new instance of Diva. Note that you can temporarily change the GUI size without entering the *Preferences* page – right-click in the background

### Default Skin

Choose an alternative design (if you have any) and set this as the global default. Note that the configuration overlay is automatically closed.

## Gamma

Adjusts the overall brightness.

## Oscilloscope

This setting (*eco*, *fast*, *glow*, *fire* or *wind*) affects the appearance of waves in the oscilloscope. *Eco* is the most CPU-friendly!

## Text Antialiasing

Switches the smoothing of labels and values on or off. Normally left on, in certain cases switching it off will improve readability.

## Audio

### 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 Diva's base latency. Otherwise leave it set to the default '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 Diva will always work.

### MORE ABOUT BUFFERS

Diva processes audio in chunks of  $n \times 16$  samples. This so-called 'block processing' method significantly reduces the CPU load and memory usage of all our plug-ins.

If the number of samples to be processed is say 41, Diva processes the first 32 and keeps the remaining 9 in a small buffer (16 samples is enough). Those 9 samples are then processed at the start of the next call... and so on.

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

### MIDI Control Slew

This option lets you change performance control smoothing for pitch bend, modulation wheel, breath and expression. The default setting is 'fast'.

# MIDI Specialities

## Multichannel MIDI

This feature supports a small but growing class of expressive ‘performance’ instruments (e.g. Haken Continuum, Eigenharp, Seaboard, Linnstrument) that can send each note on a separate MIDI channel. For Diva to respond correctly, your host application must be able to route multiple MIDI channels to a single instance of a plug-in. Each voice/note will then react *individually* to the following performance controls:

*Pitch bend*

*Pressure (aftertouch)*

*Modulation (MIDI CC #01)*

*Breath control (MIDI CC #02)*

*Expression pedal (MIDI CC #11)*

The voice modes *Poly*, *Mono* and *Legato* become practically identical while multichannel MIDI is being received. In each case, Diva behaves like several (up to 16) mono synths set to the same sound. The *Voices* setting still applies, as voices can be ‘stolen’ across multiple channels.

The *Duo* voice mode is not ‘channel aware’ i.e. all MIDI channels are merged.

## Polyphonic aftertouch

As well as the more common *Channel Aftertouch*, Diva recognizes and reacts appropriately to polyphonic aftertouch (commonly abbreviated to polyAT).

Unlike channel aftertouch, polyAT acts on each played note individually, like on the mighty old Yamaha CS80. Modern MIDI keyboards capable of generating polyAT have become quite expensive, although a few mini keyboards have surfaced recently. Note that using polyphonic aftertouch can generate very dense streams of MIDI data, often enough to choke older systems.



# Tips and Tricks

## so bite me!

The *BITE* models are based on relatively cheap but (as I only recently started to realize) extremely characterful Japanese hardware – perhaps BITE stands for “Big In The East”?

Let’s take a closer look at a preset that uses the BITE highpass filter:

Load POLY SYNTH / **HS Ecobite Clav** and play that sound for a while. Use your pitchbender.

One thing you should notice is that the HPF cutoff has *glide* while the oscillator pitch doesn’t. This is because HPF cutoff is modulated by *KYBD2* (keyboard follow 2) with *Glide2* set to 32.

Go to the Main page and change the HPF to e.g. *POST*. The sound has lost all its bite – so the main ladder filter has little to do with the character of this patch. Change the HPF back to *BITE*.

You could make this sound ‘honk’ a bit more by switching the VCF to 12dB mode. Try that...

Still not gritty enough? Select *Rotary* in Effect 1 and switch it on. Set *Drive* to maximum and turn the *Balance* way down.

## bass boost

The BITE highpass can also be used to boost bass frequencies – see the preset *HS Model K12*. Note that much of the actual ‘bite’ in that preset comes from the lowpass ladder filter.

## twin effects

Diva’s two effects are arranged in series, and they offer the same options... which means you can even use the same type of effect in both slots:

## twin reverb

Load PERCUSSIVE / MK FX Zapper (if it works with sharp percussion, it works with anything!)

Turn Effect 2 *Wet* up to 50 and Decay to minimum. Compare by switching Effect 2 off and on. Try adjusting the *Size* parameter slightly, but leave it somewhere between 15 and 35.

Select *Plate* in Effect 1 and switch it on. Take Effect 1 *Wet* to about 15.

Note that the first effect in the signal chain is responsible for the tail and the second is for the early reflections – a richer sound than the more obvious “early reflections first”, as long as the tail’s *PreDelay* is very fast.

## twin rotary

Load TEMPLATES / INIT Alpha

Take envelope 1 **Sustain** to zero and adjust the decay until you get your preferred organ-type click (even 0 works). Turn **Sustain** back up to 50 and **Release** to zero.

Set up the effects to look just like this image. Rotary1 is responsible for removing some high frequencies (via *Balance*) as well as for the strong distortion (via *Drive*). Effect 2 is a typical stereo Rotary – push your modulation wheel up while performing.

This patch can be improved by adding vibrato, by using different waves, adding SUB etc..



## stereo without effects

Diva's signal is basically mono (with pan) until processed by effects. However, stacked voices can be panned apart – try this:

- Load TEMPLATES / INIT Alpha. Go to the Trimmers panel and set *Stack* to 2. Turn the second (from the left) *Stack Tuning* knob up to 4.00 – a major third interval. Play your keyboard and watch the voice activity LEDs light up in pairs. Note that you can only play 3 note chords before voice-stealing occurs (for 8-note polyphony, set *Voices* to 16 if your computer can handle it).
- Open the Main panel, click on the box next to *Pan Mod* and select *StackIndex*. Slowly turn the knob to maximum and hear how this pans the two notes apart.

*StackIndex* doesn't have to be used in such a static way. For instance, we could multiply it with an LFO: Go to the Modifications page, select *LFO2* and *StackIndex* as the two multiplication factors. Go to the Main panel and replace the Pan Mod source (currently set to *StackIndex*) with *Multiply*.

Also try modulating cutoff with Multiply instead of LFO2. Your VCF and Amp panels would then look something like the image here.



## LFO as ramp generator

If you don't need both LFOs for cyclic modulation, you can use one of them as a ramp generator (a simple envelope). In the end, it's all about the LFO's *Delay* parameter:

- Load TEMPLATES / INIT Jupe-6 and turn MIX up to 50.
- Turn VCO2 pitch modulation (the knob below VCO1 octave range, labelled *LFO2*) up to exactly 1.00. The pitch of VCO2 now wanders in a drunken stupor around the nominal pitch. Change the LFO2 waveform to *sqr hi-lo*. VCO2 now jumps a semitone above and below.
- Turn LFO2 *Rate* down to minimum and set VCO2 detune to exactly -1.00. Everything is now back in tune. Finally, turn LFO2 *Delay* to about 20 – yes, it's all about the *Delay* parameter!

Of course it would have been easier to use envelope 2, but it's good to have that envelope free for cutoff duties. On the other hand, we could have used LFO2 for cutoff and envelope 2 for VCO2 pitch instead. Hmm... that would have been easier (envelopes are unipolar), and perhaps more interesting (full-spec ADSR instead of ramp).

## voice map tricks

Looking through the presets in Diva, the *Voice Map Modulator* isn't used very often. Perhaps all the other 'slop' parameters are enough to get by, but to surgically 'detune' any modulation target you like over a wide range, you do need those knobs...

### chord inversions

- Load TEMPLATES / INIT Jupe-8 and go to the Trimmers page
- Set the *Voice Map Modulator* values to -100, 0, 100, 0, -100, 0, 100, 0
- Use *VoiceMap* to modulate oscillator pitch, amount = 12.00 (or 7.00 if you like Jazz)
- Switch the Effects on, adjust filter settings to taste etc. and play simple triads

### cutoff offset

- Load TEMPLATES / INIT Minipoly, go to the Trimmers page and change the *Voices* parameter to 4. Double-click on Cutoff and turn the resonance up to about 80.
- Replace the second cutoff modulator (currently LFO2) with *VoiceMap* and turn it up to about 50.
- Adjust the first four *Voice Map Modulator* knobs to taste while repeatedly playing the same note.

## dual oscillator crossfade

Two of the oscillator models in Diva have a balance (MIX) control instead of individual oscillator levels – **DUAL VCO** and **DIGITAL**. In the Modifications page, modulate *Noise & Dual VCO Mix* to crossfade between the two oscillators.

## modulation processor tricks

Mastery of the modulation processors in the Modifications page is the key to making seemingly impossible sounds in Diva, and a fantastic playground for experimentation. A few examples:

### quantize

- Load TEMPLATES / INIT Mongrel-2, turn envelope 1 Sustain up to maximum.
- In the oscillator, turn the lower of the two TUNE MOD knobs up to maximum. You should hear a cheap “alarm siren” sound caused by LFO2.
- Open the Modifications page and specify *LFO2* as input for the QUANTIZE processor. In the oscillator panel, replace that LFO2 modulation with *Quantize*. Change the LFO2 Sync to 1/2.
- Specify *Quantize* as input for the LAG processor, go to the oscillator and replace *Quantize* with *Lag*. Turn the Lag time up to about 22.
- Experiment with different LFO2 waveforms, Sync and Quantize values.

### rectify

Here are a few examples of what you can do with the rectifier – try them out!

- Double the speed of a triangle or sine LFO
- Change a saw LFO into a triangle
- Change a square LFO into a constant (DC)
- Make your pitchbender unipolar

### all processors

Load *HS All Processors* from the *Local* folder, and open the Modifications page. This patch uses all of the modulation processors, but it's still fairly easy follow:

- LFO1 > **Lag** > feedback modulation
- LFO1 > Lag > **Add** with **Inverted** Mod Wheel > cutoff modulation
- LFO2 > **Quantize** > shape modulation of VCO1, cutoff modulation
- LFO2 > Quantize > **Rectify** > pitch modulation of VCO1
- LFO2 > Quantize > **Multiply** with LFO1 > resonance, filter FM

# Troubleshooting

Diva has proved herself to be very stable. You shouldn't have any trouble running Diva in any of the popular host applications (but see *CPU Overload* below).

## intermittent crackling sound?

That's Diva's one and only demo restriction. To purchase a license, go [here](#) and click on the shopping cart symbol. If you already own a license, right-click on Diva's data display and select "enter serial number".

## CPU overload?

Diva is very demanding, especially in 'divine' mode. You will need quite a powerful computer. Even if your system only delivers one or two voices before the CPU starts complaining, there are still a few things you can do without upgrading your hardware:

- Lower the *Accuracy* setting (in the Main panel)
- Lower the polyphony and/or switch the *Mode* (Main panel) to Poly2, then resave the preset.
- If you have e.g. a quad-core computer, also try activating *multicore* (a button in the control bar). Multicore is not an adequate replacement for freezing tracks etc., its main purpose is to let users play *one instance* of Diva with as many voices as possible. If a project consists of many instances of Diva, please check that as few as possible have *multicore* enabled. In certain combinations of hosts, drivers etc., *multicore* can even cause drop outs and stalls.
- Use Diva as a purely monophonic synth. Many treasured classics are "only" monophonic.
- Avoid automating the 'Digital' oscillator's WAVE switches, which can cause serious CPU spikes.

## out of tune?

First of all, you have good ears! Diva emulates classic analogue hardware, and many of the presets (including some of the template files) have been programmed to sound very similar to wobbly old synthesizers. Some people actually like that...

However, the amount of *slop* is optional: Go to the *Trimmers* page and turn down *Detune Amt* as well as *Voice Drift* before saving a sound. Then read all about the [Trimmers](#).

## no switch automation?

Host automation of 'switch' type parameters (e.g. oscillator and filter models, DIGITAL oscillator wave modes etc.) in the middle of a track would almost inevitably cause CPU spikes, crashes, loud noise bursts and other erratic behaviour. So we decided not to expose these parameters to host automation. Note that you can still *MidiLearn* those switches.

## other problems?

If you're really stuck, you should contact us via our [support page](#).

You could also help us improve Diva by sending a log file. To set this up, create a new text file and name it **Diva.log** (not *Diva.txt*). Once the problem occurs, quit your host app and send a copy of *Diva.log* to [support@u-he.com](mailto:support@u-he.com) together with a short explanation of the problem. Please also state your operating system and host application. Thanks in advance!

# List of Modulation Sources

The available modulation sources are divided into two **alphabetical** lists. The upper half is for MIDI data, envelopes and LFOs. The lower half is for simple math functions and stack/voice indices etc.:

<b>default</b>	A modulation source chosen to suit each target... but often “none”.
<hr/>	
<b>Breath</b>	Breath controller, MIDI CC #02
<b>Env1</b>	Envelope 1 (amp envelope)
<b>Env2</b>	Envelope 2 (modulation envelope)
<b>Expression</b>	Expression pedal, MIDI CC #11
<b>Gate</b>	MIDI gate i.e. whenever a note is being played
<b>KeyFollow</b>	MIDI note pivoting around E2, including any Glide
<b>KeyFollow2</b>	Ditto, but includes Glide2 offset
<b>LFO1</b>	Diva’s vibrato LFO
<b>LFO2</b>	Diva’s ‘mod’ LFO
<b>ModWheel</b>	Modulation wheel, MIDI CC #01
<b>PitchWheel</b>	MIDI pitch controller (wheel, stick, ribbon... depending on the hardware)
<b>Pressure</b>	Channel or key pressure (mono or poly <i>aftertouch</i> ), whichever is received first
<b>Velocity</b>	MIDI velocity
<hr/>	
<b>Add</b>	Adds two mod sources together
<b>Alternate</b>	Flip-flop per voice i.e. two alternating (extreme) values
<b>Invert</b>	Inverts the mod source – negative to positive and vice versa
<b>Lag</b>	Slows down changes in the mod source, makes e.g. square waves rounded
<b>Multiply</b>	Multiplies two mod sources together e.g. LFO2 x modulation wheel
<b>Quantize</b>	Creates discrete steps – the value is a division factor (try 2.00, 4.00, 8.00...)
<b>Random</b>	A random value per played MIDI note
<b>Rectify</b>	Converts any negative values within a modulation source to positive values
<b>StackIndex</b>	Voice number (use for e.g. Pan). For detuning, use the <i>Stack Tuning</i> knobs instead. <i>StackIndex</i> values are evenly spread between +1 and -1
<b>VoiceMap</b>	Voice Map Modulator (general-purpose voice offsets – see <i>Trimmers</i> panel)
<hr/>	
<b>none</b>	nothing at all!

*The End*