VAPORIZER2 - Synthesizer Plug-in   User's Manual

CONTENTS

1. Introduction

1.1 Disclaimer

This document describes features of the newest version that was available when the document version was released. It might be required to upgrade to a newer version to use all described features.

There is no guarantee or warranty that the features described here are fully functional in the version that you are using, and we are not liable for that.

This manual assumes that you know the basics of synthesis. If you have any queries or would like to join a lively discussion about Vaporizer2 feel free to write a message to mailto:contact@vast-dynamics.com.

1.2 Installation

This software can be downloaded on our web site by using the following link: http://www.vast-dynamics.com/?q=products. All older released versions can be downloaded here: http://www.vast-dynamics.com/?q=downloads.

The installation should be guided and straight-forward. You basically have to follow the steps described in the installation program.

1.1.1 Installation on PC

After you have downloaded the installation archive (.zip) from the website, open the archive (on Windows a free archive program e.g. WinRAR is required) and run the executable installation file (.exe). Follow the instructions in the installation process. You will have to choose an installation folder for the standalone version, presets, wavetables and noises. The standard path is <drive letter:>\Program Files\Vaporizer2. The installation program copies the VST3 version to the standard VST3 folder on Windows (either \Program Files (x86)\Common File\VST3 or \Program Files\Common File\VST3 depending on 32-bit / 64-bit) and the VST2 version to \Program Files\Steinberg\VSTPlugins\Vaporizer2 or \Program Files (x86)\Steinberg\VSTPlugins\Vaporizer2 depending on the 32-bit / 64-bit selection.

After a successful installation it might be required to add the corresponding plug-in search path to your digital audio workbench (DAW – your host software). Please refer to your DAWs manual to find out how to do that.

1.1.2   Installation on Mac

After you have downloaded the installation archive (.zip) from the website, open the archive and run the PKG file. In case that you get a security warning you need to accept the downloaded file in the security preferences of your Mac. This will open an installer that guides you through the installation and copy the corresponding files to the destination location. The standard paths are:

- Standalone /Applications/Vaporizer2
- Presets   /Applications/Vaporizer2/Presets
- Wavetables /Applications/Vaporizer2/Tables
- Noises   /Applications/Vaporizer2/Noises
- VST   /Library/Audio/Plug-Ins/VST
- VST3   /Library/Audio/Plug-Ins/VST3
- AU   /Library/Audio/Plug-Ins/Components

After a successful installation it might be required to add the corresponding plug-in search path to your DAW. Please refer to your DAWs manual to find out how to do that. If the presets do not show up, please select the corresponding preset folder on the tab strip "Presets" in Vaporizer2.

1.1.3   Installation Folder

The folder in which the plug-in file is located is of special importance for Vaporizer2. The plug-in expects potential key files in the installation root folder of Vaporizer2. In case of

- Windows /Program Files/Vaporizer2
- Mac   /Applications/Vaporizer2

On Windows the path to the installation folder is stored in the Windows registry and is written there during installation.

1.1.4   Key File for Registration

To unlock the full version, you need a personalized key file that can be purchased here: http://www.vast-dynamics.com/?q=products. After purchasing you will receive the key file via e-mail – usually within only a few minutes.

In case that you have obtained a key file for the plug-in, you need to store the key file in the installation root folder. Please upload it manually to the corresponding location(s). You can

verify that the key file is working correctly and unlocks the full version when your license information is displayed in the top-right corner of the user-interface.
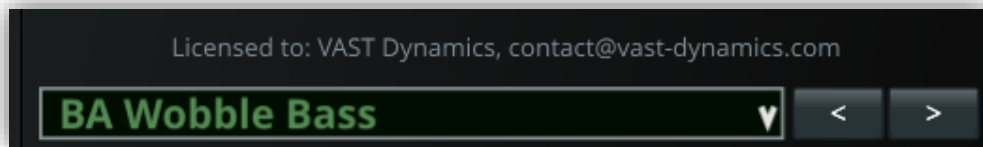
Without a key file the plug-in will operate in demo mode. The demo version will mute audio out after twenty minutes of testing and does not allow saving of patches / exporting to the host program.

1.2   System Requirements

The following system requirements are the minimum requirements to run the software:

- Any CPU that supports AVX or SSE2 (Intel or AMD)[1].
- 1GB RAM or more.
- Microsoft[2] Windows 8/10 (32/64bit) and Mac OS X 10.10 or above.
- A VST / AU compatible host software (32 bit or 64 bit).

Please test the demo version (same download - full version is unlocked with a key file) on your system first! The standard version of Vaporizer2 requires a CPU with AVX vector extensions - if your system is older than from 2011 please check first! We added an SSE2 compatible version per huge demand. But consider that this one will not achieve highest CPU performance.

It is important to choose a suitable audio buffer size. It is recommended to use a buffer between 128 and 512 samples (at 44.1 / 48 kHz sample rate) as this balances latency and CPU performance. A smaller buffer might lead to an unstable sound output.

2.   Overview

Vaporizer2 is our flagship hybrid wavetable additive / subtractive VST/AU synthesizer / sampler workstation. The intention of this development is to create an alias-free versatile high-performance wavetable sound engine with low system CPU resource usage.

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[1] Intel and AMD are registered trademarks.
[2] Microsoft is a registered trademark.

The philosophy here is that highest sound quality can only be achieved with the highest possible quality of the underlying waveforms.

The signal path was laid out in full stereo for all generators, effects and chains. Vaporizer2 offers three polyphony modes with 16 and four-voice polyphony plus a monophonic mode that supports legato.

While many software synthesizers can only produce dry sounds, Vaporizer2 includes a full effect bank with high quality oversampling effects (e.g. distortion, chorus, delay, reverb, comb filter and parametric EQ).

Vaporizer2 comes with a high and continually growing number of high-quality factory presets with many different styles.

Vaporizer2 includes many functions that round it off as a complete working horse, e.g. monophonic and polyphonic portamento in all modes including ARP. Almost all parameters of Vaporizer2 can be controlled via MIDI. The heart of all modulation in Vaporizer2 is the modulation matrix that allows controlling and modulating the sound in almost unlimited ways.

2.1   Sound Concept & Idea

Being able to synthesize any arbitrary waveform without aliasing – audible or not – is considered the holy grail of wavetable synthesis. But what does aliasing mean in that context?

If you are familiar with the Nyquist Theorem (https://en.wikipedia.org/wiki/Nyquist_frequency), then you know that in digital audio synthesis we can successfully sample and play back frequency components up to one-half the sampling frequency (fs). Aliasing is the term used to describe what happens when we try to record and play back frequencies higher than one-half the sampling rate. In that case frequencies above Nyquist fold over into the audible spectrum as aliasing distortion. Aliasing audio signals must be considered as unwanted and non-musical, so they must be avoided by all means in a soft synth.
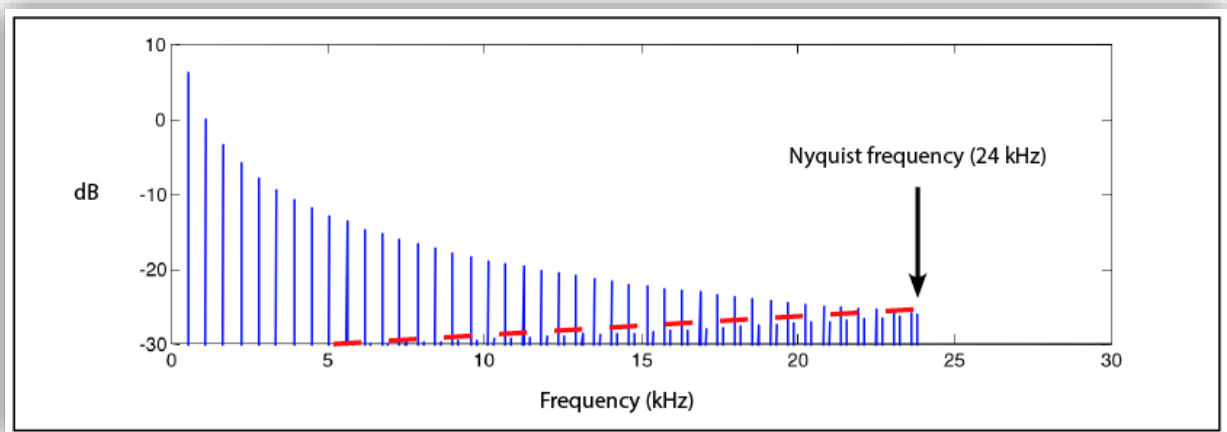
So why not just generating only frequencies up to Nyquist, e.g. fs / 2?

Well, that's not so easy as it sounds. It can be done with sine waves. But other waveforms like sawtooth or square generate a rich overtone spectrum that always exceeds Nyquist to some extent (audible or not). While a square wave is constructed from only odd harmonics, a sawtooth wave's sound is harsh and clear, and its spectrum contains both even and odd harmonics of the fundamental frequency. So, a sawtooth wave contains all integer harmonics – even those above fs / 2. Generating a naive, non-bandlimited sawtooth wave leads to a distorted sound especially at higher frequencies that is unusable for music productions.

So why not just low-pass-filter the oscillator to get rid of the frequencies above fs / 2?

Well, nice idea. But unfortunately, the fold-over frequencies already inherently exist in the naive waveform and generate a distorted signal while computing the oscillation for a certain

sampling frequency. Not a lot can be done to remove it afterwards since it is intermingled with the wanted part of the harmonics. A low pass filter at 20 kHz in the above example would cut away the wanted harmonics above 20 kHz and the fold-overs above 20 kHz – but it would leave the distorted harmonics below 20 kHz in the signal.

So what to do to avoid aliasing?

There are many techniques discussed and used to avoid aliasing in waveform generation. A common technique is oversampling. Oversampling means calculating the synthesis with a higher sampling frequency as actually needed for playback. I consider this a workaround since it does not remove aliasing. It only helps to reduce it. Remember that a naive sawtooth wave contains all (up to infinity) integer harmonics. Besides that, oversampling is very CPU heavy of course. Research revealed other more efficient techniques that were commonly used over the past decades including BLITS and BLEPS / minBLEP that aim at "repairing" a waveform at its sharp edges with so called "minimal bandlimited steps" so that it does not generate harmonics above Nyquist. Those are effective mechanisms when it comes to the "standard" waveforms of subtractive synthesis. So, you can easily add BLEPs to a sawtooth, square or triangle wave.

But what about synthesis of arbitrarily shaped waveforms?

Vaporizer2 implements the holy grail of wavetable synthesis. It supports the creation and playback of arbitrarily alias-free wavetables that can be morphed and even be altered in real-time during playback. The secret sauce is that during wavetable editing and generation, Vaporizer2 transitions between the time-domain representation and the frequency domain representation of all waveforms in a wavetable. Vaporizer2 does not store a single wavetable cycle per waveform. Instead it generates frequency dependent cycles – in fact multiple cycles per octave. In the frequency domain these wavetable cycles are bandlimited by using Fourier Analysis – so it is guaranteed that they do not contain any harmonics above Nyquist. Due to the efficient implementation of the sound engine in Vaporizer2 these computations are done in real-time during the design-time of a wavetable in the wavetable editor.

What is special about Vaporizer2 is that these wavetable changes can also be done during playback in real-time. The sound engine guarantees, that whatever shape of waveform you create –

It will be played without any aliasing!

2.2   Functional Overview

The user interface of Vaporizer2 follows the design principle to have everything at sight and don't hide parameters behinds tabs or menus, especially those that are required for designing and playing a wavetable.

The following diagram shows the main areas of the Vaporizer2 user interface.
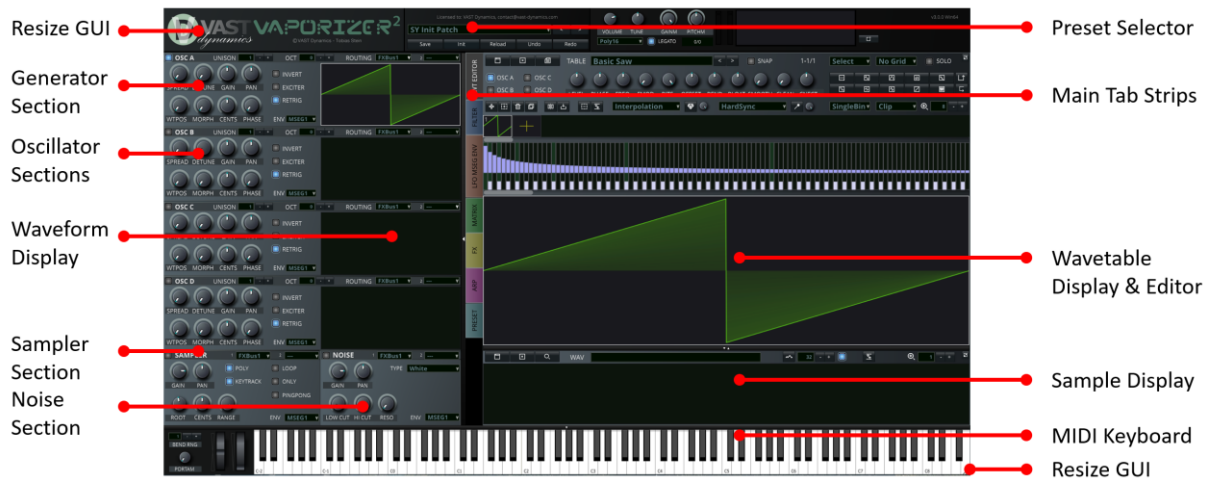
The UI is divided in the following areas:

- Header Section
    - Logo Section (Resize GUI)
    - Preset Section
    - Master Voicing Section
- Generators Section
    - Oscillator Sections A-D
    - Sampler Section
    - Noise Section
- Tab Strip Section
- Keyboard Section
    - Pitchbend
    - Modwheel
    - Portamento

The main tab strip switches the following areas:

- Wavetable Editor (WT EDITOR) Section

- Filter Section
- LFO & MSEG Section
- Modulation Matrix Section
- Effects (FX) Section
- Arpeggiator (ARP) and Step Sequencer Section
- Preset Section

You can find a functional description of all these sections in chapter 4 Functional Description.

2.3 Controlling Parameters

All knobs, faders, drop down boxes and numerical fields are controlled by left-clicking on them and dragging the mouse in a vertical direction.

You can also use the mouse wheel for changing the parameters. Just position the mouse pointer over a control without clicking and use the mouse wheel for increasing or decreasing the parameter value.

For better control when fine-tuning the values, you can hold CTRL (Windows) or CMD (Mac OS X) while dragging. This will turn the control into "velocity mode" so that the updated range depends on the speed the mouse is dragged, e.g. slight movements will lead to small changes.

Hovering over parameter controls will show you a tool-tip text that briefly describes the function of the parameter.

You can identify knobs and parameters that are automatable by the grey half circle that is painted around them. In case that a matrix automation is active this will be displayed in yellow color.

Right clicking on a parameter gives you the following context menu:

Here you get information about the parameter and its current value. Double clicking on a parameter resets its value to the default value.

You can use "Type in value" to enter the value of the parameter directly in a text editor that appears in a small pop-up window.

3.   Function Description

3.1   Logo Section (Resize GUI)

On the top left corner of the GUI the VAST Dynamics logo is display. By clicking on this logo, you can choose predefined zoom levels for the GUI so that it is resized accordingly. The selection is stored in the preferences of the plugin and will be reloaded also on the next startup.

You can also define custom GUI sizes on the preset tab strip.

3.2 Preset Section

3.2.1 Changing Programs

There are several ways to change the active preset.

- By using the host software functionality to change programs.
- By using a MIDI program change message (will work for the first 128 presets in Vaporizer2 only as this is the maximum addressable number in the MIDI standard).
- By using the preset select buttons on the right of the preset display (you can also use the mouse wheel or cursor up / down keys when the preset box is selected, page up / down keys will work as well even when the control is not selected).
- By clicking on the preset name on the preset combo box, this will pop up a **preset browser** that allows navigating to factory and user presets.
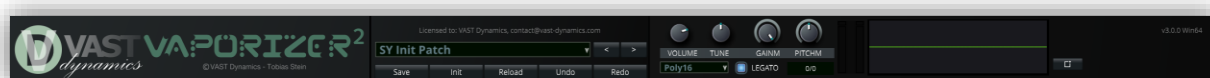
3.2.2 Preset Browser

Vaporizer2 offers a powerful preset browser that allows to easily navigate through all the presets that are available – factory presets and user presets (created on your own or purchased libraries) that are stored on the files system as .vvp files (VAST Dynamics Vaporizer2 presets).

The preset browser shows the preset name and meta-data like:

- ID: the user / factory preset number.
- Name: the name of the preset.
- Category: a freely definable preset category, e.g. instrument type ...
- Author: the author / copyright holder of the preset.
- Tag: a freely definable tag for selection and filtering.
- Folder: the file system folder (top level) that holds the preset file (this can be used to easily structure user presets by just organizing them as desired in file system folders).

All the meta-data can be used to filter the result list. You just need to enter the filter value in the text box on the top and only those presets are shown that match the filter. The filter will scan all meta-data values case insensitive.

Clicking on the table headers will sort the (filtered) list ascending or descending.

When single clicking on a preset (or using arrow keys / page up, down) to navigate through the list the preset will be loaded and can be played via the MIDI controller. This allows pre-listening the preset before choosing it.

You can close the dialog with the escape key (if not suppressed by your DAW), by double-clicking on the selected preset or by clicking outside of the pop up.
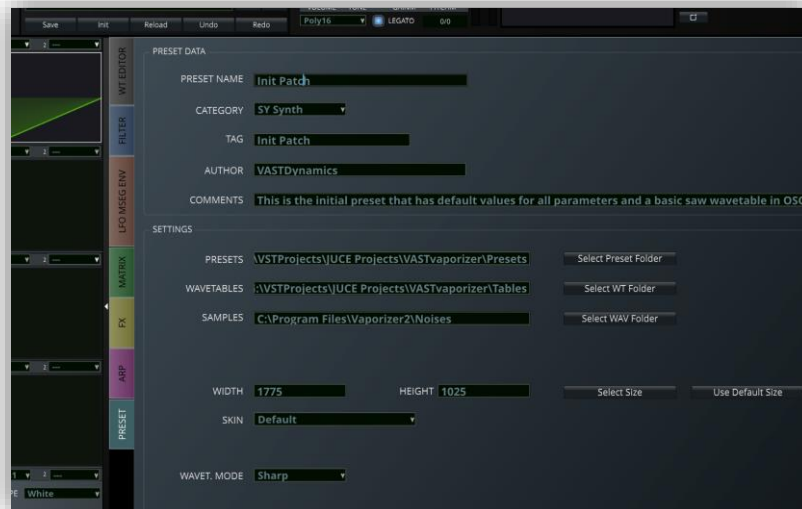
You can use the presets tab strip on the main window of Vaporizer2 to define the root folder that is used to search for presets. All subfolders below this root folder (and the root folder itself) are searched for Vaporizer2 presets (.vvp files). Important: please make sure that the folder you choose here does not have too many subfolders (like e.g. the C:\ folder) since this will result in long scan times. Typically, you will use a subfolder of your Vaporizer2 plug-in folder or a separate folder where you store your presets for other plug-ins as well.

The root folder is stored in the VASTvaporizerSettings.xml file that is created in the Vaporizer2 folder (see chapter Installation). In case that you need to save this information make sure to copy this file as well.

In the preset section you can also change between three different skins / color schemes that Vaporizer2 offers (Default, IceCubes, BloodTech). Here is an overview:

The wavetable mode (sharp, soft, dull) in this section controls the general sound sharpness of Vaporizer2 in the high frequencies. When soft or dull is chosen, very high frequencies will be slightly softened. Decide upon your own preferences which mode sounds best to you.

3.2.3 Saving User Presets

Most DAWs allow saving presets as .fxp files (Steinberg[3] FX Preset File). When creating and saving a project in you DAW, the currently selected preset is saved together with the plug-in state so that it is fully restored after reloading the project.

To better support preset management and organization Vaporizer2 allows to save presets directly from within the plug-in. You just need to use the save button in the preset browser section.

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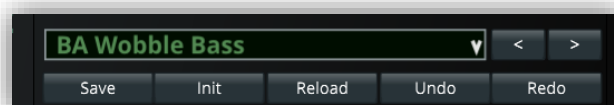
[3] Steinberg is a registered trademark.

The save button opens a save dialog that allows to save the preset to an arbitrarily selectable file system folder as a proprietary .vvp file. The meta-data that will be used to structure the presets can be directly entered here on the window. You also create subfolders directly from this dialog. The standard OS dialog will be used (e.g. from Windows or Mac) and allows additional functions like e.g. creating subfolder or copy / move presets.

Some DAWs (like Reaper[4]) suppress the space key as it is bound to the DAW transport. A workaround for this issue is to use shift-space when typing text, e.g. the preset name.

After saving the preset the newly created custom preset is loaded and shown with a USR preset number – the preset browser will show the new preset as well the next time it is opened. **It is important to note that the newly saved preset will only be found by Vaporizer2 if it is saved to the search folder or one of its subfolders that is selected in the Vaporizer2 settings.**

Note that saving is disabled in the demo version of Vaporizer2.

3.3 Master Voicing Section

The master voicing section controls the voicing, master volume and the master tune. Both parameters are stored with the preset data as well to allow to fine tune the preset.
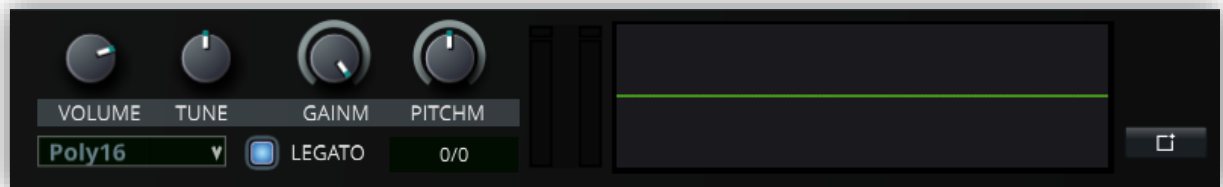
3.3.1 Adjusting Polyphony & Portamento

Vaporizer2 offers three different modes: a monophonic mode, a polyphonic mode with four voices and a polyphonic mode with 16 voices. In all modes a new MIDI note that exceeds the number of voices will lead to releasing the oldest voice that is sustained.

The polyphony mode has an impact on the arpeggiator and the portamento settings as well. In mono mode the arpeggiator will not allow polyphonic modes of course. Portamento will be monophonic in mono mode and glide frequencies between two subsequent MIDI notes.

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[4] Reaper is a registered trademark.

Note that the portamento knob was moved to the left of the keyboard section in newest releases.

3.3.2 Polyphonic Portamento

In polyphonic mode the portamento will also be polyphonic and glide all played notes simultaneously. Polyphonic portamento is a highlight of Vaporizer2 as it preserves the "chord stack" that was played before. This allows polyphonic glissandos of complex chords while the lowest note, the second note, … and the highest note are operated individually.

3.3.3 Legato Mode

Especially in the mono mode the legato checkbox is important. If switched on, a second simultaneously played note will skip the attack and decay part of the envelope and will immediately sustain the note. In combination with portamento this allows for state-of-the-art mono glide effects.

3.3.4 Velocity and Gain Modulation

The knob gain modulation (GAINM) is used to control the keyboard velocity of the preset. In case that you want to assign a dynamic velocity based on the MIDI input you just need to automate this knob in the following way:

Open the modulation side panel (button on the top right of the GUI). Drag the modulation control for velocity (VELOC) to the gain modulation knob (GAINM). This should create an entry in the modulation matrix as depicted above, controlling the velocity of the preset.

3.3.5 Pitch Modulation

The knob pitch modulation (PITCHM) can be used to modulate the overall pitch of the preset (for all generators simultaneously).

3.3.6 Pitch Bend and Modulation Wheel

The standard MIDI behavior is that the modulation wheel responds to MIDI CC 1. Vaporizer2 maps MIDI CC 1 per default to the modulation matrix input source ModWheel (see chapter Modulation Matrix). You can use the modulation matrix to freely assign the modulation wheel to control any of the parameters controllable with the modulation matrix. You can use the MIDI Learn function (see chapter MIDI Learn) to assign MIDI CC 1 to a different Vaporizer2 parameter directly as well.

Note that some DAWs like FL Studio[5] require additional settings to pass MIDI control changes to the plugin. Please refer to your DAWs manual for details on this process.

3.4 The Keyboard Section

Vaporizer2 offers a virtual keyboard that can be used to trigger MIDI notes and display externally played noted. You can hide the whole section by minimize the concertina control.

3.5 The Generators Section

3.5.1 Oscillator Sections A-D

The oscillator section of Vaporizer2 is designed to be alias free, especially high frequencies are not distorted with aliasing frequencies caused by non-linearities as it is often the case with other software synthesizers.

With a maximum of 98 parallel oscillators per voice (four unison / detune banks with max 24 plus one additional noise oscillator and sampler) and up to 16 voice polyphony, Vaporizer2 can calculate 1568 oscillators per plug-in at a time.

To achieve this Vaporizer2 does not limit the oscillators to a small number (e.g. four …). It organizes the high number of separate oscillators in banks (bank A, B, C and D, a noise oscillator and a sampler section). The oscillators grouped together in a bank are on the one hand side completely individual oscillators, yet on the other hand side they are managed together for (normalized) detuning and (dynamic) amplification and attenuation.

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[5] FL Studio is a registered trademark.

Vaporizer2 supports arbitrarily designed wavetables that can be either loaded from various sources or created with the built-in wavetable editor on the corresponding tab strip on the right-side of the UI. Wavetables in Vaporizer2 follow a standard format that is used by many wavetale synthesizer plugins today:

- 2048 samples per single-cycle
- Maximum of 256 positions, less than 256 frames will be morphed

The wavetable position (WTPOS) controls the currently played wavetable position. It is of course most effective when it is automated via the modulation matrix. The wavetable position is a continous floating point value that guarantees smooth transisitions as two adjacent wavetable positions will be interpolated (cross-faded). In case that you do not want to have smooth interpolation you can use the MORPH knob to choose a more step-wise behavior of the WTPOS knob. The PHASE knob controls the starting phase of the wavetable. It can also be used for phase modulation of the oscillator.

For each of the oscillator banks you can control the overall GAIN, the stereo PAN, the fixed tune (CENTS) (in cents: note that 100 cents correspond to a semitone, so that you can detune here from minus two to plus two octave). For convenience you can also directly control the octave (OCT) – from minus two octaves to plus two octaves.

The invert (INVERT) knob will lead to an inverted waveform output of every second oscillator within a bank. Note that two identical waveforms will annihilate themselves when one is inverted. Therefore, wave inversion should be combined with detuning or phase shifting (random retriggering).

The VCA envelope that is used for each oscillator bank (you can define different ones per bank!) can be set with ENV. Here you can choose one of the MSEG envelope generators that can be altered on the corresponding tab strip.

3.5.1.1 Unison and Normalized Detuning

The detune unison algorithm is the heart of the oscillator section of Vaporizer2. Simply adding multiple identically calculated waveforms (UNISON) does not give the desired sound effect. In fact, it only makes the signal louder. To create fat unison sounds out of multiple oscillation sources we need two mechanisms:

- Altering the phase shift of oscillators
- Detuning of oscillator frequencies
- Stereo spreading the unison signal (SPREAD)

With the random retrigger button (RETRIG) switched on it is enforced that for each new MIDI note all oscillators within a bank will start the waveform at a random phase position. This will already make multiple stacked oscillators audible. It also makes the generated sound a bit softer in its character and not so sharp in its attack phase. Switching it off will create sounds with a sharp attack that are suitable for example for basses and stabs as all oscillators will start at the beginning of the phase when a new MIDI note is played.

For detuning the oscillators within a bank there are basically two options:

- Exciter (EXCITER)
- Normalized detune (DETUNE)

The exciter randomly detunes the oscillators when a MIDI note is played. This gives a slightly hovering sound effect. Since all oscillators have slightly different frequencies, they will run more and more out of phase which adds ambience to the sound.

Normalized detuning is the most complex detuning and de-phasing algorithm in Vaporizer2. It is based on detuning all oscillators while preventing that their phases multiply which would lead to unwanted phasing effects. Therefore, a frequency distribution is calculated for each value of the detune knob that prevents phase recurrence. Normalized detuning is activated by choosing a DETUNE value other than zero (and having an oscillator bank with more than one active UNSION oscillator of course).

3.5.1.2 Audio Routing

You can select the audio routing (ROUTING) of each generator separately. With this you can decide whether the signal shall be routed to the filter section, to one of the effect busses or directly to the master. If multiple signals are routed to the same target the audio data will be mixed accordingly.
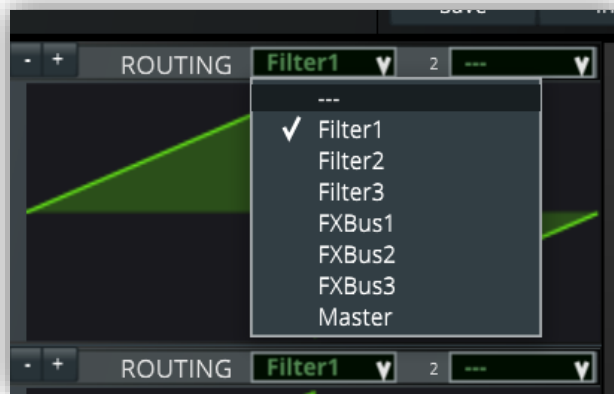
You can select up to two different audio routing targets per generator. With this you can split the signal and process both part individually.

3.5.2 Sampler Section

Vaporizer2 offers a sampler that is mainly intended to be used to accompany presets with specific attack or background sounds. But it can also be used for versatile sampling effects.

The sampler section plays a single sample that can be controlled and changed in the lower part of the wavetable editor tab strip.
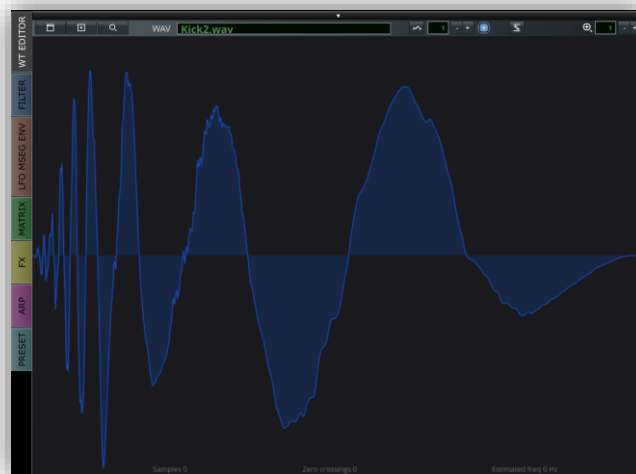
Here you can also load a WAV, MP3, AIFF, OGG or FLAC file as sample. Drag & drop is also support by dragging a file directly on the sample editor. You can also clear and normalize the sample by pressing the buttons. The magnification glass icon allows to zoom into the displayed sample. You can also use the mouse wheel the zoom in and out of a sample selection.

Once a sample is loaded you can control its GAIN, PAN, fine tuning (CENTS) and root note (ROOT). With KEYTRACK you control whether only the ROOT note is played or if the midi note input is used to scale the pitch accordingly. POLY defines if per midi note only one single sample is played or if it is played polyphonically.

The VCA envelope that is used for the sampler can be set with ENV. Here you can choose one of the MSEG envelope generators that can be altered on the corresponding tab strip.

The sampler has a loop function that allows to define a loop section by dragging a white rectangular selection. You can do a more accurate fine selection by pressing the SHIFT key on the keyboard while using the left mouse button. The loop function can be switched on with LOOP. ONLY defines that only the loop is played and not the attack part before the loop section. PINGPONG is a loop mode that switches between forward and backward playback of the loop section.
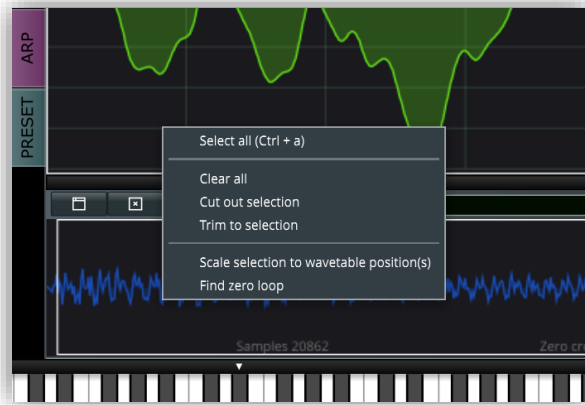
The loop range knob (RANGE) can be used to modify the loop range dynamically. Use this knob to automate the behavior in the modulation matrix.

Right-clicking on the sample display window brings up a context menu with additional functions, e.g. to select, clear, cut and trim samples.

3.5.3 Resample Samples to Wavetables with Pitch Detection

A very special function is the possibility to convert a sample or a selection of a sample into a wavetable that can be used in one of the oscillator banks. For this select a part of the sample and press the corresponding resample button above the sample display. If the pitch detection checkbox is marked, Vaporizer2 will automatically propose the number of single cycles / wavetable positions that optimize the wavetable.

Note that this function is only reliable in case that the sample itself is constant in its pitch. Otherwise the result will be a wavetable with single cycles that de not start and end at zero-crossing, leading to a harsh sound when changing the wavetable position. You can manually correct that by selecting all wavetable positions and use the CLEAN knob to window the positions.

3.5.4 Noise Section

Vaporizer2 offers a noise generator to add ambience to sounds or to create percussive noises. Alternatively, you can also use sampled noises in the sampler section.

Noise types that can be generated are white noise, pink noise and brown noise that differ in its frequency distribution and spectrum.

You can control (and dynamically modulate) the GAIN and PAN of the noise. You can add resonance to the noise by using the RESO knob. You can LOW CUT and HI CUT the signal to focus on a specify frequency range in your further processing. ENV lets you select the VCA envelope that is used and like in the other generators you have two audio routing possibilities that you can choose.

3.6   Wavetable Editor Section

The first tab strip on the main tab strip control is the Wavetable Editor (WT EDITOR) Section. The wavetable editor is clearly one of the highlights of the plugin Vaporizer2.

The wavetable editor is designed to provide a flexible and fun-to-use workflow for defining and testing complex wavetables to be used in your presets.

The wavetable editor consists of multiple parts:

- The editor controls on top
- The position / single cycle control that shows and allows to select the 1 to 256 wavetable positions of the wave table
- The additive display showing the sine waves with phases the singe cycle will generate
- The single cycle display / editor window
- The sample display (does not belong to the wave table editor per se but can be used to generate wave tables out of samples)

The top part of the wavetable editor consists mainly out of the wavetable slot selector, the knobs for the wavetable effects, the quick select buttons for the most commonly used waveform shapes (e.g. flat line, square, sine, sawtooth, half-sine, triangle, sinc, ramp and random) plus buttons to invert and revers a selection.

Below that you can find controls for editing and selecting multiple positions plus combo boxes for wavetable modulation and generation.

The wavetable editor can control the four different wavetables of the generator sections for oscillator A-D. You can switch between those with the following control:

But these different wavetable slots are not only used for playback in the different oscillator banks, they can also be used to optimize the creation workflow, e.g. you can use one of those to prepare, cut and paste and copy it over to one of the of the other slots. You can do this by simply copying one or more cycles (e.g. by pressing CTRL-C or pressing the corresponding button) and pasting them into the desired slot (CTRL-V).

In the same section you can also load, save and clear the whole wavetable. Note that Vaporizer2 can load and even save the de-factor wavetable standard format that is used in the other most prominent wavetable synthesizer plugins.

3.6.1   Multi Selection

Most of the following wavetable functions are designed to operate on a multi-selection. That means that you can select parts of your wavetable in two dimensions:

1. Select one or more wavetable positions. You can simplify do that by pressing SHIFT while clicking on one or more positions.
2. Selecting a part of a single cycle waveform. Drag the mouse across the single-cycle display to draw a white rectangular selection. You can fine adjust it by simultaneously pressing SHIFT.

If you have multi-selected parts of your waveform than all wavetable effects will be applied to only the selected part of all the selected positions.

3.6.2 Wavetable Effects

The following effects can be used to change the shape of the selected single cycle waveforms:

- LEVEL – change / scale the amplitude / gain of the multi-selection
- PHASE – change the phase shift of the multi-selection
- FREQ – change the frequency of the multi-selection
- FMOD – change the frequency modulation of the multi-selection
- BITS – change the bit-depths of the multi-selection
- OFFSET – change the (DC) offset of the multi-selection
- BEND – bend effect on the multi-selection
- BLOAT – bloat effect on the multi-selection
- SMOOTH – smoothen the multi-selection so that sharp edges are rounded

- CLEAN – clean beginning and end of the multi-selection so that the waveform selection is windowed

3.6.3 Wavetable Positions / Single Cycles

The control above the single cycle display provides an overview about all the 1-256 wavetable positions that the wavetable consists of. You can use it to add, copy, delete, select positions for further processing.

Note that you can exchange two positions by dragging the selection with the mouse to a different position.

Wavetable positions are drag and drop targets and you can drag an arbitrary sample file to it and Vaporizer2 will add a corresponding single-cycle waveform.

3.6.4 Additive Synthesis

The wavetable editor includes an additive synthesis section that allows to freely edit all harmonics and phases in real-time. It displays all the sine waves (corresponding to a Fourier analysis) the (not bandlimited) waveform consist of. The bars on top specify the amplitude of the sine wave. The lower bars specify the phase of the sine wave. Green bars indicate octaves. The first bar is the fundamental frequency of the sound.
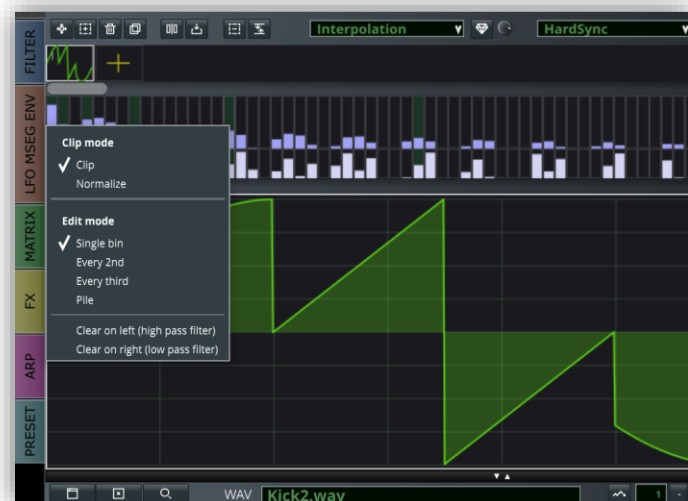
In the context menu you can find helpful functions for additive synthesis:

- Clip mode – changes will be clipped when reaching +1 / -1,
- Normalize – changes will be normalized so that the highest value is scaled to +1,
- Edit modes
    - Single bin – only one sine wave / frequency bin is changed,
    - Every second bin – every second sine wave is changed,
    - Every third bin – every third sine wave is changed,
    - Pile – change also surrounding sine waves,
- Filter
    - Clear on left side – this means high pass filtering the waveform,
    - Clear on right side – this means low pass filtering the waveform.

3.6.5   Wavetable Select and Draw Modes

Below the additive section you can see the single cycle display window. It basically supports three different functions:

- Display a single cycle waveform,
- Select parts of a single cycle waveform,
- Draw a single cycle waveform.

You can switch between those functions in the context menu:

In the context menu you can choose to display a grid for selection or the draw mode. Selection and drawing will be snapped to the grid then.

TIP!
In the draw mode you drag with a left click a ramp. When pressing the right mouse button (CTRL on Mac) simultaneously you can create a smooth Bezier curve instead of a linear ramp.

Further functions include copying a wavetable to a different slot, appending a single cycle to the wavetable in OSC A-D, cut and trim the selection and using a MSEG envelope as waveform shape.

3.6.6   Wavetable Modulation

An important function in the wavetable editor is to modulate multiple positions simultaneously. The amount of the effect is controlled with the knob on the right of the drop-down menu. The following functions are supported:
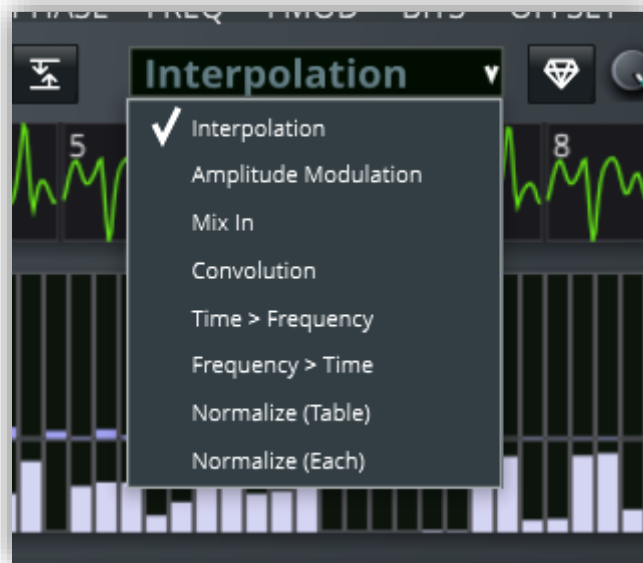
- Interpolation
    - The interpolates (cross-fades) between the first and the last selected wavetable position
- Mix-in
    - This mixes in the copy buffer into all the selected wavetable positions. In case that the number of positions in the copy buffer differs from the selection, it will be interpolated smoothly accordingly.
- Amplitude modulation (AM)
    - This modulates the amplitude (AM synthesis, basically multiplying the signal) of all the selected wavetable positions with the ones in the copy buffer. In case that the number of positions in the copy buffer differs from the selection, it will be interpolated smoothly accordingly.
- Convolution
    - Convolution is multiplication in the frequency domain. This function multiplies the frequency domain of content in the copy buffer with the selected single cycles. With this you can use e.g. the frequency response of a reverb and convolute it with another arbitrary waveform. Vaporizer2 provides example convolution impulse response in the Tables folder.
- Time > Frequency
    - This transfers the shape of the waveform to the similar shape of the frequency bins. The number of bins is controlled by the grid. In the example below an 8x8 grid is used and therefore the first 8 frequency bins are filled with a ramp.
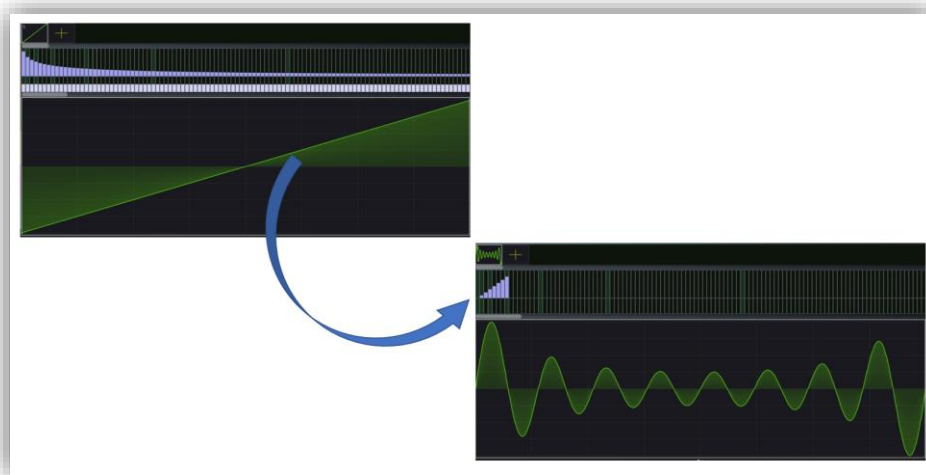
- Frequency > Time
    - The reverse function of Time > Frequency. It recreates a waveform out of the shape of the frequency bins. This function as well is dependent on the grid settings.
- Normalization
    - You can choose between table normalization (normalize according to the maximum value in the whole selection) and single-cycle (each) normalization (normalize according to the maximum value of each single-cycle individually).

3.6.7   Wavetable Generation

A unique function of Vaporizer2 is to generate a full wavetable out of a selected single-cycle waveform. The amount of the effect is controlled with the knob on the right of the drop-down menu. The following generators are available:
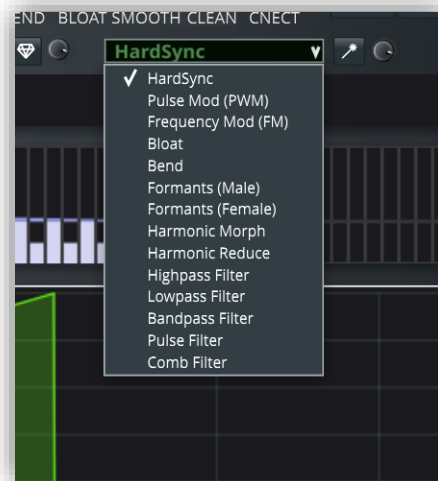
- Hard Sync
- Pulse Wave Modulation (PWM)
- Frequency Modulation (FM)
- Bloat
- Bend
- Formants (Male)
- Formants (Female)
- Harmonic Morph
- Harmonic Reduction
- Highpass Filter
- Lowpass Filter
- Bandpass Filter
- Pulse Filter
- Comb Filter

3.7 Filter Section

The filter section is the heart of a modern synthesizer plugin. Vaporizer2 offers a state of the art filter section with more than 30 different filter types. Those include four-times oversampled LPF filters (biquad, state variable and diode ladder implementations) plus high pass, all pass, band pass, notch, shelf, comb and scream filters – with all supporting resonance.

The different filters are implemented with different filter slope dBs per octave ranging from 12 dB / octave to 48 dB / octave.

All filters are fully stereo and support minimal attack and release times with a response of only a few milliseconds.

In the filter section you will see the real-time filter response display that allows you to control and shape the desired filter response.

All filters support a WET setting (which controls the dry / wet rate of the signal going in and out of the filter), a filter DRIVE (i.e. a pre-gain amplification / attenuation of the signal going in the filter), a CUTOFF frequency and a resonance (RESO) level. Note that for some filter effects a certain drive level is helpful to achieve the desired effect.

The parameter VCFENF controls which MSEG envelope is used to control the cutoff frequency of each filter. ENV MODE describes this relationship and can even be used with negative values to invert the envelope behavior.

An important feature of the filter section is that the signal path from the oscillator banks to the filter modules (and from one filter module to another) can be freely defines in various ways. For this you can use the FILTER ROUTING to control the signal path. E.g. you can decide to route the output of Filter 1 to Filter 2.

3.8   LFO and MSEG Envelopes Section

The upper part of the LFO and MSEG tab strip allows to define the shape of the five MSEG (multi-stage-envelope-generator) envelopes. The MSEG concept allows to define a lot more than the typical ADR, ADSR or ADHSR envelopes but it fully includes those of course.

The knobs for attack time (ATK), decay time (DEC), sustain level (SUS) and release time (REL) are mainly used in case you want to modify the values via the modulation matrix. You can also use them to define the time range of the common MSEG segments. But note that a MSEG envelope in Vaporizer2 is not limited to the typical attack, decay, sustain, release segments and can contain multiple different segments and even loops.
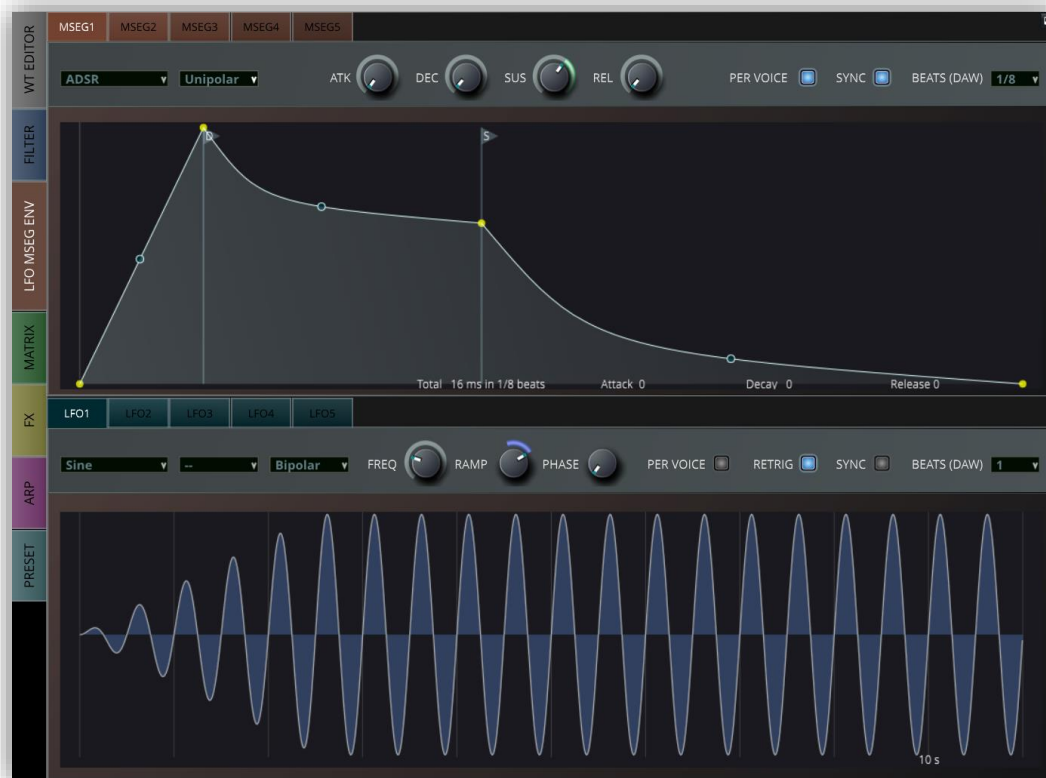
You can preselect a common shape from the drop-down box. But you can also create a completely new envelope shape. For this just right-click on the envelope and select from the context menu. You can add or delete control points here. You can also mark a control point as a

- Decay point
    - This point defines the end of the attack phase,
- Loop start point
    - If a loop is defined this is where the envelope will return to when the loop end is reached,
- Sustain point (is also loop endpoint)
    - This is where the release phase is started when the midi note is released,
    - This is also the loop endpoint.

With SYNC you can synchronize to the DAW time code or they can be free running. When synced to DAW the DAW's BPM (beats per minute) setting controls the attack, decay and release times in steps by calculation fractions of whole notes defined by the BEATS(DAW) setting.
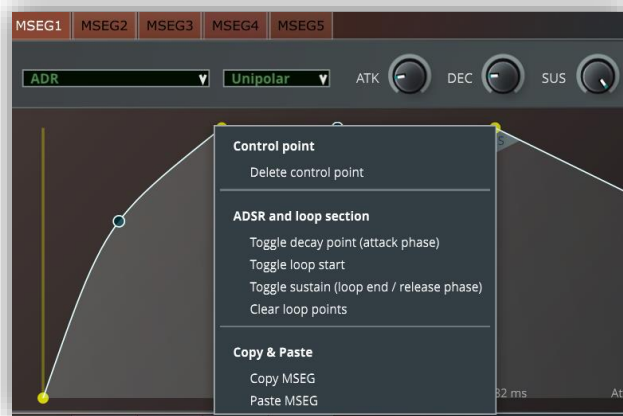
You can drag the unfilled circles up and down to change the steepness (curviness) of the envelope segment between two points.

3.8.1 LFOs

Below the MSEG tabstrips you can find the display section of the five LFOs. Vaporizer2 allows to use LFOs with smooth generation optimized for lowest frequencies with ramp and phase settings that can be set per voice (PER VOICE on) or global (all voices use the same LFO generator - PER VOICE off). All LFOs can be synchronized with the time-code signal of the DAW. Several LFO shapes are supported, e.g. sine, square, saw-sine, triangle, sawtooth, sample & hold. LFOs can be defines as unipolar (0 to 1 values) or bipolar (-1 to 1 values). This is important in case that you want to use an LFO to circle around a certain parameter value (use the bipolar setting then).
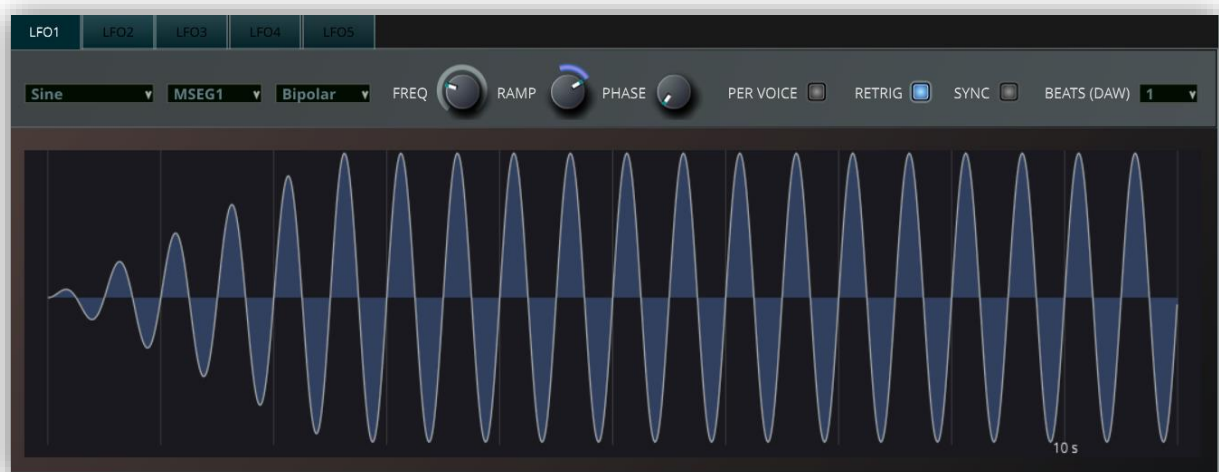
The five LFOs are modulation sources in the modulation matrix and can be dragged as sources from the modulation side-panel.

With the MSEG drop-down you can specify that you want to use an MSEG envelope together with the LFO. In this case the LFO value will be multiplied with the MSEG. With this you can control the LFO shape very convenient. This also supports synced MSEGs and loops.

With SYNC you can synchronize to the DAW time code or they can be free running. When free-running (SYNC switched off) the frequency (FREQ) controls the LFO oscillator. When synced to DAW the DAW's BPM (beats per minute) setting controls the LFO frequency by calculation fractions of whole notes defined by the BEATS(DAW) setting.

The RAMP function is used to apply a growing ramp for the LFO once it is retriggered.

Independently of whether the LFO is synced or not, the RETRIG setting can be used to control whether the phase of the LFO wave is restarted at the beginning for each new MIDI note or not. Using the retriggering option ensures that each run of the DAW project will produce identical outputs for the modulation.

3.9   Modulation Matrix Section

The modulation matrix is the "heart" of the Vaporizer2 synthesizer plug-in. It allows controlling the sound generation in multiple ways by altering of a huge variety of synth parameters based on internal and external signals and events.
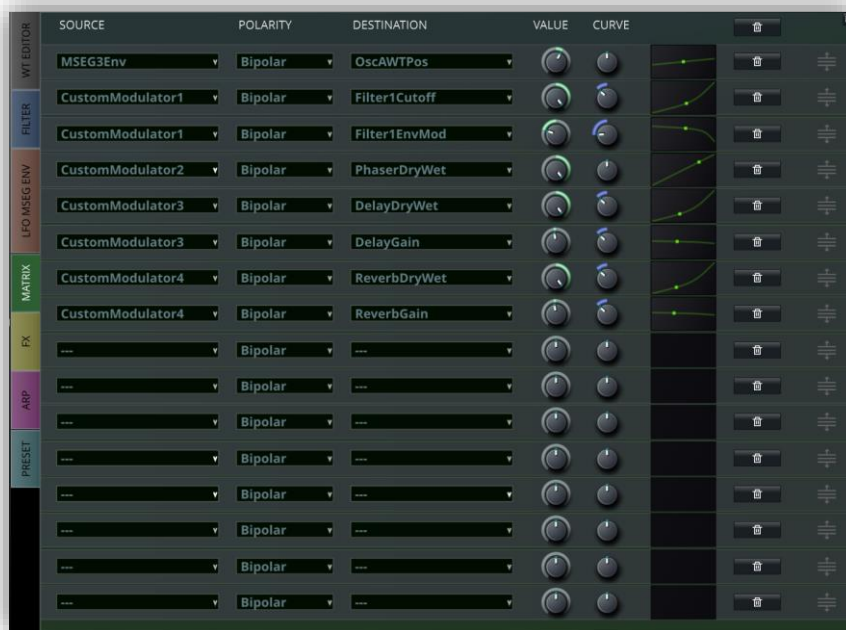
The mechanism behind the modulation matrix is to define an input source (e.g. LFOs, envelopes …) that modulates a modulation destination with a defined intensity and behavior controlled by the modulation matrix value. With the 16 modulation matrix slots, the positive and negative modulation curves and the 11 input sources and the >200 destinations Vaporizer2 supports more than 100.000 possible different modulation combinations.

Modulation Matrix settings can either be changed manually on the tab strip. Alternatively, you can drag and drop a modulation source to a parameter that shall be modulated. For this use the modulation side panel that is opened by clicking on the corresponding button in the top-right corner of the Vaporizer2 GUI.

Vaporizer2 User's Manual | VAST Dynamics GbR
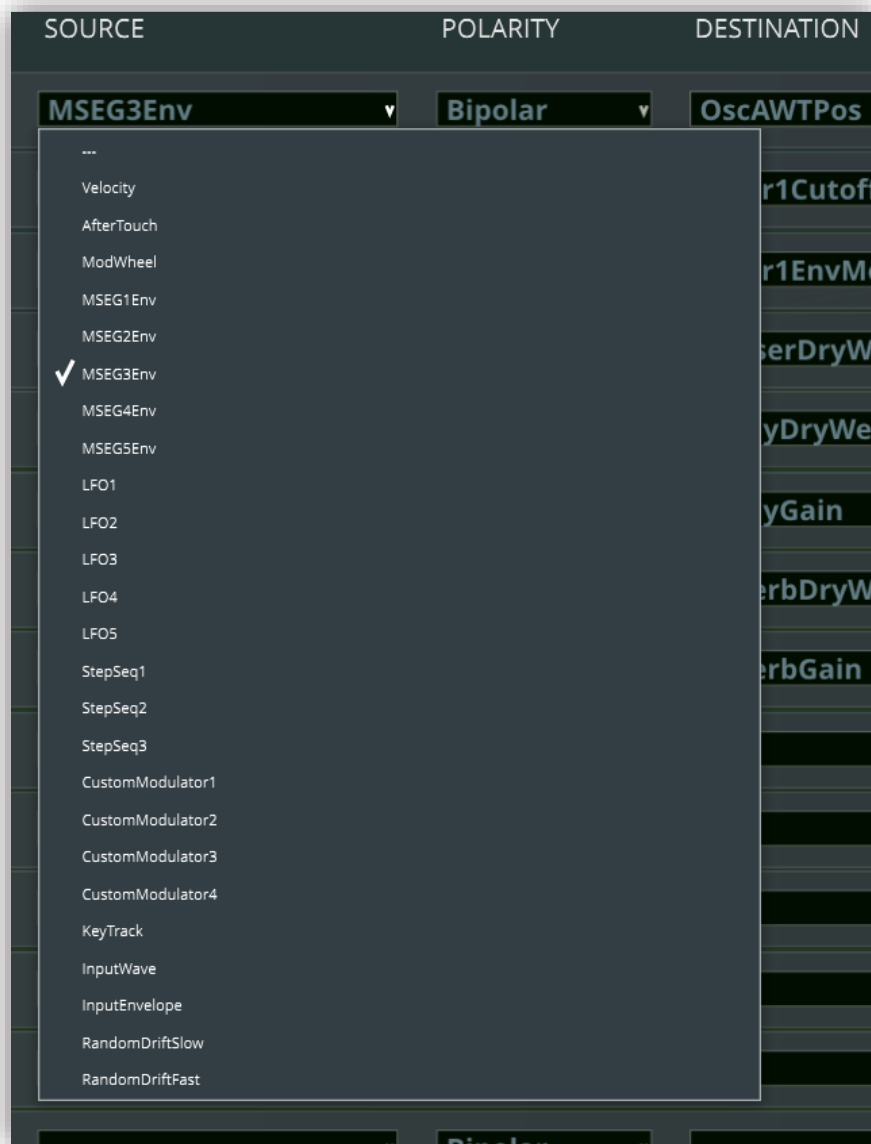
The following input sources are available in Vaporizer2 (note that Vaporizer2 also includes modulation controlled by external audio sources):

Modulation matrix input source	Description
NoSource (---)	No modulation.
Velocity	The velocity value of the MIDI note played (not only usable for voice gain, can also control filter etc.).
AfterTouch	Polyphonic after touch values send via MIDI for each MIDI note played. Will only affect modulation matrix values of voices of the corresponding MIDI note.

ModWheel	The standard MIDI behavior is that the modulation wheel responds to MIDI CC 1. Vaporizer2 maps MIDI CC 1 per default to the modulation matrix input source ModWheel (see chapter Modulation Matrix). You can use the modulation matrix to freely assign the modulation wheel to control any of the parameters controllable with the modulation matrix.
MSEG1Env	The envelope value of the MSEG1 envelope.
MSEG2Env	The envelope value of the MSEG2 envelope.
MSEG3Env	The envelope value of the MSEG3 envelope.
MSEG4Env	The envelope value of the MSEG4 envelope.
MSEG5Env	The envelope value of the MSEG5 envelope.
LFO1	The output signal of LFO 1. Note that LFO 1 can modulate LFO 2.
LFO2	The output signal of LFO 2. Note that LFO 2 can modulate LFO 3.
LFO3	The output signal of LFO 4. Note that LFO 3 can modulate LFO 4.
LFO4	The output signal of LFO 4. Note that LFO 4 can modulate LFO 5.
LFO5	The output signal of LFO 5.
StepSeq1	The output signal of the Step Sequencer 1.
StepSeq2	The output signal of the Step Sequencer 2.
StepSeq3	The output signal of the Step Sequencer 3.
CustomModulator1	The value of the custom modulator 1 knob on the modulation side panel.
CustomModulator2	The value of the custom modulator 2 knob on the modulation side panel.
CustomModulator3	The value of the custom modulator 3 knob on the modulation side panel.
KeyTrack	Key track (key follow) of the played MIDI note: higher modulation values for higher MIDI notes (higher frequencies).
InputWave	The unfiltered direct input signal. This is only useful for input signals with very low frequency (e.g. LFO) as other signals will result in audible aliasing.
InputEnvelope	Envelope of the input signal. Vaporizer2 uses an envelope follower to derive the envelope from the input.
RandomDriftSlow	A random LFO generator with slow change period.
RandomDriftFast	A random LFO generator with fast change period.

The modulation matrix allows to set a polarity for each single modulation. This parameter controls whether:

- Bipolar – the modulation is applied to a range from minus to plus where the current value of the parameter is in the center
- Unipolar - the modulation is applied to a range from the current value of the parameter up to a mod value

You can easily see the difference when looking at the modulation range displays (yellow arc):

In general, all of the parameters and knobs in Vaporizer2 are modulation destinations. It should be noted that Vaporizer2 supports **modulation of modulation matrix values** which is a quite unique feature of this software synthesizer.


Note that Vaporizer2 supports positive and negative modulation values. Modulation matrix values follow the following schema:

Modulation matrix value	Behavior
Zero	No modulation
Positive n%	n% of the currently set slider value is modulated, e.g. the modulation matrix will use the parameter value range from (100-n)% value to value.
Negative –n%	n% of the currently set slider value is modulated with a negative curve, e.g. the modulation matrix will use the parameter value range from 0 % value to n% value. This modulation will be done with a negative curve. So if e.g. ModEnv1 is used – if the envelope has 1 the filter cutoff will be at the lowest value.

You can change these values with the corresponding knobs on the right side of the modulation matrix.

There is also a curve parameter for each single modulation which controls how the input source value is mapped to the modulation. It can either be linear or along a Bezier curve that is controlled by the curve parameter.
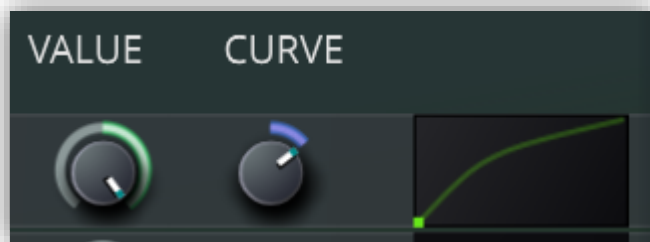
Once a parameter is modulated (either by drag & drop or by manual assignment) it will be marked with yellow color to indicate the modulation behavior. The modulation center and amount are indicated with the yellow range. You can change this range either in the modulation matrix or by dragging with a right mouse-click up and down. The center of the modulation controlled by the parameter value itself.

Note that you can directly type in the modulation range values by using the context menu of a modulated parameter.

3.10   Effects (FX) Section

One of Vaporizer2's philosophies is to produce wet sounds that are immediately usable in music productions. Therefore, it includes a complete effect bank in the layout.

All effects can be switched on / off individually and can be mixed in and out by using a dry / wet parameter.

You can decide if you want to route the FX bus signal into the master output or into another FX bus first.

A unique capability of Vaporizer2 is to split the signal in a center and a left and right chain before it is routed in the effects modules. This multiband processing feature is called MONO CUT and is useful to ensure that low-frequencies in stereo and delay effects of low frequencies do not dilute the sound output. This feature can be switched on choosing a MONO CUT frequency other than 0. This frequency is the split frequency that divides center (mono) and stereo signals (higher than MB CUT).

Note that most of the parameters in the effect section can be modulated and automated via the modulation matrix.

The following effects are available:

- Equalizer (EQ)
    - Vaporizer2 integrates an 8-band parametric equalizer (EQ) that is helpful for instant tweaks and sound adjustments. The equalizer is modeled with a low-shelf filter at 50 Hz, six peak notch filters at 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz, 8 kHz and a high-shelf filter at 16 kHz.
- Chorus

- o The chorus effect module in Vaporizer2 emulates a classical and powerful left-center-right chorus as it is used in vintage Korg[6] synthesizers. As the module is fully stereo enabled it uses six independent triangle low-frequency oscillators, each with its own depth and frequency. For convenience the user-interface only offers one central parameter for chorus frequency and depth. The six LFO parameters are calculated out of this in the module automatically. The chorus supports oversampling as doing so generates a unique and fat sound.
- Phaser
  - o A versatile Phaser effect that can be synced to the DAW time code.
- Flanger
  - o A versatile Flanger effect that can be synced to the DAW time code.
- Atomizer
  - o A digital effect based on Fourier analysis that can be synced to the DAW time code.
- Distortion
  - o The distortion effect implements a fuzz wave shaper with a definable pre-gain amplification / attenuation and fuzz factor. The fuzz distortion model, of course, introduces per design a complete non-linear behavior. Therefore, it is oversampled to reduce the resulting aliasing. To achieve the best possible audio result the module implements a pre- (low-shelf at 800 Hz) and post EQ (high-shelf at 2000 Hz) filter for the wet signal.
- Bitcrush
  - o A bitcrush effect that supports bit depth and jitter. Bitcrushing introduces per design a complete non-linear behavior. Therefore, it is oversampled to reduce the resulting aliasing.
- Comb Filter
  - o A digital comb-filter effect.
- Formant Filter
  - o A digital formant-filter effect that emulates human formants for the vowels A, E, I, O, U. You can mix two different vowels.
- Compressor
  - o A built-in multiband compressor that supports attenuating and reduction of different frequency bands for powerful sounds.
- Limiter / Gate
  - o A built-in limiter / gate to limit to certain gain levels.
- Stereo Delay

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[6] Korg is a registered trademark.

- The delay module is a ping-pong stereo delay with feedback and an adjustable delay time that can be synced to the DAW. Note that you can bypass low-frequencies from being routed through this module by using multi-band processing.
- Reverb
  - Vaporizer2 comes with a combined room / plate reverb with internally included four times filter oversampling. The reverb feedback can be freely defined. The reverb size controls the dry / wet mix between the room reverb module and the plate reverb module. Note that you can bypass low-frequencies from being routed through this module by using multi-band processing.

3.11 Arpeggiator (ARP) and Step Sequencer Section

There are two additional features in Vaporizer2 that are controlled on the ARP and Step Sequencer tab strip.

3.11.1 Step Sequencer

The top section allows to define three step sequencers that can be synchronized to the DAW time code. Step sequencers can be use as modulation source in the modulation matrix. Use STEPS to define the number of steps, use GLIDE to define the roll-on / roll-off slope and use GATE to define the gap between two steps.

The step sequencer can be synced to the DAW time code or can be free running. When free-running (SYNC switched off) the speed is derived from the SPEED setting. When synced to DAW the DAW's beats per minute setting controls the speed by calculation fractions of whole notes defined by the BEATS(DAW) setting. E.g. quarter notes are defined by a value of "4". E.g. triples can be set up with a value of "3".

You can invert a pattern with the invert checkbox.

You can adjust the height of the bars by clicking on them in the editor.

A common usage of step sequencer is to emulate a side-chain effect in Vaporizer2.

3.11.2 Arpeggiator

Vaporizer2 supports a built-in arpeggiator that is freely editable and supports polyphonic modes and hold. It is based on a transpose, gate, velocity and hold model. It comes with more than twelve default arpeggiator and sequencer patterns and four different arpeggiator modes (polyphonic, up, down, up / down).

The engine allows user defined arpeggiator patterns. For this just choose a number of desired steps for the pattern. Then use the following process:

- Left-mouse double click – change the length / gate of a note,
  - 0 – no note played
  - 1 – 25% gate,
  - 2 – 50% gate,
  - 3 – 75% gate,
  - 4 – hold (100% gate, the note played before is held).
- Left-mouse single click – change the octave of the note,
- Drag the green / orange note up or down to change the pitch of the note in semitones,
- Right-click on a pattern step to change the velocity value of the step (displays a light grey bar).
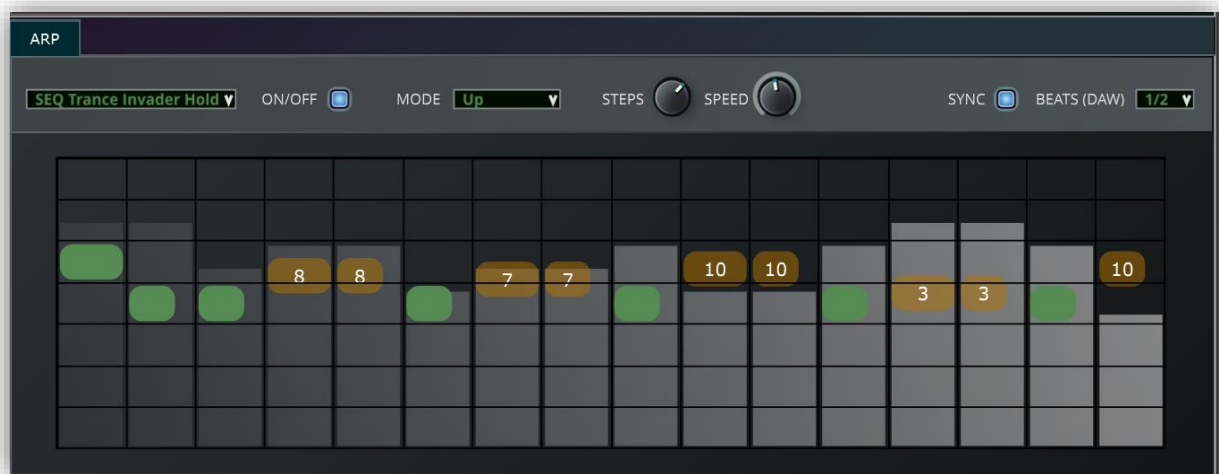
The arpeggiator can be synced to the DAW time code or can be free running. When free-running (SYNC switched off) the speed is derived from the SPEED setting. When synced to DAW the DAW's beats per minute setting controls the speed by calculation fractions of whole notes defined by the BEATS(DAW) setting. E.g. quarter notes are defined by a value of "4". E.g. triples can be set up with a value of "3".

3.12 Preset Section

The last tab strip on the list is the preset section. Here you can define name, category, a search tag, author and comments for your presets. The information is saved together with the preset data in the .vvp file.
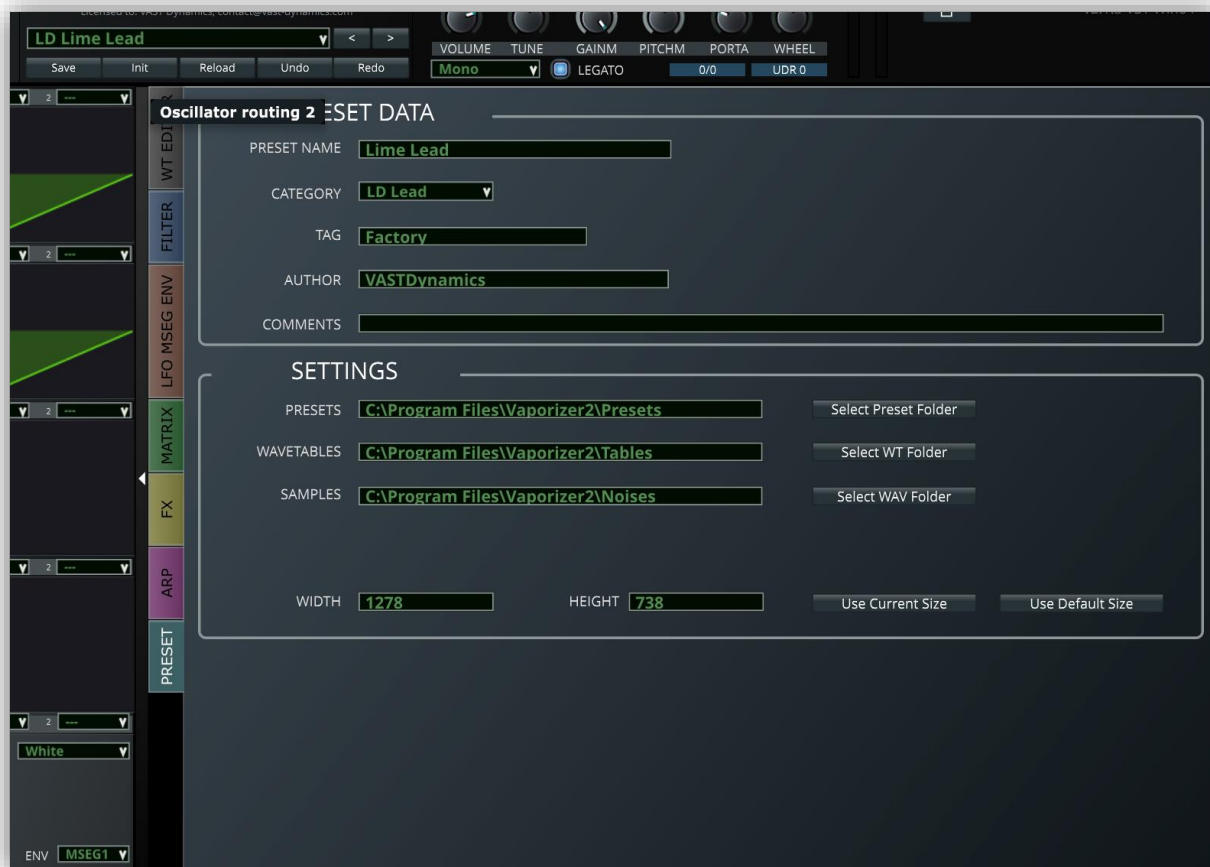
In addition to that you can control path settings here. Press the select buttons on the right-hand side to change the paths for presets, wavetables and samples. The paths will be stores in the settings file so that they remain available after restart.

You can choose a custom screen size and save it in the settings. Just resize the GUI by using the control in the lower right corner. Press USE CURRENT SIZE to store the currently used size in the settings file.

4.   Synthesizer Layout and Audio Path Routing

You can select the audio routing (ROUTING) of several sections separately, e.g. for all generators, for all filters and for all FX busses.

With this you can decide whether the signal shall be routed to the filter section, to one of the effect busses or directly to the master. If multiple signals are routed to the same target the audio data will be mixed accordingly.
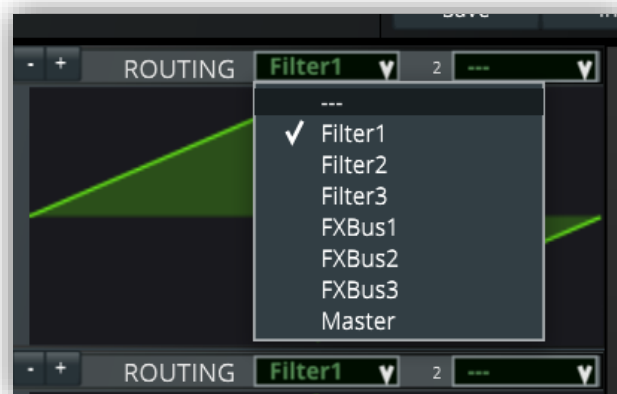
You can select up to two different audio routing targets per generator. With this you can split the signal and process both part individually.

With this you can flexibly setup complex audio routing paths for your preset.

5.   Keyboard Shortcuts

Vaporizer2 supports keyboard shortcuts to improve visibility. Note that this feature has to be supported by your DAW. In some DAWs it is required to activate keyboard input.

The following keyboard shortcuts are defined:

Section	Function	Windows Shortcut	Max OS Shortcut
Wavetable Editor	Select all positions	CTRL + a	CTRL + a
	Copy selected position(s) in copy buffer	CTRL + c	CTRL + c
	Cut selected position(s)	CTRL + x	CTRL + x
	Insert copied position(s)	CTRL + v	CTRL + v
	Duplicate selected position(s)	CTRL + d	CTRL + d
	Normalize selected position(s)	CTRL + n	CTRL + n
	Extend multi selection of positions to the left	Shift + Cursor left	Shift + Cursor left
	Extend multi	Shift + Cursor right	Shift + Cursor right

	selection of positions to the right		
	Insert position after selections	INS	INS
	Delete selected position(s)	DEL	DEL
	Select position to the left	Cursor left	Cursor left
	Select position to the right	Cursor right	Cursor right

6. MIDI Settings

6.1 MIDI Learn

Vaporizer2 comes with a default mapping of some of its parameters to MIDI control change (CC) messages (see chapter MIDI Mapping). So, by assigning the corresponding CCs to your MIDI controller (keyboard) or your DAW you will already be able to control these parameters remotely.

But there are more controllable parameters in Vaporizer2 as free MIDI CCs. Therefore, the MIDI Learn function allows to freely define a custom specific mapping of CCs. This mapping will be persisted and is not preset specific. So, it will be available again and again after restarting Vaporizer2.

MIDI Learn is accessible by right-clicking on any of the control elements in Vaporizer2 (knobs, sliders, buttons …).
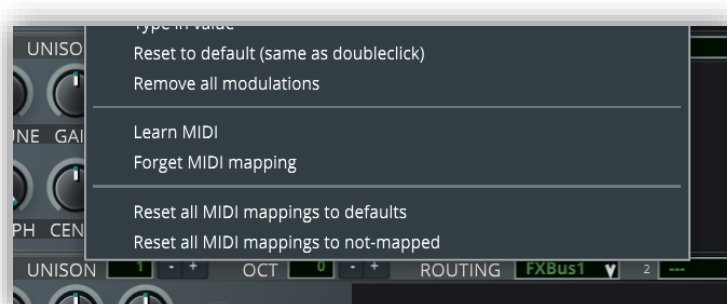
The following options are accessible from here:

- Learn MIDI.
  Start the MIDI Learn process.
- Forget MIDI mapping.
  Un-assigns the currently used MIDI CC from this parameter.
- Reset all MIDI mappings to defaults.
  This will reset all parameter mappings to the default values (see chapter MIDI Mapping) and persist the default mapping in the settings file.
- Reset all MIDI mappings to not-mapped.
  This will reset all parameter mappings to "not assigned" and persists this information in the settings file.

The MIDI Learn process is as follows: When choosing the menu entry from the context menu the corresponding UI control will be highlighted in red color.

This is the sign that Vaporizer2 will use the next received MIDI control change information as mapping for this parameter. So, all you need to do is to move the knob on your hardware controller that you want to assign. The red highlight will disappear to indicate a successful mapping process.

MIDI Learn is stored in the VASTvaporizerSettings.xml file that is created in the Vaporizer2 folder (see chapter Installation). In case that you need to save this information make sure to copy this file as well.

Note that some DAWs like FL Studio[7] require additional settings to pass MIDI control changes to the plugin. Please refer to your DAWs manual for details on this process.

6.2   MIDI Mapping

Many parameters in Vaporizer2 can be remote controlled via MIDI. The default MIDI controller to parameter mapping follows general MIDI conventions and the MIDI standard.

But there are more controllable parameters in Vaporizer2 as free MIDI CCs (control change messages). Therefore, the MIDI Learn function (see MIDI Learn chapter) allows to freely define a custom specific mapping of CCs. This mapping will be persisted and is not preset specific. So, it will be available again and again after restarting Vaporizer2.

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[7] FL Studio is a registered trademark.

7. Trouble Shooting

7.1 Optimizing Performance

Vaporizer2 is optimized for performance and low CPU usage. The complete critical path is AVX vectorized and supports parallel processing. Yet as Vaporizer's high-quality synthesis model relies on real-time calculation and processing some settings might cause a higher CPU load.

The following settings can lead to intensive CPU requirements:

Oversampling as used in filter sections and certain effects

Please note that a four-times oversampling is a CPU intensive process. By using highly-optimized assembler AVX routines Vaporizer2 guarantees that the CPU consumption is not four-times as high compared to a non-oversampled signal. Yet oversampling will have an impact on the CPU consumption for sure. Some effects like distortion are non-linear by design and can produce higher-quality sounds when oversampled.

Modulation matrix

The modulation is effectively buffered and optimized. Yet patches with intensive usage of the modulation matrix will have a higher CPU consumption. You can try to reduce the number of used modulation matrix slots in such a case.

Number of voices / oscillators

Using a high degree of polyphony will require more voices and thus will lead to more intensive CPU processing. You can reduce the polyphony mode from POLY16 mode to POLY4 or MONO mode in that case.

Also avoiding the usage of a higher number of oscillators as necessary should be avoided. Please try to reduce the number of parallel used oscillators in each bank if necessary.

Long release times in MSEG envelopes

Long release times in MSEG envelopes will cause a longer processing of oscillator and filter generation. This leads to more active voices that need to be processed in parallel. If possible, reduce release times to a minimum then.

Switching off what is not needed

You should switch off all sections, filters and effects that are not used in the processing of your patch.

7.2 Other Problems

Standalone version or plugins do not start at all

Most probably your system does not have a CPU that supports AVX vector extensions. Please have a look at the section describing the system requirements.

Patches are not saved when saving the project in the DAW

Saving patch data to the DAW is not supported in the demo version of Vaporizer2. Please consider purchasing a license.

Parameter values change unexpectedly

Please check your MIDI and MIDI Learn setting by using the context menu of the parameter control knob / slider.

Low-quality sound output

Make sure that you use appropriate sound interface and buffer settings in your DAW (see chapter System Requirements).

8. Legal Information

8.1 Copyright

Vaporizer2 is © 2016, 2017, 2018, 2019 by VAST Dynamics GbR, Lindenweg 59, 69126 Heidelberg, Germany.

8.2 Special Thanks

Special thanks to:

- My family for understanding that DSP programming sometimes requires some time.
- Tom "Truepiano" Trupiano for contributing great presets, great demo songs and adding many valuable ideas and concepts to Vaporizer2.

- The folks at the KVR Audio forums that contributed with feedback and ideas to what Vaporizer2 is today.

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