SynthMaster 2.9 User Manual

Version 2.9.1

Written By

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Credits

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User wavetables:	Compiled with permission from public archive
Factory Presets (v2.7)	BluffMonkey Gercek Dorman Nori Ubukata Rob Lee Ufuk Kevser Vorpal Sound Vandalism
Factory Presets (v2.5/2.6):	BigTone Frank “Xenox” Neumann Nori Ubukata Rob Lee Sami Rabia Teoman Pasinlioglu Umit “Insigna” Uy Xenos Soundworks Ufuk Kevser
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Introduction

System Requirements

SynthMaster 2.8 comes in the following formats:

Format	System Requirements	DAW Requirements
VST Instrument & Effect	Windows 7 and above MacOSX 10.7 and above 2 GB RAM, 2 GHz CPU	VST Host supporting VST 2.4 plugins
AU Instrument & Effect	MacOSX 10.7 and above 2 GB RAM, 2 GHz CPU	AU Host application such as Logic, GarageBand.
AAX Instrument	Windows 7 and above MacOSX 10.7 and above 2 GB RAM, 2 GHz CPU	32 bit: ProTools 10.3.6 and above 64 bit: ProTools 11 and above
Standalone	Windows 7 and above 2 GB RAM, 2 GHZ CPU	ASIO compatible sound card or ASIO4ALL installed on your system

Downloading the Full Installer

SynthMaster 2.9 full installer can be downloaded at:

- *Windows (32.64 bits)*: http://www.kv331audio.com/DownloadFile.aspx?fileID=48
- *Mac OSX (32/64bits)*: http://www.kv331audio.com/DownloadFile.aspx?fileID=43

This installer contains the latest binaries and all the data files necessary to install SynthMaster 2.9.

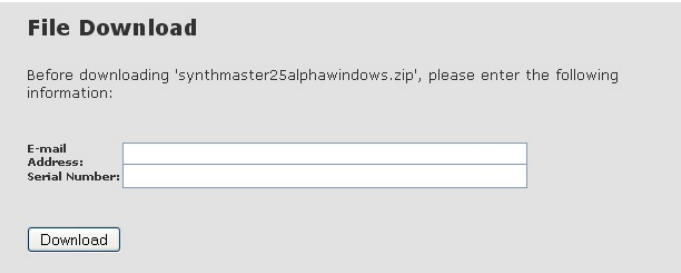
Downloading the Latest Update

The latest update of SynthMaster 2.9 installer can be downloaded at:

- *Windows (32/64 bits)*: http://www.kv331audio.com/DownloadFile.aspx?fileID=49
- *Mac OSX (32/64bits)*: http://www.kv331audio.com/DownloadFile.aspx?fileID=53

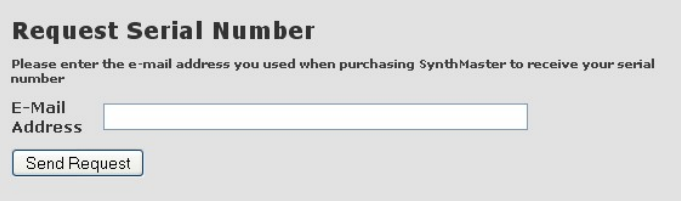
This update, unlike the full installer, contains only the latest binaries and data files for SynthMaster 2.9.

To start your download you should enter your registered email address and serial number:



Forgot Your Serial Number?

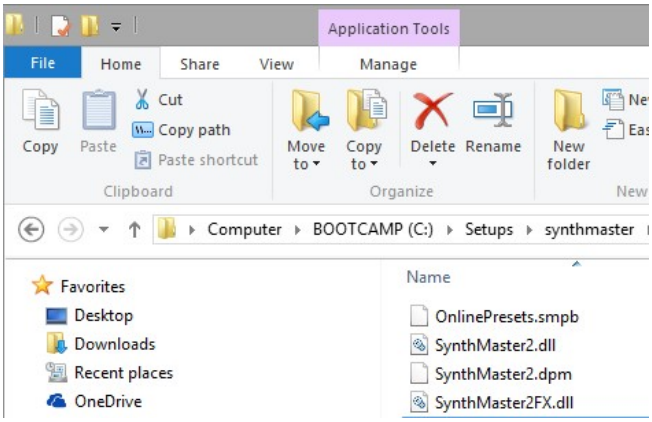
If you forgot your serial number, it is very easy to retrieve it. Just go to
http://www.kv331audio.com/requestlicensefile.aspx



enter your registered email address and click on the “Send Request” button. You’ll receive your serial number plus the above download links in a couple of minutes!

Installing Latest Version

Once you download the zip archive containing SynthMaster 2.9 setup files, simply extract its contents to a temporary location and run the setup application: (SynthMaster29Setup.exe on Windows, SynthMaster29Setup.pkg on MacOSX)



By default, SynthMaster will be installed under the following directories:

- Data Files:
  - Windows: **C:\Program Files\KV331 Audio\SynthMaster**
  - MacOSX: **/Library/Application Support/KV331 Audio/SynthMaster**
- VST binaries:
  - Windows 32 bit: **C:\Program Files\VstPlugins\KV331 Audio**
  - Windows 64 bit: **C:\Program Files (x86)\VstPlugins\KV331 Audio**
  - MacOSX: **/Library/Audio/Plug-Ins/VST**
- AudioUnits binaries:
  - MacOSX: **/Library/Audio/Plug-Ins/Components**
- AAX binaries:
  - Windows 32 bit: **C:\Program Files (x86)\Common Files\Avid\Audio\Plug-Ins**
  - Windows 64 bit: **C:\Program Files\Common Files\Avid\Audio\Plug-Ins**
  - MacOSX: **/Library/Application Support/Avid/Audio/Plug-Ins**

Changing Data Folder

If you want to place SynthMaster data files in a different folder, you can either install the full setup and choose a new data folder, or do the following:

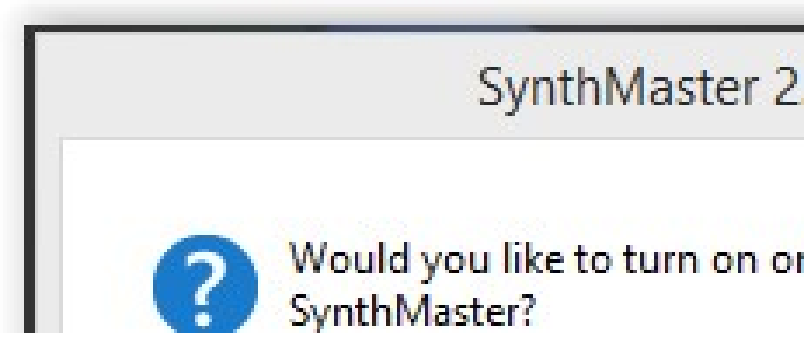
- Copy all SynthMaster data files to into the new folder
- Open up the SythMasterFolders.txt file located at <Documents>\SynthMaster folder using a text editor, and change the following line:

  RootFolder=<new folder path goes here>

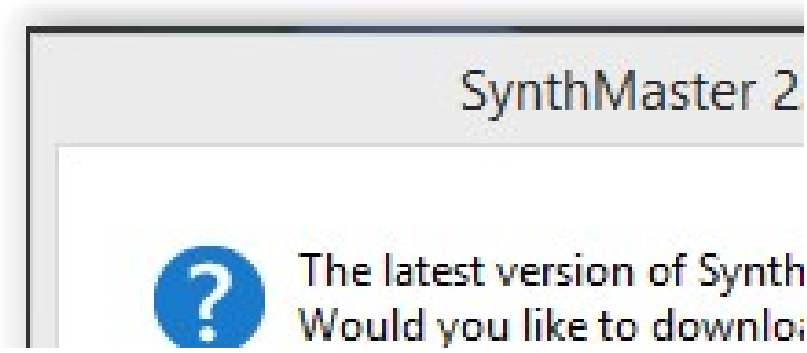
- Save the SynthMasterFolder.txt file and run SynthMaster app/plugin again.

Automatic Version Checking

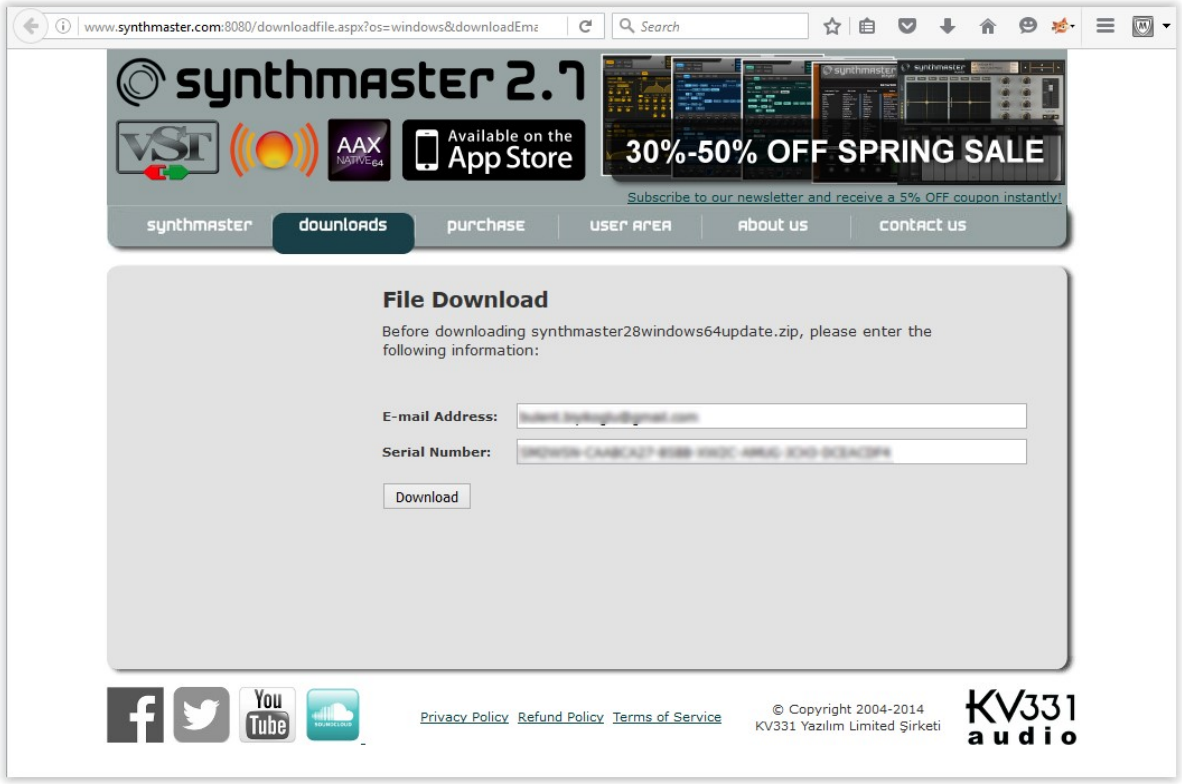
When you run SynthMaster plugin/app for the first time, it will display the following dialog box and ask whether you want to turn on weekly version checks:



If your answer is “Yes” once every week SynthMaster will automatically check if there’s a new update, and notify you when there’s one:

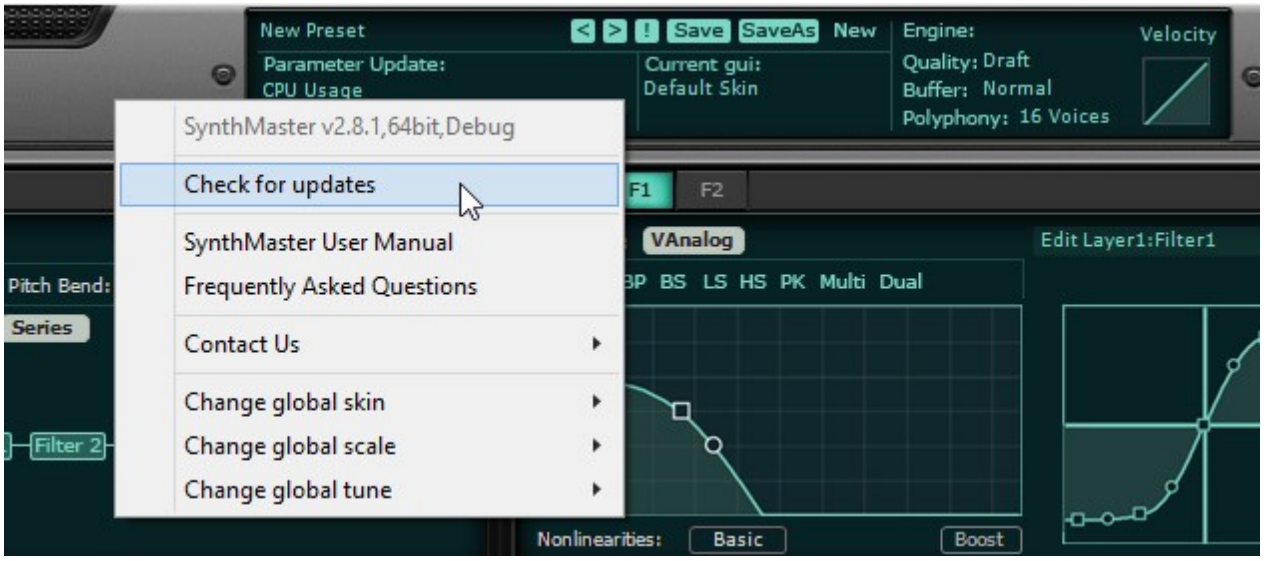


If you choose “Yes” to download the latest update, SynthMaster will redirect you to the latest update:



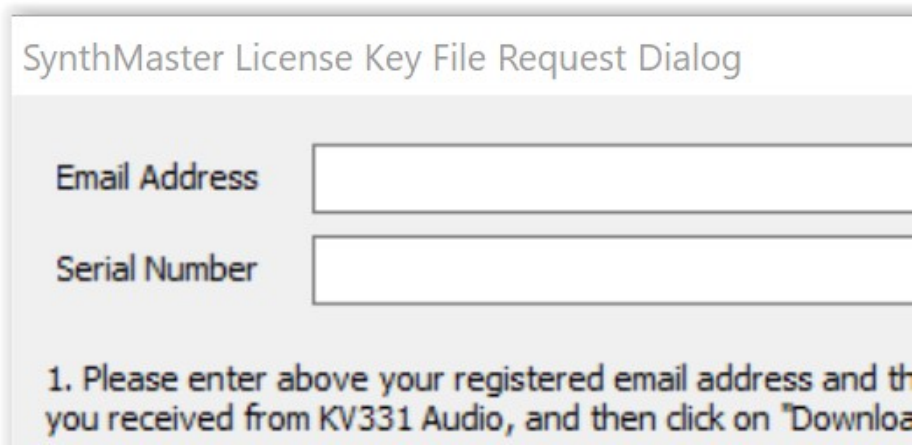
Checking for Updates Manually

Instead of automatically checking for updates every week, you can do it manually as well. To check for updates, right click your mouse, it’ll display a popup menu. On this menu, you’ll see what version of SynthMaster you are running, click on “Check for updates” submenu to check for updates. The rest of the workflow is the same as automatic version checking:



Downloading License Key File

Each time you run SynthMaster, SynthMaster searces for the license key file under <My Documents Folder>\SynthMaster folder. If the file is not found, or if its version is invalid, the license key file request dialog pops up:



On this dialog, you should enter your registered email address and SynthMaster or Synthmaster One serial number, and then press the “Download License Key File”. If you don’t know your serial number, you can simply click on the “Email my license key file” so that the license key file is emailed to your registered email address.

If your computer is offline, you can download the serial number from an online computer at:

http://www.synthmaster.com/requestlicensefile.aspx

Getting Started with SynthMaster

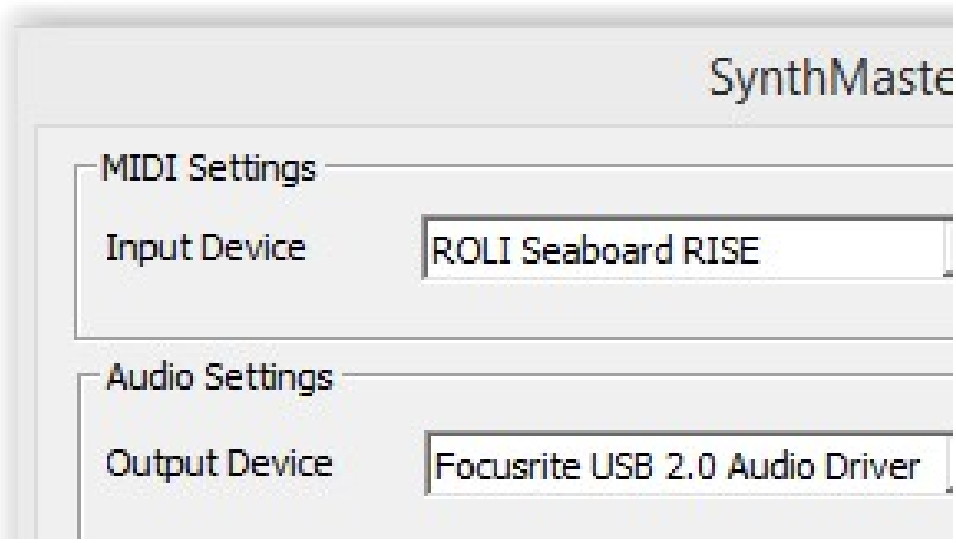
Now that we you've installed SynthMaster, it's time to explore it! SynthMaster comes in different formats on different platforms:

On Windows 7 and above	On MacOSX 10.7 and above
Standalone	N/A
VST instrument/effect	VST instrument effect
AAX instrument	AAX instrument
N/A	AudioUnits instrument/effect

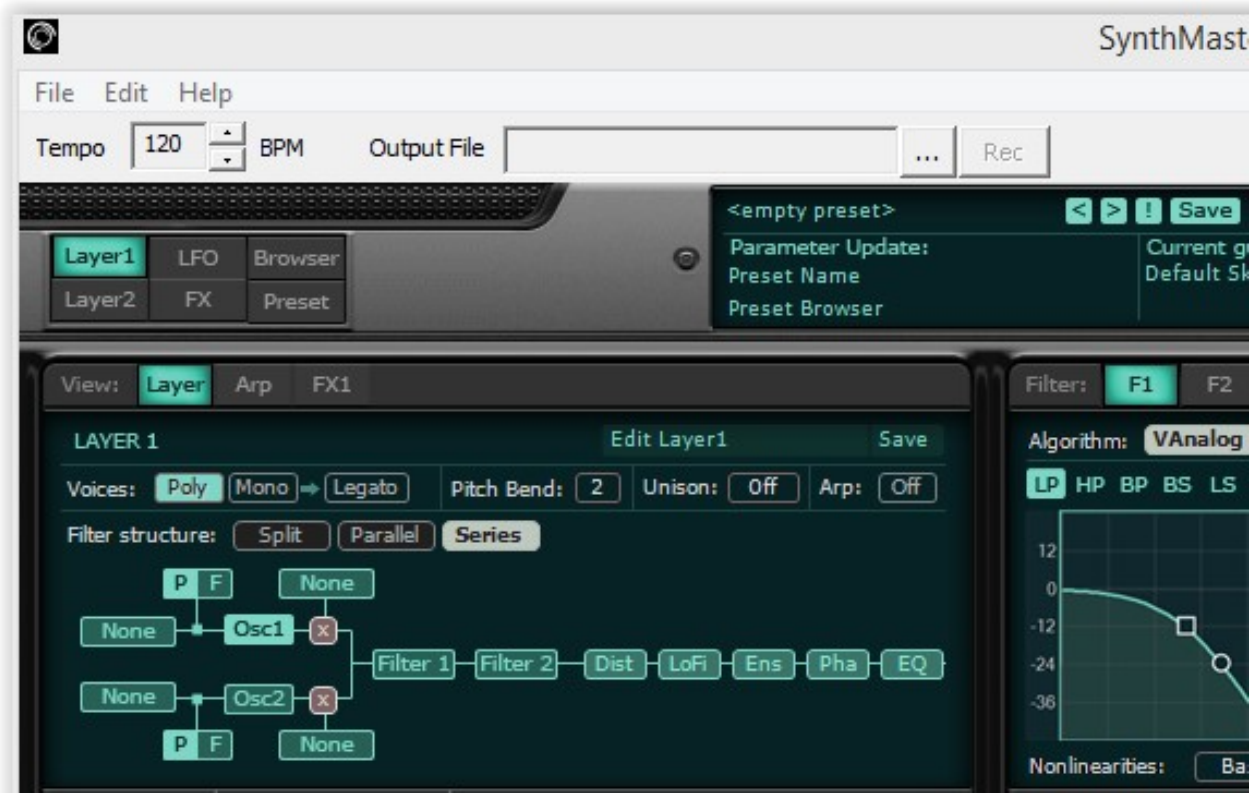
Running SynthMaster as a Standalone App

On Windows, SynthMaster is installed under KV331 Audio group, click on it start the standalone app:

When you run the app for the first time, it displays the "I/O Settings Dialog". On this dialog you choose the MIDI input device, and Audio output device. If no MIDI devices are available, PC Keyboard is selected by default:



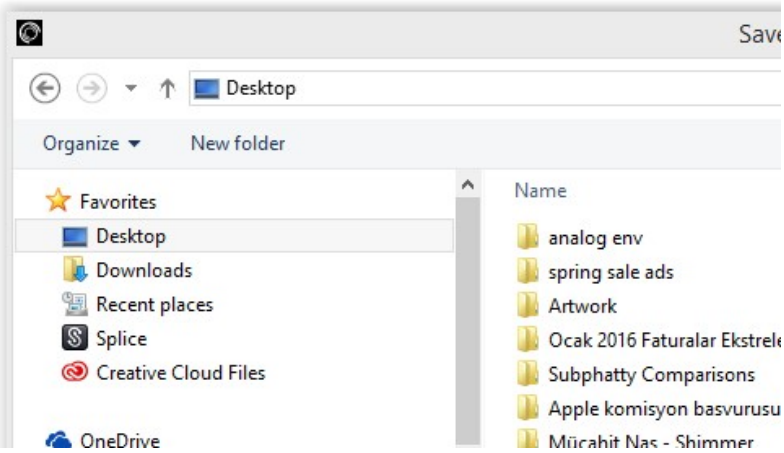
Once you select the input/output devices and click OK, the app starts running:



Recording SynthMaster Standalone Output to File

It's possible to record the output of the synth to a wave file. To start recording

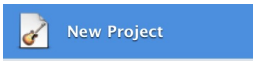
1. Click on the ... button next to the output file name, and choose the file path:



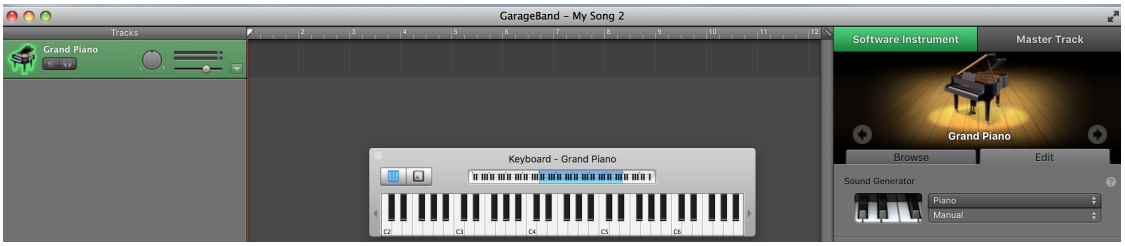
2. Click on the Rec button to start recording. When you are done with recording, click on the button again to stop recording.

Running SynthMaster as a Plug-In

SynthMaster supports VST, AudioUnits and AAX plug-in formats. To be able to use it as a plug-in, you'll need a DAW application supporting one of those formats. On OSX, GarageBand comes by default, so you can use it to run SynthMaster if you don't have any other DAW app:

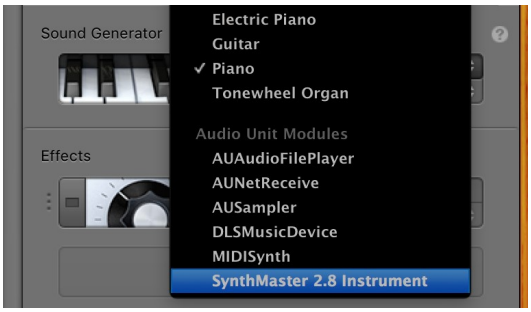
1. Start GarageBand, click on 

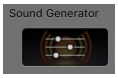
and then  . GarageBand will open up with a single piano track:



2. Click on the 

combobox to to select SynthMaster 2.8 as an instrument:



3. SynthMaster will be instantiated. To bring up the user interface to the front, click on the 

button:

Changing Skins

SynthMaster supports multiple skins/interfaces, and it comes with 5 different skins:

Default (Gray) Skin

Blue Skin

Orange Skin

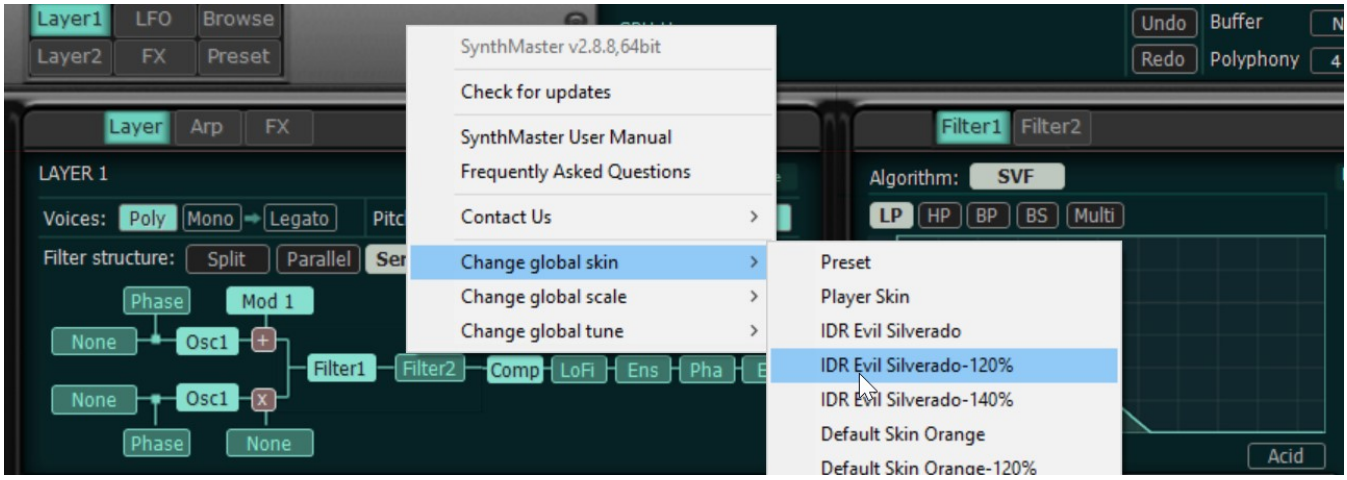
IDR Evil Silverado

sT-Tranquil Blue (Satyatunes) Skin

Starting in version 2.8.8, SynthMaster supports skins at different resolutions. The following skins come at 100%, 120% and 140% resolutions:

- Default (Gray) Skin
- Blue Skin
- Orange Skin
- IDR Evil Silverado
- sT-Tranquil Blue (Satyatunes) Skin

To switch between skins, right click your mouse, then click on “Change global skin” sub menu, it’ll display names of existing skins. Click on the one you’d like to switch to:



For the skin change to take effect, you need to close and reopen the plugin window.

Browsing Presets

SynthMaster 2.9 comes with a comprehensive preset library, with more than 1400 presets to start with. To start browsing the presets, click on the 

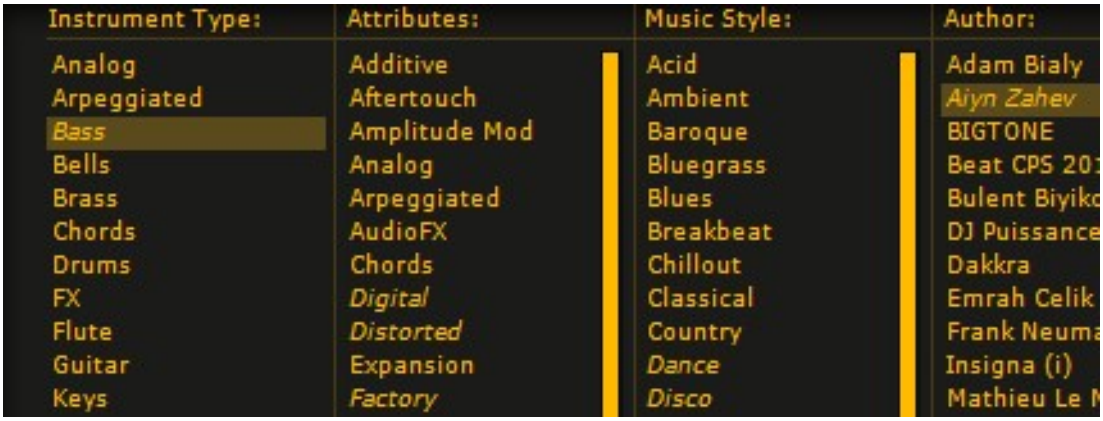
button:

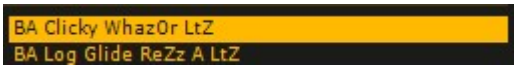
When you select a preset from the list, it is loaded from disk, and its easy parameters are displayed. You can tweak the easy parameters right from the browser or using you MIDI controller's knob/sliders that are globally linked to the easy parameters.

The presets can be filtered by

- Instrument Type
- Attributes
- Music Style
- Preset Author
- Bank Name

For instance, if you want to see all *Mono Bass Factory* presets for *Electro* music style created by *Aiyn Zahev*, click on Bass, Mono, Electro, Aiyn Zahev and then Factory Presets:



To load a preset on the list: click on it: 

To go to the next preset on the list: click on the  arrow, or press the "Down" key on your keyboard.

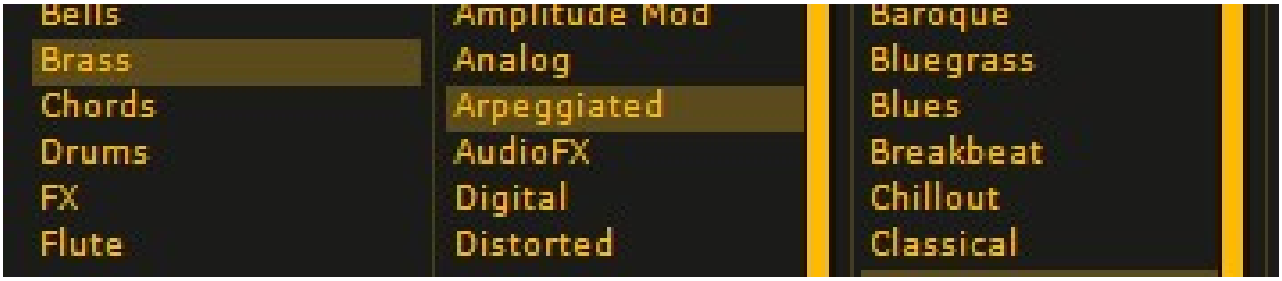
To go to the previous preset on the list: click on the  arrow, or press the "Up" key on your keyboard.

To load a random preset from the list: click on the preset name, and select "Load Random" menu item from the popup menu shown:

To search for a preset by name: type the text into the search textbox 

and press enter or click on the Search icon. The matching presets will be displayed on the list:

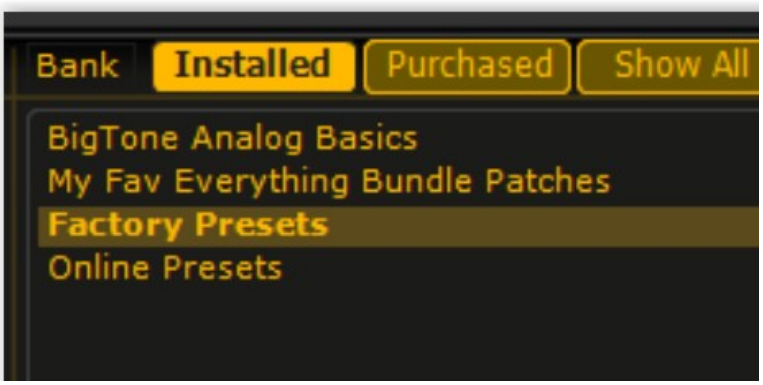
To clear all browser filters: Right click, and select "Clear browser filters" menu item:



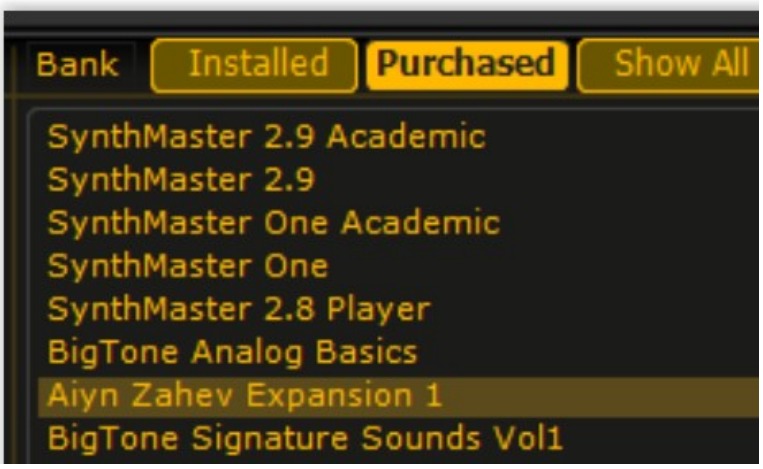
Viewing and Downloading Purchased Preset Banks

On top of the preset banks list, there are 3 buttons: 

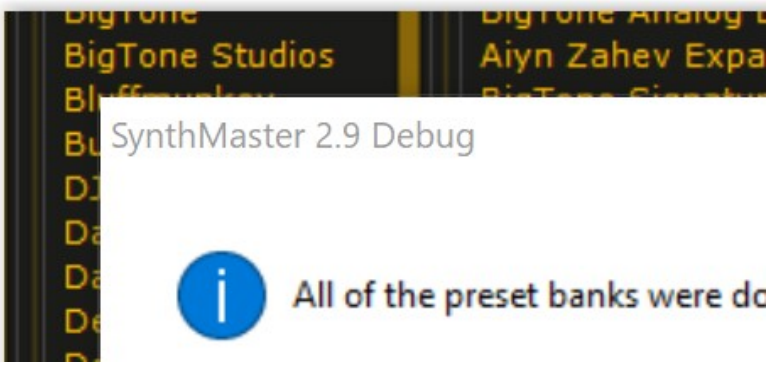
- *Installed*: When you press this button, preset banks installed on your computer are listed:



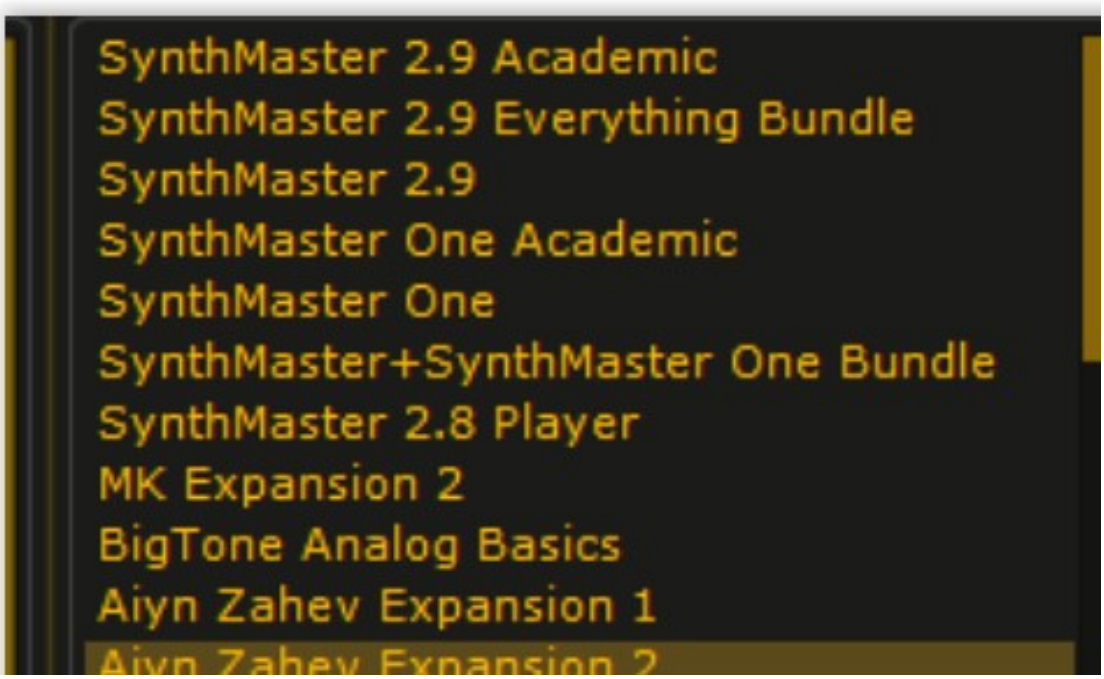
- *Purchased*: When you press this button, all preset banks you purchased (but not installed yet) are listed:



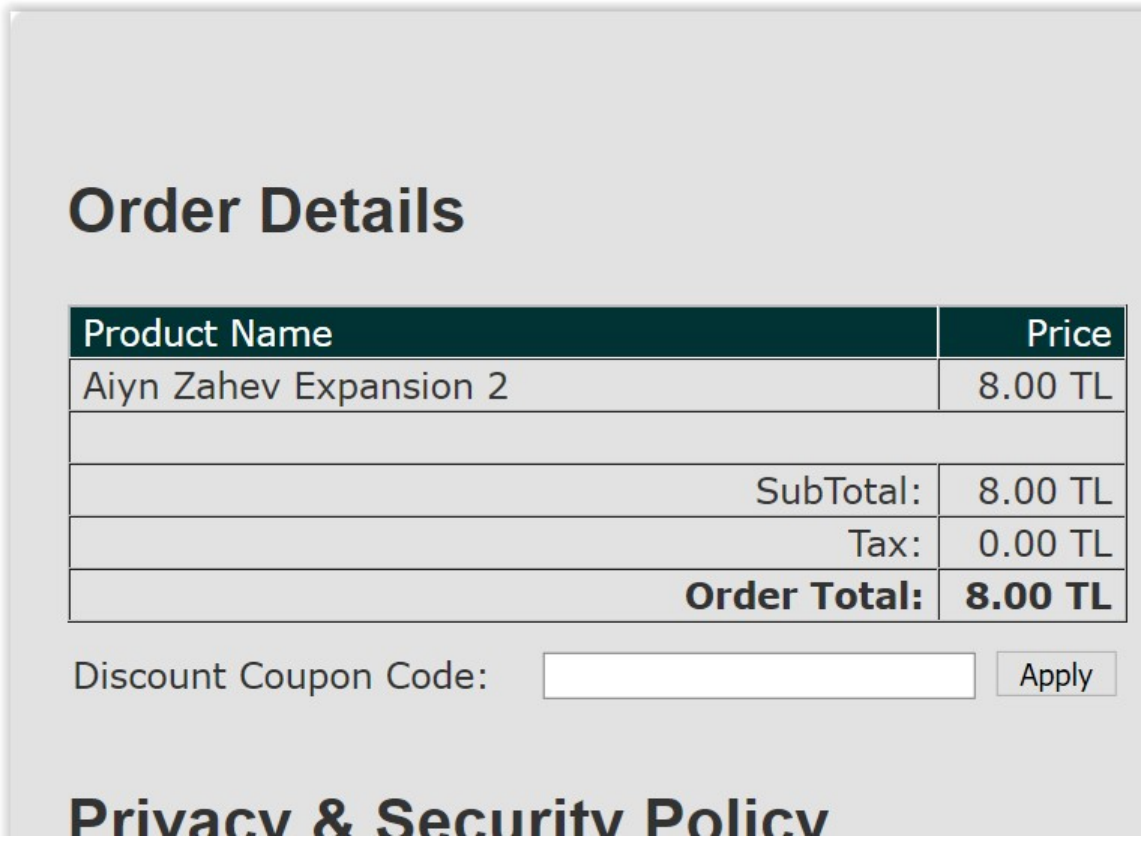
When you click on a preset bank name, the bank details are shown. To download and install the bank, just click on the *Download* button. SynthMaster will download and install the bank behind the scenes. This of course requires your computer to be online:



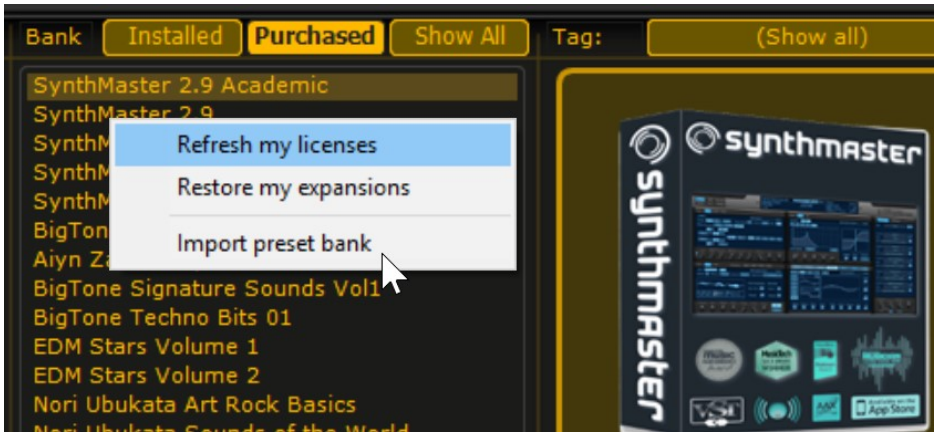
- *Show All*: When you press this button, all products from KV331 Audio are listed. By clicking on a product name, you can see the product's details such as Price, Release Date, Tags, Description and Audio Demos:



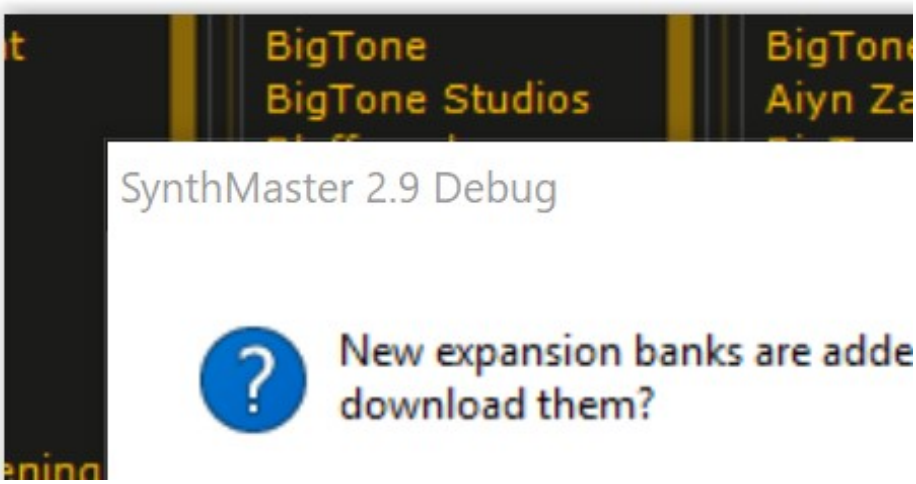
By clicking on the Buy Now button, you can purchase the selected bank from our web site:



When your purchase is complete, switch back to the Purchased products list, right click, and select “Refresh my licenses” menu:



SynthMaster will detect the recently purchased preset banks and ask you to download them:



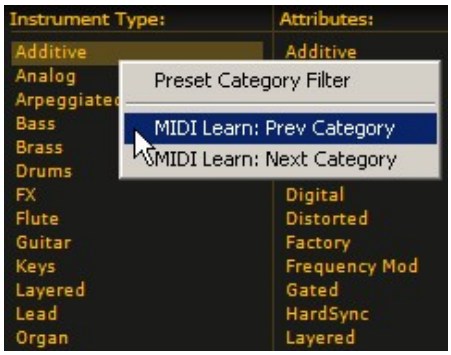
When the download is complete, SynthMaster will install the bank(s), and the bank(s) will be available under installed preset banks list:

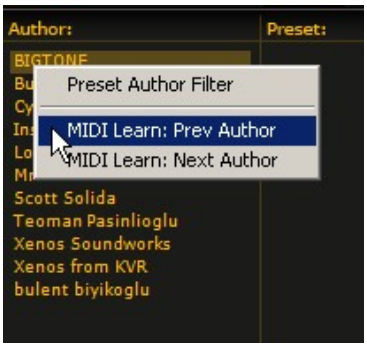
Controlling the Browser from your MIDI Controller

It is possible in SynthMaster to control the preset browser from your MIDI controller, by sending MIDI CC messages. You can assign buttons on your controller for scrolling up/down

- Instrument type
- Music style
- Preset Author
- Presets

To link a button to a list, move your mouse over the list, and then click on the right mouse button. The popup menu will show up with 2 selections: Prev and Next





After you select one of the menu items, press the button on your MIDI controller to send the MIDI CC message, SynthMaster will learn the button and establish the link between the button and the browser function. SynthMaster saves this link in its configuration file, so you have to do this linking only once.

Online Presets

Aside from the “factory” presets that come with SynthMaster, starting with version 2.5 SynthMaster has now an “online” preset library where users can

- Upload their own presets to the online library
- Browse for presets in the online library
- Download presets from the online library

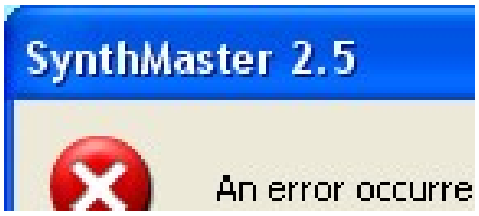
To browser for online presets: click on the 

button. When you do this for the first time, SynthMaster will ask for your permission to connect to the web service:

Click on the “Yes” button to continue. SynthMaster will connect to KV331 Audio web site and display online presets:

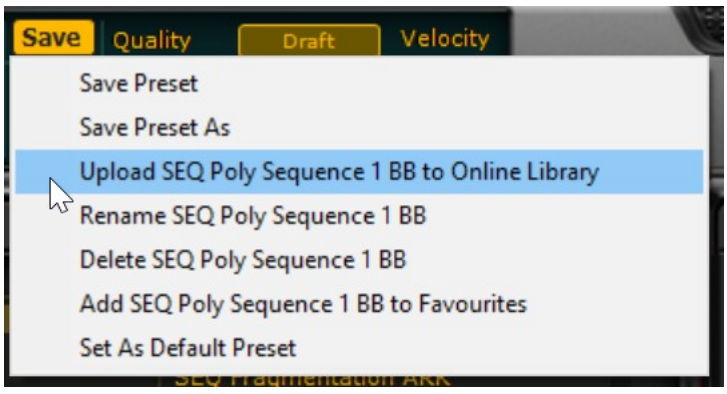
To download an online preset*:* just double click on the preset. It will be downloaded and stay in memory. To save the preset to your local preset library, simply click on the Save button to save the preset contents.

In case there are connection errors, SynthMaster will display an error message:



To upload the current (local) preset to the online library: Click on the 

button, and select “Upload <Preset Name> to Online Library” menu item:



During the upload process, the server makes some checks and might return an error back, such as preset metadata missing.

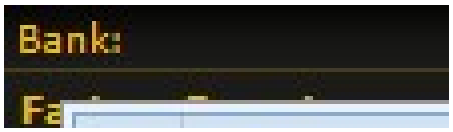
Importing Preset Banks into SynthMaster

If you purchase preset banks from our website , you will notice that most of them require manual installation (expect the ones that come with their own installers).

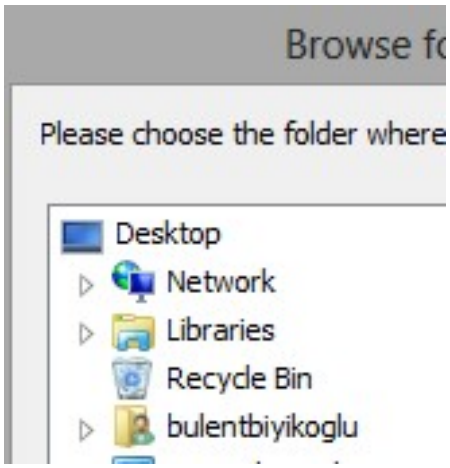
Starting with version 2.6, we've made it very easy to import those banks into SynthMaster:

1. Click on the 

button to display the preset browser
2. Move your mouse under the *Bank* list and right click. Popup menu will show up. Select *Import preset bank(s)* menu item:



3. Directory browser dialog will open up. Browse to the folder where you extracted the zip file that contains the preset bank files (that end with .smpb / .smar) and click OK to import the files:



4. If import is successful, the preset browser will be refreshed and you'll see the imported banks :

TIP: In case importing fails (due to write permission error), you can manually copy the preset bank file(s) (and the archive file(s) if the preset bank uses any custom samples/waveforms) to the following locations:

- *Windows:* ***C:\Program Files\Vstplugins\KV331 Audio\Presets***
- *MacOSX:* ***/Library/Application Support/KV331 Audio/SynthMaster/Presets***

Adding Presets to Your Favorites List

It is possible to mark the presets you like as ‘favourites’ so that you can easily load them again in your session. To add a preset to your ‘favourites’ list:

- Click on the preset name to choose the preset
- Right click on the preset name to bring up the dropdown menu
- Choose “Add to Favourites”

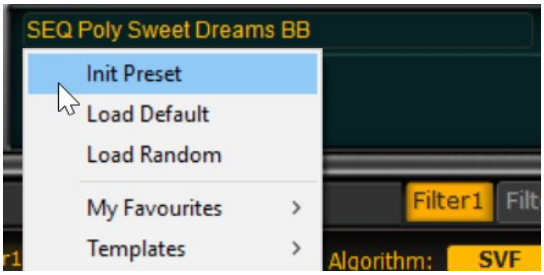
Assigning the “Default” Preset

“Default” preset is the preset that is loaded when a new instance of SynthMaster is created. To assign a preset as the “default” preset:

- Click on the preset name to choose the preset
- Right click on the preset name to bring up the dropdown menu
- Choose “Set As Default Preset”

Creating a New Preset

To create a new preset, click on the preset name. A popup menu will be displayed. Choose “Reset Preset” to create a new preset with initial settings (init patch / sawtooth waveform)



Loading the “Default” Preset

Instead of creating an empty preset with initial settings, you can load the “default” preset by clicking on the preset name and then choosing “Load Default” menu item.

Loading a Preset from Your Favorites List

Instead of creating an empty preset with initial settings, you can load one from your 'Favourites' list, by clicking on the preset name and then choosing a preset listed under the "My Favourites" menu item.

Preset Attributes (Metadata)

For each preset in SynthMaster, the following preset attributes are available:

- Author name
- Company name
- Bank Name
- Comments
- Instrument type
- Attributes
- Music Style

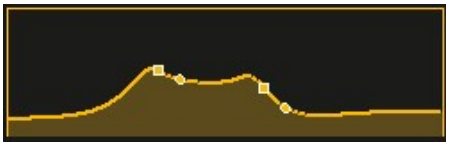
To edit the attributes, click on the 

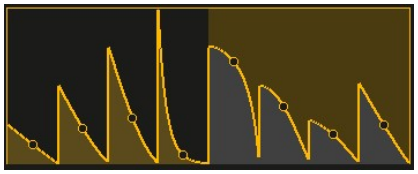
button. Please note that you can select multiple values for Instrument type, Attributes and Music Style:

TIP! If you select "Template" for Attributes, the preset will be shown in the list of template presets that show up when you click preset name.

Editing Preset Parameters

SynthMaster has many different types of user interface elements to edit parameters. Below we explain one by one how to use them:

Type	Description
Knob 	• Knobs can either operate in *Linear* or *Circular* mode • ***To operate in linear mode***: Left click close to the center of the knob, and then move your mouse in up/down direction. • ***To operate in circular mode***: Left click around the outer ring of the knob, and then move your mouse in circular direction. • ***Double Click*** resets the knob back to its default value • ***Shift+ Left Click*** is used to edit the knob's value in a finer resolution. • ***Mouse Wheep Up*** increases the knob's value by one step • ***Mouse Wheep Down*** decreases the knob's value by one step
Dropdown 	• Dropdown controls display a list of values to choose from. To select a value, click on the dropdown, the list will pop up. If you want to cancel your selection, just click on an area outside the list and it will go away. • ***Double Click*** resets the dropdown back to its default value. • ***Mouse Wheel Up*** selects the previous value in the list of values. • ***Mouse Wheep Down*** selects the next value in the list of values.
Waveform Dropdown 	• Waveform dropdowns are a subclass of dropdowns, and they operate in a similar fashion. • ***Shift + Mouse Wheel Up*** selects (previous globally selected waveform dropdown value) +1 • ***Shift + Mouse Wheel Down*** selects (previous globally selected waveform dropdown value) -1.
Toggle Button 	• Toggle buttons are basically On/Off buttons. Clicking on them toggles their state. • ***Double Click*** resets the button back to its default value
EQ Display 	• EQ displays are used to show the frequency response of 2/4 Band EQs. The graph is in logarithmic scale on both axes. • By clicking on a point  on the graph, you can change the cutoff frequency (x-axis) or gain of a band (y-axis)
Filter Display 	• Filter displays are used to show the frequency response of various filter types used in SynthMaster. • By clicking on a point  on the graph, you can change the cutoff frequency (x-axis), or resonance (y-axis) • By clicking on a circle  on the graph, you can change the mode (x-axis) or slope (y-axis).

ADSR Envelope Display 	• ADSR Envelope displays are used to edit various parameters of ADSR envelopes. • By clicking on a point on the graph, you can change the length (x-axis) or final value of an envelope stage. • By clicking on a circle on the graph, you can change the slope (curvature) of an envelope stage.
Multistage Envelope Display 	• Multistage Envelope displays are used to edit various parameters of Multistage envelopes. • By clicking on a point on the graph, you can change the length (x-axis) or final value of an envelope stage. • By clicking on a circle on the graph, you can change the slope (curvature) of an envelope stage.
Step/Glide LFO Display 	• Step/Glide LFO displays are used to edit step volumes and slopes (curvatures) of Step/Glide LFOs. • By clicking on a step, you can change its volume. • By using the mouse wheel, you can change a step's volume • By clicking on a circle on the graph, you can change the slope (curvature) of the corresponding step.

Undo/Redo of Parameter Changes

Starting with SynthMaster 2.8.8, parameter changes are stored internally by SynthMaster, so you can undo or redo your last edit.

When you change a parameter's value, the Undo button is lit: 

When you click on the 

button, the parameter reverts back to the previous value, but this time the Redo button is lit: 

Linking Parameters to MIDI Controllers (MIDI Learn)

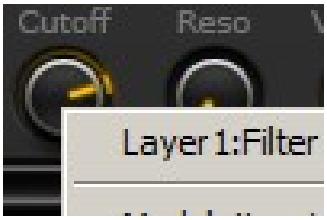
In SynthMaster, continuous parameters can be assigned to MIDI controllers. This assignment is achieved by the *MIDI Learn* feature in SynthMaster. Up to 32 assignments can be defined, and they are saved within the preset.

To Start MIDI Learn: Bring your mouse over the parameter (knob), and then right click to bring up the content menu.

Click on *MIDI Learn (Global)* or *MIDI Learn (Current Preset)* menu item, and then start moving the corresponding knob/slider/etc on your MIDI controller device to send MIDI Control Change (CC) messages. As soon as SynthMaster receives a CC message, it will assign that controller to the parameter.

To Remove MIDI Controller Assignment: Bring your mouse over the parameter (knob) that's linked to a MIDI controller, and then right click to bring up the content menu.

Click on the *Remove MIDI CC Link* menu item, and the assignment will be removed.



Assigning Modulation Sources for Parameters

In synthesizer terminology, modulation means varying a parameter's value over time using a modulation source. Modulating parameter values is an essential part of synthesizer sound design.

In SynthMaster, continuous parameters (knobs) can be modulated by the following modulation sources:

MIDI	Note Velocity, Poly (Note) Aftertouch, Channel Aftertouch, Pitch Bend, ModWheel (CC1), Breath Ctrl (CC2), Foot Ctrl (CC4), Volume (CC7), Pan (CC10), Expression (CC11), Brightness (CC74)
LFOs	Synth LFO 1/2/3/4, Voice LFO 1/2
Easy Parameters	Easy Parameter 1/2/3/4/5/6/7/8
XY Pads	XY Pad 1X, 1Y, 2X, 2Y
Keyscalers	KeyScaler 1/2/3/4
Envelopes	ADSR Env 1/2/3/4, Multistage Env 1/2, 2D Env 1X, 1Y, 2X, 2Y
Other	Constant, Alternating, Bipolar Random, Unipolar Random

Keyscalers, Envelopes and Voice LFOs are voice modulation sources: They operate on a single voice. Starting with version 2.6.19, voice modulation sources can be assigned to global/effect parameters. When notes are playing, the first playing voice provides the modulation sources to global/effect parameters.

In SynthMaster, there are 2 types of modulation types:

+ Modulation: In this mode, the modulation amount is between -1 and +1. The center default value indicates zero modulation. The target parameter is calculated as:

Target = Target + (Modulation Curve[Source X Via] X Mod Amount)

X Modulation: In this mode, the modulation amount is between 0 and 1. The target parameter is calculated as:

Target = Target x ((1-Mod Amount)+(Modulation Curve[Source X Via] X Mod Amount))

TIP: For an Oscillator/Voice to turn off completely after they receive MIDI Note Off messages, you should modulate the Osc/Voice Volume with and envelope in X mode, and set the modulation amount to the max value 1. If the volume parameter has other modulation sources as well, the X modulation must be applied as the last modulation source.

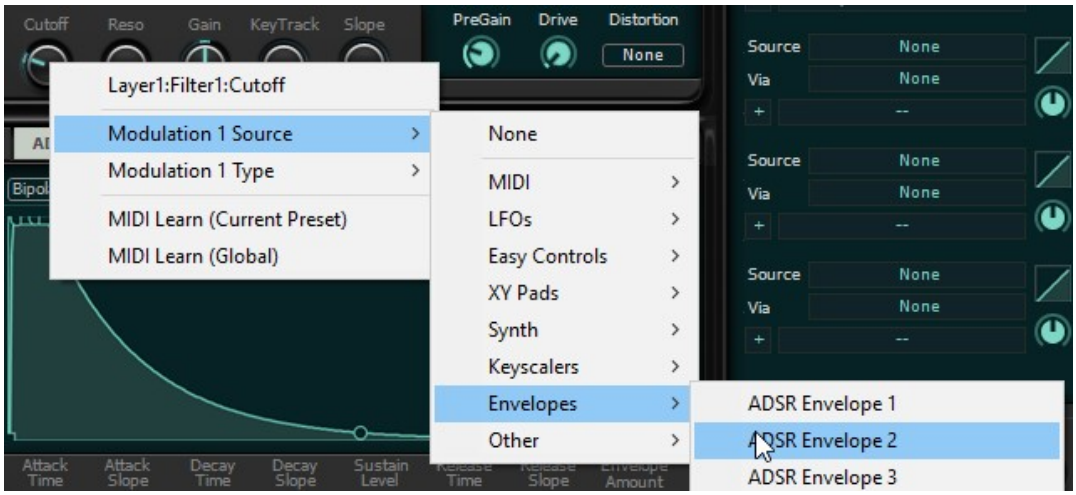
Modulation Curve and Modulation Via Source are recently added in version 2.8.

There are 3 ways to assign a modulation source for a parameter:

1. By right clicking on the parameter and assign a source from the popup menu
2. By dragging a modulation source and dropping it onto a parameter
3. By assigning sources and targets for a modulation matrix entry

Assigning Modulation Source from Popup Menu

Bring your mouse over the control (knob), and then right click to bring up the context menu:



Once you decide on the modulation source, click on its menu item. The modulation matrix will also be updated to reflect the changes:

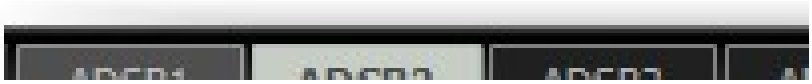
To change the modulation amount, click on the modulation amount knob  , or use the mouse wheel after bringing the mouse over the knob.

To change the modulation type, click on the modulation type dropdown 

, or use the mouse wheel after bringing the mouse over the dropdown control.

Assigning Modulation Source by Drag and Drop

Starting with SynthMaster 2.8, we introduced a new modulation sources tab, which displays the modulation sources in a color coded way. Also, to simplify access to modulation sources that have targets assigned they are displayed before sources that don't have any targets assigned:



The following modulation sources are available on the modulation sources tab:

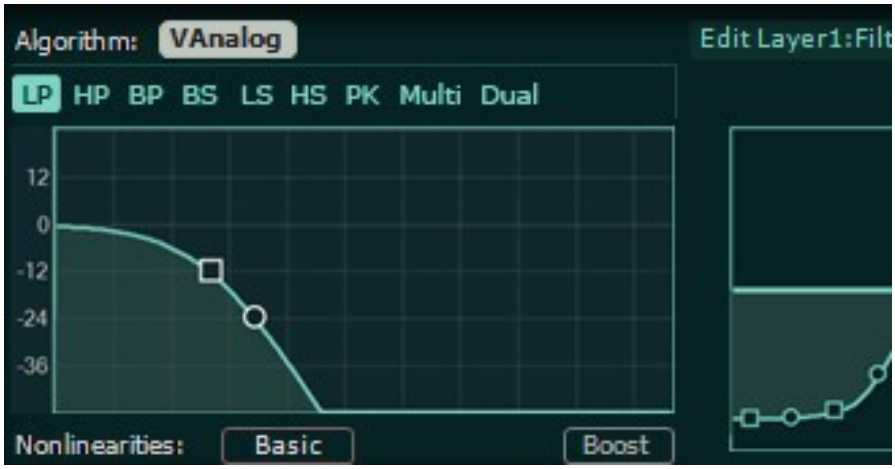
- ADSR Envelopes: ADSR1, ADSR2, ADSR3, ADSR4
- Multistage Envelopes: MSEG1, MSEG2
- Voice LFOs: VLFO1, VLFO2
- Global LFOs: SLFO1, SLFO2, SLFO3, SLFO4
- Keyscalers: KSCL1, KSCL2, KSCL3, KSCL4

By using the arrow keys  , or mouse wheel, you can cycle through tab pages.

The color coding for the tabs indicate different statuses for the modulation sources:

	Tab selected, has modulation targets
	Tab not selected, has modulation target
	Tab selected, doesn't have modulation targets
	Tab not selected, doesn't have modulation targets

When you click on a tab/modulation source that has modulation targets assigned, the min/max ranges of modulation is displayed as a ring around the knob, and the modulation matrix is filtered to show only slots with that source:



To create a new modulation matrix entry, first click on the tag/modulation source, the mouse cursor will instantly change:

When you move/drag the mouse over any modulateable knob, the knob's display will change indicating that it can be modulated:

When you drop the mouse over the knob, a new modulation matrix will be created, and the modulation matrix will be filtered to show only modulations assigned for that knob/parameter:

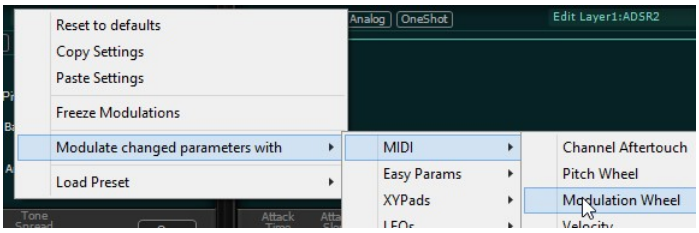
Assigning a Modulation Source to Multiple Parameters

Starting with SynthMaster 2.7, it's possible to assign a single modulation source to multiple parameters. By doing that you can create complex morphs! The workflow to achieve that is as follows (We're demonstrating on Layer1:Oscillator1 parameters but it can be applied to any section)

1. Click on the "Edit Layer1:Osc1" menu, choose "Copy Settings" menu item. This will copy the Layer1:Osc1 parameters to the clipboard.

2. Modify some parameters

3. Click on the edit menu again, since we modified some parameters we'll now see a new menu item: "Modulate changed parameters with:" Choose "Modulation Wheel" submenu under "MIDI"



4. You'll see that modulation matrix is populated with new entries now, and all modulation amounts are calculated automatically for you. Also, the modulation matrix filter is changed to "ModWheel", and the modulation ranges of the target knobs are displayed around the knobs as rings.

Modulation Matrix

When you add new modulations for each parameter, they are shown on the modulation matrix. The matrix has 13 pages each page displaying 5 entries. By clicking on the  arrows, or by using the mouse wheel, you can scroll through the matrix pages.

The matrix also has filtering functionality. By default, no filtering is applied, so all matrix entries are shown. To change the current display filter, click on the filter dropdown:

There are 4 display filter choices: None, By Modulation Source, By Modulation Target, and Automatic.

To see parameters modulated by a specific modulation source only: Select "By Source" from the display filter. SynthMaster will display another dropdown below to select the modulation source. Select the source from this dropdown, and SynthMaster will only show the modulation targets for that source:

To see a specific parameter's modulation sources only: Select "By Target" from the display filter. SynthMaster will display another dropdown below to select the modulated parameter (target). Select the modulated parameter (target) from this dropdown, and SynthMaster will only show the modulation sources for that parameter:

Automatic filtering: You can also select "Automatic" from the display filter. In that case, the source/target filters are set automatically, when you click on any knob. For instance, if you want to see modulation entries for Layer1:Filter1:Cutoff only, click on the cutoff knob and SM will display entries for that parameter only.

Easy Parameters

SynthMaster has more than 3000 parameters. This might look quite complicated at first! But using the 12 "easy" parameters, you can control the most important parameters using those 12 "easy" parameters.

Easy parameters are also modulation sources in SynthMaster, so to assign an easy parameter to any parameter, bring the mouse over the parameter, and right click

Aside from the 8 easy knobs, there are 2 xy pads which are also used as easy parameters. For any of the 12 easy parameters, you can rename each, and give them meaningful names for the current preset:

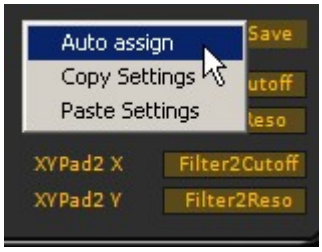
TIP: When you link easy parameters to MIDI controllers, those links are saved globally, so that you don't have to link easy parameters for each preset.

TIP: To see all parameters modulated by a certain easy parameter, choose "Automatic" mod matrix filter, and click on the easy knob!

Assigning Easy Parameters Automatically

Since figuring out which parameters to choose for easy parameters might be a problem, we have developed an algorithm in SynthMaster to do the assignment automatically for you. To assign the easy parameters for the current preset settings, click on the 

button, and then click on the dropdown list next to the xy pads. Choose "Auto Assign" from the menu:



Easy Parameter Presets

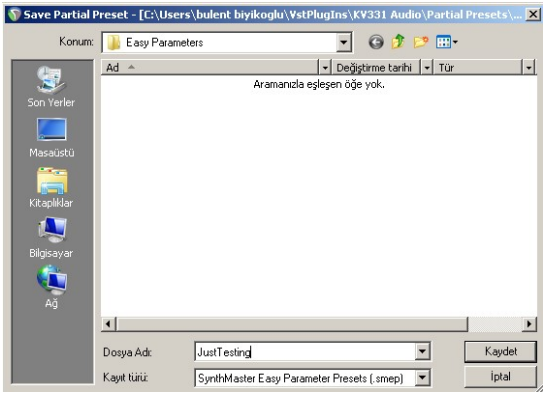
Since you might want to use the same easy parameter assignments for different presets, SynthMaster allows you to save your current easy parameter assignments, and then load them back to other presets.

To save current easy parameter assignments:

Click on the 

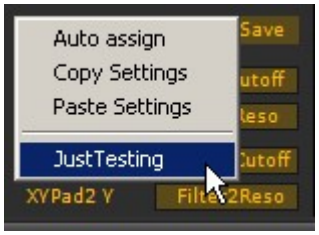
button, and then click on the 

button (next to the xy pads). After entering preset name, SynthMaster will save it:



To load an existing easy parameter preset:

Click on the easy parameter preset dropdown, and select an easy parameter preset:

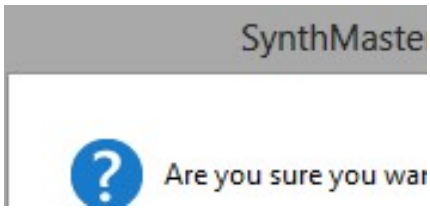


Saving Presets

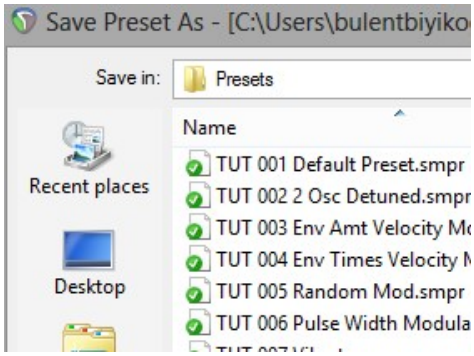
Once you're done editing preset parameters and attributes, it's time to save them in preset files. To save a preset, press the 

button and choose "Save Preset" or "Save Preset As" sub menu.

If you click on the “Save Preset” sub menu, SynthMaster will ask you whether you want to override the existing preset:



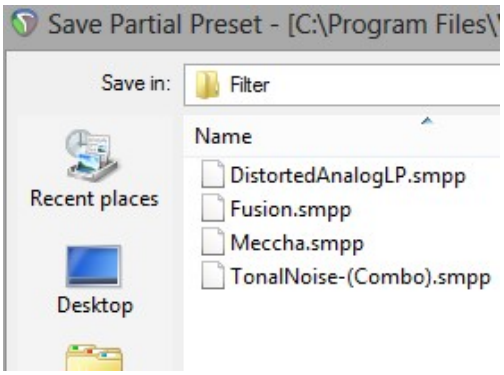
If you click on the “Save Preset As” sub menu, SynthMaster will ask you to enter the name of the new preset:



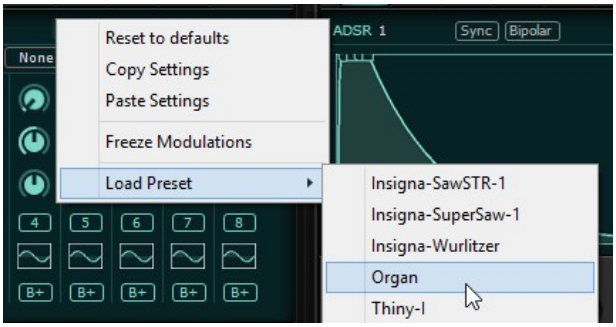
Saving “Partial” Presets

SynthMaster supports saving settings for separate modules (Osc, Mod, Filter, Chorus, Reverb, etc…) as “Partial” Presets.

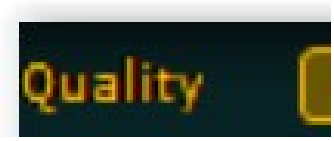
To Save the settings for a module, click on the Save button on the upper right hand side of the corresponding module. SynthMaster will ask you to enter the new of the new preset:



To load the settings back for a section, click on the Edit menu for the corresponding section. A popup context menu will list presets for that module. If you select the first menu item “Reset to defaults” the parameter values for that module will be reset back to their default values:



Preset Engine Quality



There are 2 settings that affect the rendering of audio for each SynthMaster instance:

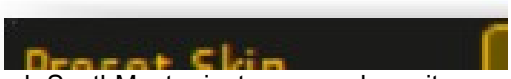
Engine Quality changes the internal sampling ate. It can take 4 different values: *Draft (No oversampling), Good (x2), Better (x3), Best (x4)*

Engine Buffer Size changes the smallest buffer size length at which the internal LFOs, envelopes etc are recalculated. It can take 4 different

values: *Short (16 samples), Normal (32 samples), Large (64 samples), XLarge (128 samples)*

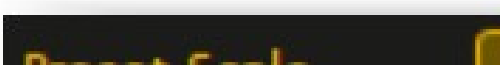
If global engine quality settings are set to values other than “Preset”, those global values always override preset values.

Preset Skin



Each SynthMaster instance can have its own skin setting. If (global) default skin is set to a skin other than “Preset”, that global value always overrides the preset value.

Preset Scale



Each SynthMaster instance can have its custom tuning, loaded from a Scala tuning file:

Scale tuning files are simple text files that let you define custom scales:

```
!Equal Tempered.scl
Basic equal tempere
12
!rootnote=C4
100.000 cents
200.000 cents
300.000 cents
400.000 cents
```

The tuning definition files in Scala format (.scl) are placed under:

- Windows: **C:\Program Files\VstPlugIns\KV331 Audio\Scales**
- MacOSX: **/Library/Application Support/KV331 Audio/SynthMaster/Scales**

If you want to use different tunings, you can copy the tunings file to:

<Documents>\SynthMaster\Scales folder

By default, “EqualTempered” is the default tuning for each instance. In the scala tuning file, you can specify the root note as a comment line as follows:

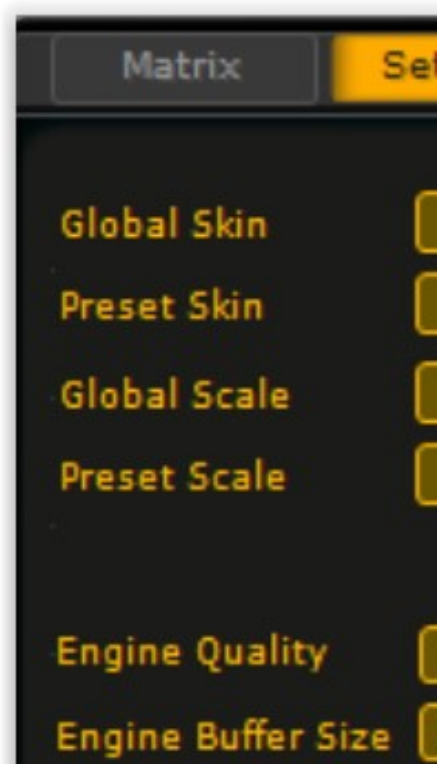
!rootnote=A4

The above is not part of the scala tuning format, however we added it as a workaround to be able to define root notes for loaded scales.

If (global) default scale is to a value other than “Preset”, that value always override the preset scale.

Settings

Under the Settings tab, the following settings can be adjusted:



Global Skin changes the skin globally for all SynthMaster instances. If set to *Preset*, the *Preset Skin* takes effect. When the skin is changed, the plugin window(s) must be closed and reopened.

Global Scale changes the tuning (scale) globally for all SynthMaster instances. If set to *Preset*, the *Preset Scale* takes effect.

Engine Quality changes the internal oversampling rate globally. If set to *Preset*, the preset quality takes effect. There are 2 separate settings for realtime mode and offline mode. When the VST host is rendering a track to disk, the offline setting is used instead of the realtime setting. So, in realtime mode you can use draft quality to save CPU cycles!

Engine Buffer Size changes the internal buffer size globally. If set to *Preset*, the preset buffer size takes effect. There are 2 separate settings for realtime mode and offline mode. When the VST host is rendering a track to disk, the offline setting is used instead of the realtime setting. So, in realtime mode you can use large buffer size to save CPU cycles!

Pitch Bend Range changes the pitch bend range globally. If set to preset, the preset pitch bend ranges take effect. The range is between 0 – 48 semitones.

MIDI CC Update is used to set the length of the smoothing filter that's used to filter out the incoming MIDI CC/Channel Aftertouch/Pitch Bend signals. Its value is between 10 milliseconds – 100 milliseconds.

Parameter Update is used to set the length of the smoothing filter that's used to filter out the (automated) parameter changes. Its value is between 10 milliseconds – 100 milliseconds.

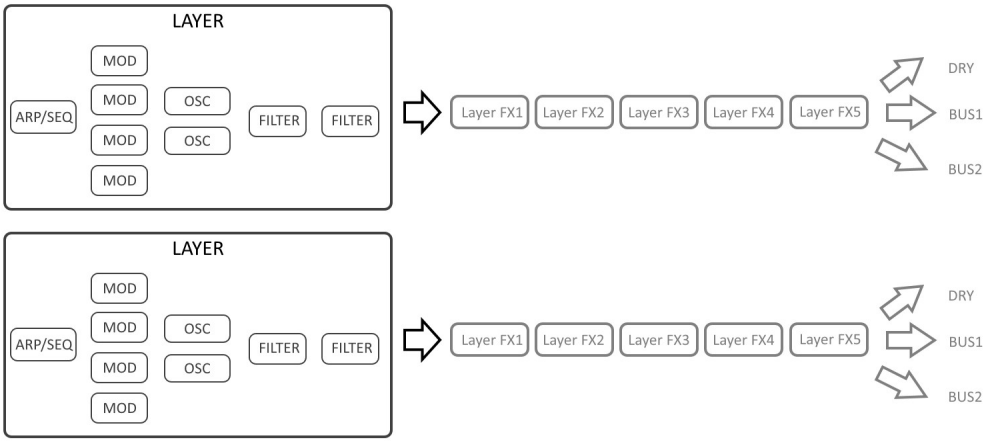
Arp Lock to Beat is used to align arpeggiator/sequencer step start positions to the beginnings of beats (if receiving position information from the host application)

Map CC74 to CC1 is used to convert MIDI CC74 messages to MIDI CC1 messages.MPE keyboards like the ROLI Seaboard send CC74, so by converting that to CC1 we can take advantage of that modulation in presets that have CC1 (Modwheel) assigned as a modulation source.

Arp MIDI Output is used to enable/disable MIDI output from the plugin instance(s). When it's on, the MIDI generated by SynthMaster's arpeggiators are sent to the DAW application. For some hosts like Digital Performer this could cause feedback, so for those hosts this feature should be turned off.

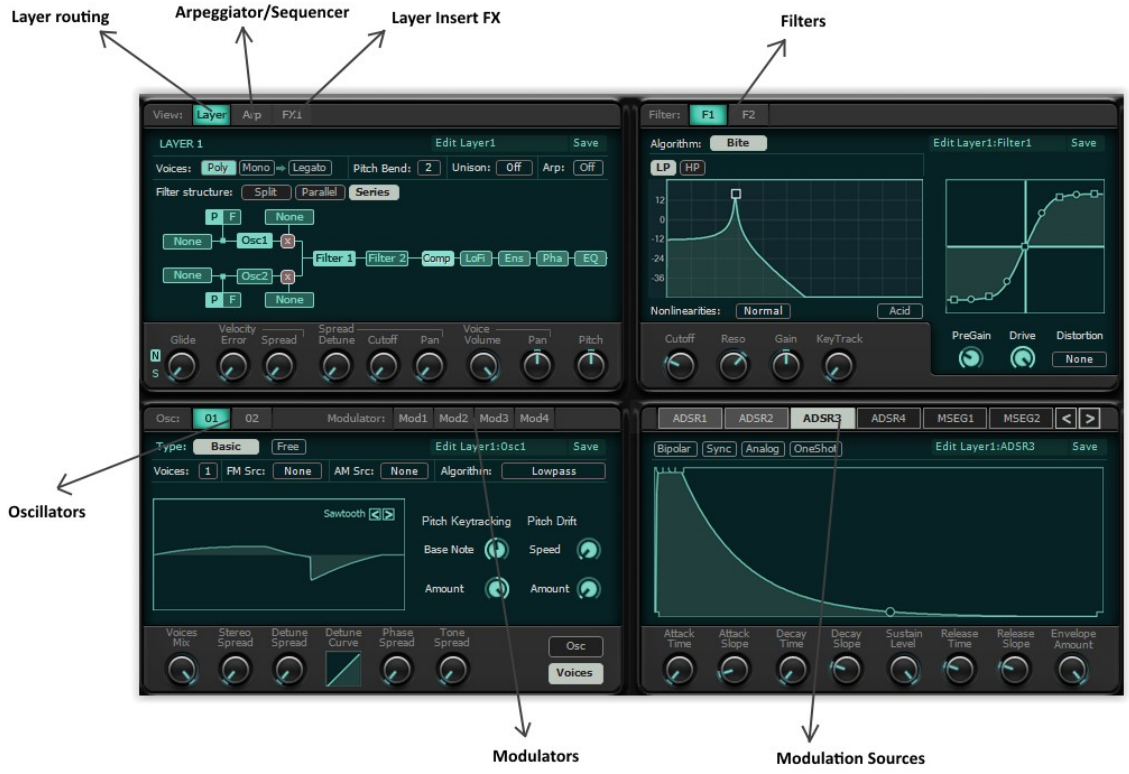
SynthMaster 2.8 Architecture

The architecture in SynthMaster consists of 2 layers followed by 2 global effect send busses. The effect routing is totally flexible. The effects can be inserted by right clicking on the insert and choosing the effect from the dropdown menu. An insert effect can be activated/bypassed by left clicking on it:



Layers

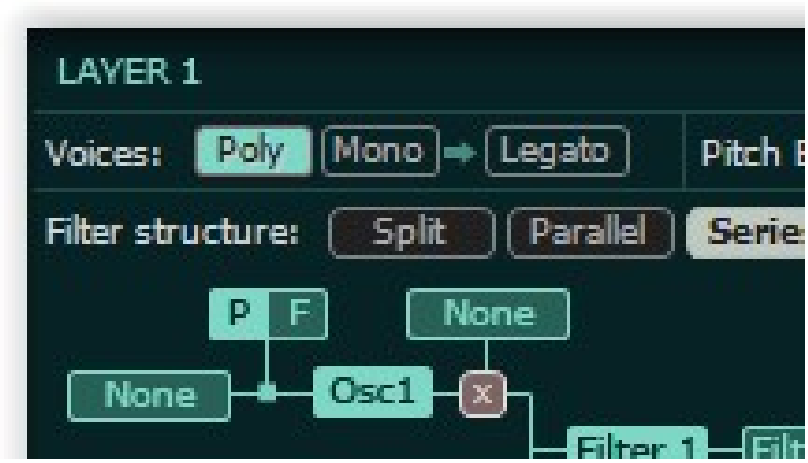
Both layers have an identical look. You can switch between them by clicking on the corresponding tab



Layer Routing & Voice Parameters

On the 

Tab, layer routing and voice parameters can be edited:



Voice Parameters

Poly: When the polyphony of the layer is set to “Poly”, the layer can play multiple voices simultaneously. The maximum number of simultaneous voices depends on

1) *Number of Voices* parameter
2) Number of layers active
3) *Unison* setting for the layer

It’s given by the formula: (Number of Voices / Number of active layers) / Unison

So, according to this formula, if both layers are turned on, polyphony for a single layer will be halved. Similarly, if *Unison* value is set to N, polyphony for a single layer will decrease by N, because with Unison value of N, N voices play simultaneously for a single note (N is between 1 and 8)

If maximum polyphony is reached during playback, note stealing occurs only if there are notes in release state.

Mono: When the polyphony of the layer is set to Mono, the layer plays only a single voice at a time. If “Legato” is off, the envelopes are retriggered whenever a new note is on. SynthMaster’s Mono mode has last note priority, so if multiple notes are on, only the last one is heard.

Legato: In Mono mode, if Legato is off envelopes are retriggered whenever a new note is pressed.

Glide (Time): In Mono mode, Glide controls the time it takes to slide from last note’s pitch to the current note’s pitch. Its value is between 3 ms – 20 sec.

Glide Type: In Mono mode, there are 2 types of glide:

1) “N”ormal: Slide occurs only when w new note on message is received while another note was already on.
2) “S”lide: Slide occurs whenever a new note on message is received.

Velocity Error: controls the amount of random error value added to MIDI note on messages received by the layer. Its value is between 0-127.

***Voice Volume*:** controls the volume of each voice. Increases linearly between 0.0 – 1.0. By default, ADSR 1 envelope is connected to this parameter so it acts like the VCA (Voltage controlled amplifier) stage of the voice.

***Voice Pan*:** controls the stereo pan of each voice. Its value is between Hard Left – Hard Right. At the default mid value, the pan is at the center. The oscillators have their own pan parameter so this value is added to the oscillator pan value to get the final oscillator pan.

Voice Pitch: controls the pitch of each voice. Its value is between -64/+63 semitones. The oscillators and modulators have their own pitch (coarse tune) parameter as well so this value is added to the oscillator/modulator pitch value to get the final oscillator/modulator pitch.

Unison: When Unison is on, multiple voices are played simultaneously for each MIDI note on message received. Up to 8 voices can be played simultaneously to create a rich chorus effect. Since it wouldn't make sense for each voice to have the similar parameters, we have the following 4 spread parameters that creates variation for each voice:

1) Detune Spread
2) Pan Spread
3) Cutoff Spread
4) Velocity Spread.

As we explained on above, polyphony decreases when unison increases since there are "Unison" number of voices playing for each MIDI note on message received.

Routing

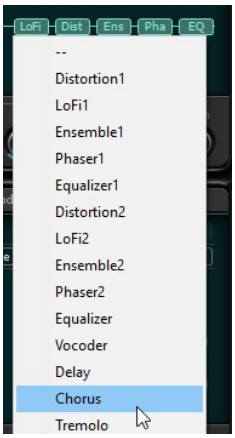
By left clicking on any of the insert effects, you can turn it on 

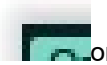
or off 

Starting with SynthMaster 2.8, its possible to change effect ordering by drag and drop:

- Click on effect and start moving the mouse:  ,
- Drag and drop the effect onto another one: 
- The effects will be swapped: 

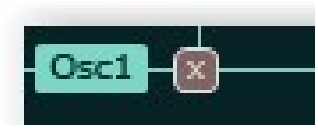
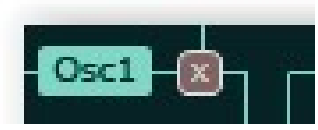
To replace an effect with another one, right click on the effect, list of available effects will be displayed:



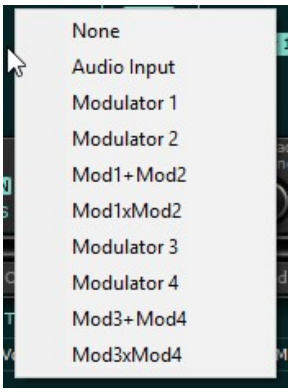
By clicking on any of the two oscillators, you can it turn it on  or off 

By clicking on any of the two filters, you can turn it on  or off 

Filter structure controls how filters are connected:

1) *Split*: In this mode, Filter1 is connected to Osc1, Filter2 is connected to Osc2	
2) *Parallel*: In this mode, Filter 1 and Filter 2 are connected in parallel.	
3) *Series*: In this mode, Filter 2 is connected after Filter 1.	

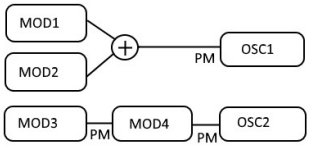
Phase, Frequency (Pitch) and amplitude of each oscillator can be modulated by the following sources at audio rate:



Phase Modulation

To modulate the phase of an oscillator: change the modulation type to “Phase Modulation”  and then select a modulation source:

Phase modulation has been used extensively in synths like Yamaha DX7. SynthMaster is capable of creating most of Yamaha DX7’s algorithms. For instance, take a look at the below diagram which is DX7 Algorithm 10:



DX7 Algorithm 10

Frequency Modulation

To modulate the frequency (pitch) of an oscillator, change the modulation type to “Frequency Modulation”  and then select a modulation source:

TIP: For analog style frequency modulation, make sure to set the DC offset of the modulation to 1.0.

Ring Modulation

To modulate the amplitude of an oscillator, change the RM type to “Multiply”  and then select a modulation source:

Please keep in mind that there are two types of amplitude modulation

1. Ring Modulation: In this modulation, oscillator waveform is multiplied by modulator waveform
2. Amplitude modulation: In this modulation, oscillator waveform is multiplied by (offset+modulator waveform)

Therefore, for ring modulation set DC Offset parameter of the modulator to zero. For amplitude modulation, set DC offset parameter of the modulator to 1.

Using Modulators as oscillators

Starting with SynthMaster 2.7, modulators can now be used as regular oscillators, when the oscillator RM type is set to “Add” 

Oscillators

Oscillators are the sound generators in a synthesizer. Each layer in SynthMaster has 2 oscillators. There are 5 types of oscillators in SynthMaster:

1. Basic
2. Additive
3. Vector
4. Wavetable
5. Audio Input

Basic, Additive, Vector and Wavetable oscillators share the following common parameters:

***Volume*:** controls the volume of the oscillator. Increases linearly between 0.0 – 1.0.

***Pan*:** controls the stereo pan of the oscillator. Its value is between Hard Left – Hard Right. At the default mid value, the pan is at the center. Since there is also a pan parameter for the layer voice this value is added to the oscillator pan value to get the final oscillator pan.

Coarse tune: controls the pitch of the oscillator. Its value is between -64/+63 semitones.

Fine Tune: controls the pitch of the oscillator. Its value is between -64/+63 cents.

Pitch Drift Speed: controls the frequency of the random drift LFO added to the oscillator pitch.

Pitch Drift Amount: controls the volume of the random drift LFO added to the oscillator pitch. Its value is between 0-1 semitones. The final oscillator pitch is calculated by the following formula:

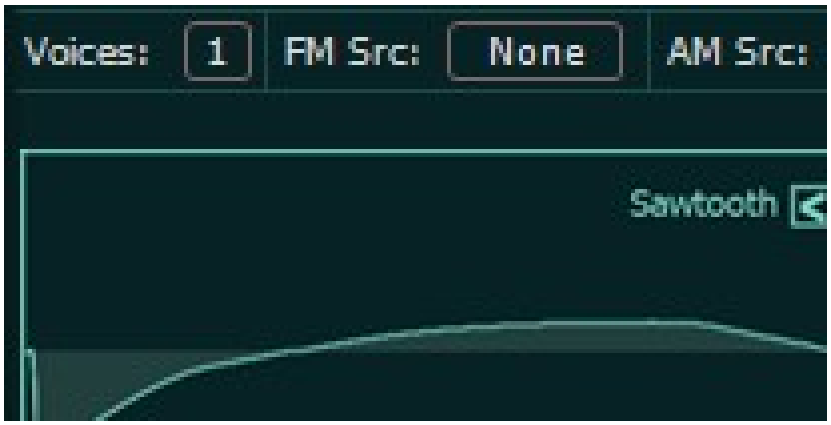
Osc Pitch = Coarse tune + Fine tune + Pitch Drift Amount + Voice Pitch

Pitch Keytracking Base Note: This is the reference note for oscillator pitch key tracking. Notes below and above this note will have different pitches according to the pitch keytracking amount parameter.

Pitch Keytracking Amount: Controls how oscillator pitch follows the MIDI note frequency. Its value is between -100%/+100%. If it's value is set to 0%, the oscillator's pitch stays at the constant value determined by Pitch Keytracking Base Note.

Free: Controls whether the oscillator waveform(s) start at a random phase, similar to free-running analog synthesizer oscillators. This is especially useful when voices parameter is increased to create "SuperSaw" type sounds.

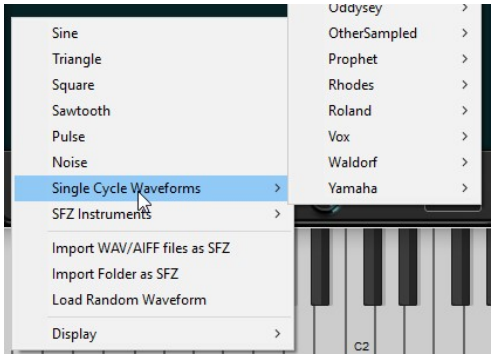
Basic Oscillator

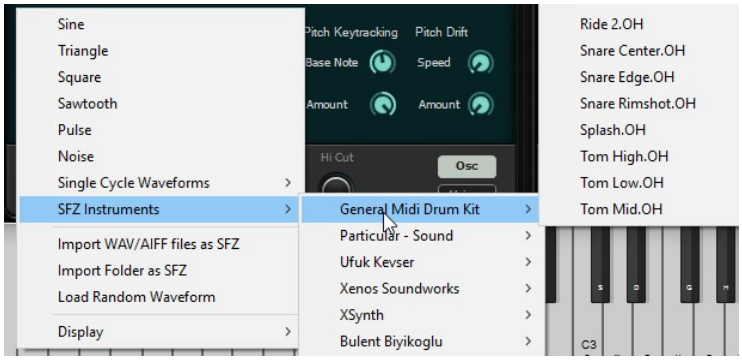


Basic oscillator can synthesize or play the following types of waveforms/samples:

- Sine
- Square, Triangle, Sawtooth
- Pulse
- Noise
- Any single cycle waveform
- WAV/AIFF samples defined in SFZ files

To select a waveform or sample for the oscillator, click on the waveform display, or the arrow keys on the waveform display:





Voices: By increasing voices, up to 8 instances of the same waveform/sample can be played back simultaneously. Since we'd want parameter values for each instance to have different values, we have the following spread parameters that can be accessed by clicking on the Voices tab:

TIP: Compared to layer Unison, increasing oscillator voices consumes much less CPU since less resources are used compared to Unison.

Algorithm: Starting with SynthMaster v2.7, oscillators have different synthesis algorithms:

- Spectral algorithms: Lowpass, Highpass, LowShelve, HighShelve, Bandpass, Bandstop
- Bend algorithms: Bend+, Bend-, Bend +/-
- Sync algorithms: Sync No Window, Sync Half Window, Sync Cos Window, Sync Triangle Window, Sync Saw Window
- Other: Pulse1, Pulse2, Bit Crush

For each algorithm, Phase and Tone parameters have an algorithm specific function. Below, algorithms and their spectrums are listed:

Algorithm	***Spectrum***	***Parameter 1***	***Parameter 2***
Lowpass 		*Phase*	*Hi Cut Frequency*
Highpass 		*Phase*	*Lo Cut Frequency*
LowShelve 		*Boost/Cut*	*Shelve Frequency*
HighShelve 		*Boost/Cut*	*Shelve Frequency*
BandPass 		*Lo Cut Frequency*	*Hi Cut Frequency*
BandStop 		*Hi Cut Frequency*	*Lo Cut Frequency*
Bend + 		*Bend+*	*Hi Cut Frequency*
Bend – 		*Bend-*	*Hi Cut Frequency*

Sync No Window 		*Sync*	*Hi Cut Frequency*
Sync Half Window 		*Sync*	*Hi Cut Frequency*
Sync Cos Window 		*Sync*	*Hi Cut Frequency*
Sync Tri Window 		*Sync*	*Hi Cut Frequency*
Sync Saw Window 		*Sync*	*Hi Cut Frequency*
Pulse 1 		*Pulse Width*	*Hi Cut Frequency*
Pulse 2 		*Pulse Width*	*Hi Cut Frequency*
Bit Crush 		*Bits*	*Hi Cut Frequency*

Additive Oscillator

Additive oscillator is 8 basic oscillators running together.

Each basic oscillator has its own:

- Volume
- Pan
- Detune / Tone / Phase
- Waveform type
- Algorithm
- Frequency

Vector Oscillator

Vector oscillator is a subset of Additive oscillator. There are 4 basic oscillators running together.

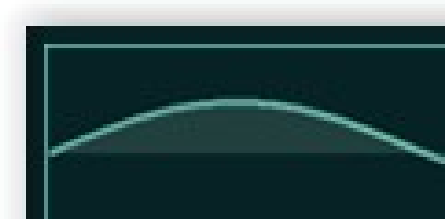
The mix ratios of oscillators are determined by the x and y indexes and 1D/2D buttons (For classical vector synthesis, 2D is on by default)

Wavetable Oscillator

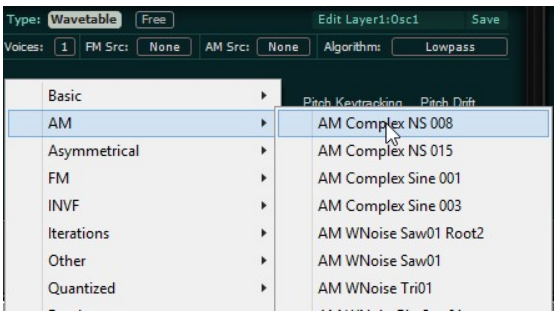
Wavetable oscillator is similar to basic oscillator, except that the waveform can be scanned (interpolated) in between 16 different waveforms shapes.

The position of the waveform can be adjusted using the *wave index* parameter

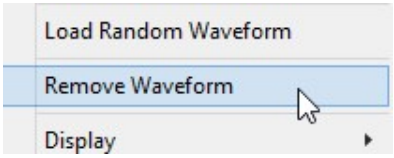
Initially, wavetable oscillator has 2 waveforms:



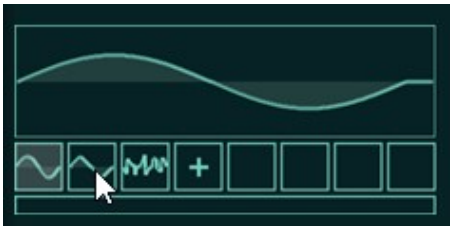
By clicking on the sign, you can add a new waveform to the wavetable:



To remove a waveform from the wavetable, right click on it, and choose “Remove Waveform” from the popup menu:

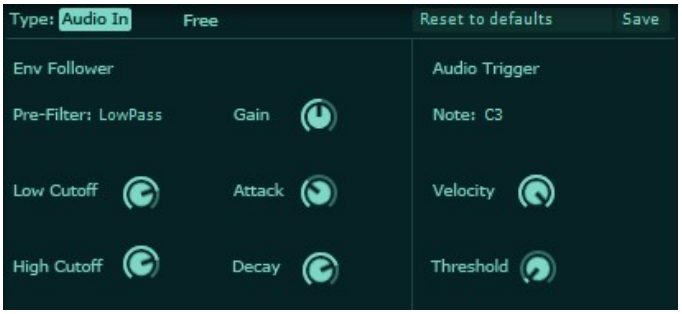


When you right click on a waveform, or use the mouse wheel, you can change the waveform:



When you click on a waveform, the wave index changes accordingly and the waveform is highlighted:

Audio-In Oscillator

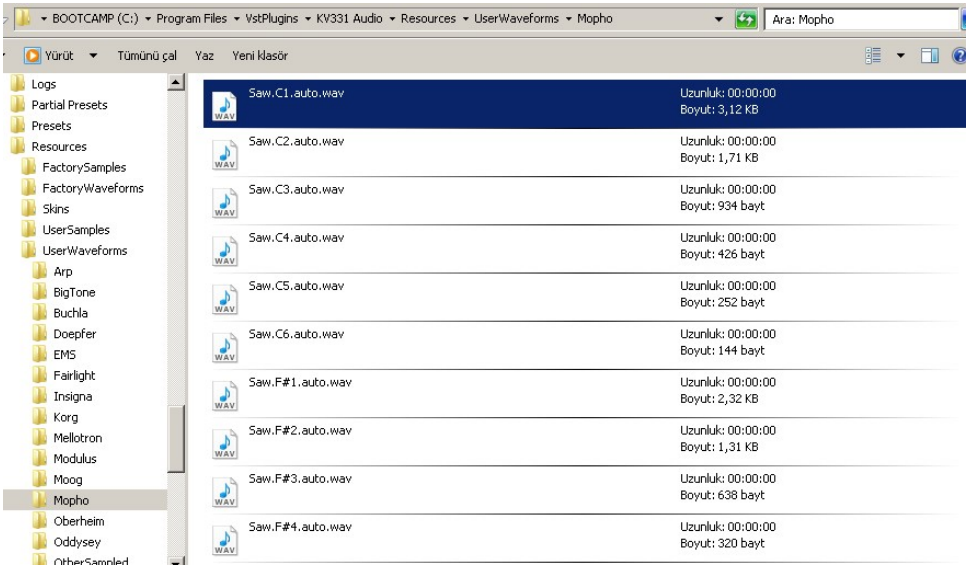


Audio-In oscillator is used to pass the incoming audio input of SynthMaster through its oscillators/filters/effects/etc.

SynthMaster features an envelope follower as well, which can trigger a MIDI note when the follower output is above a certain threshold. This way the internal oscillators/filters/effects etc can be used to process the incoming audio in various ways.

Importing Single Cycle Waveforms

SynthMaster supports importing your own single cycle waveforms into its engine. You can even import multiple single cycles taken at different root keys. The below screenshot shows how the default waveforms in SynthMaster are imported:



So basicly, to import your single cycles, you should place your single cycle WAV/AIFF waveforms under:

<My Documents Folder>\SynthMaster\Waveforms

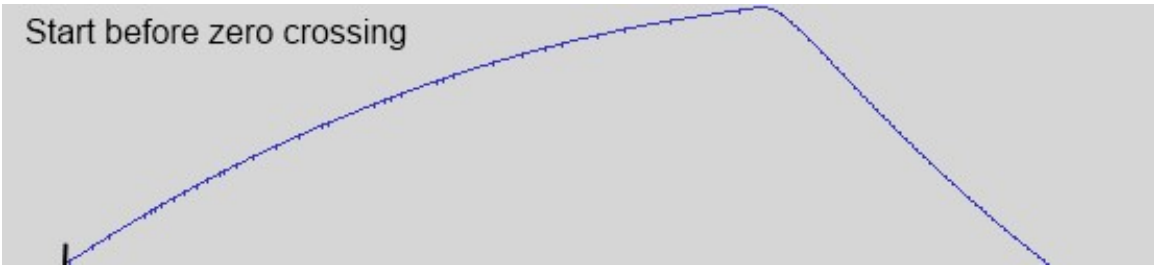
If you have multisamples, they should be named as

- <Waveform>.<Root Note>.<file extension>
- Or <Waveform>.<Root Note>.auto.<file extension>

For instance, if you look at the above screenshot, the default waveforms are named as:

- Saw.C1.auto.wav
- Saw.F1.auto.wav
- Saw.C2.auto.wav
- Etc…

“auto” in the file name is used to indicate that SynthMaster will detect the period start/end positions. For it to work correctly, the waveform should start before a zero crossing, and end after a zero crossing, as shown below:



TIP: If the waveform is a single cycle, you don’t have to use .auto in the name of the file, root note is sufficient, such as: Saw.C1.wav

When importing multiple single cycles, SynthMaster takes care of resampling, filtering and phase alignment of the multisamples automatically, using spectral (FFT/IFFT) processing.

TIP: Currently, the maximum period length SynthMaster supports is 2048 samples.

Importing WAV/AIFF samples as SFZ Instruments

In SynthMaster, it is possible to import single/multisampled WAV/AIFF files onto SynthMaster as SFZ Instruments, which can be played by any oscillator/modulator.

SynthMaster can read the root note information from each WAV/AIFF file. It can also read loop start/end points, so you don’t have to worry about those if they are defined in the WAV/AIFF header.

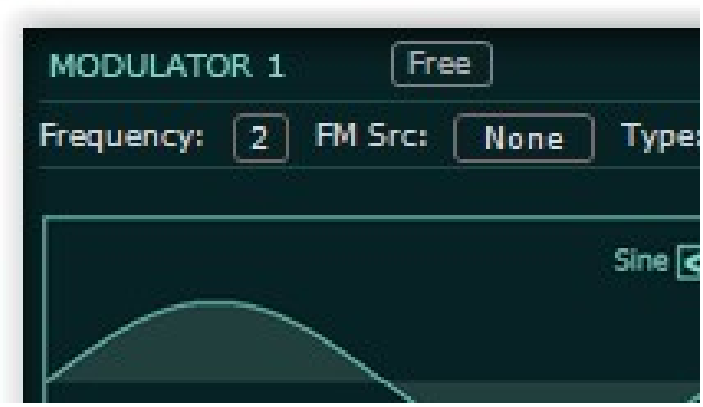
If you are importing multisamples, and they don’t have root notes defined in the WAV/AIFF headers, you can do that by renaming the files in the following way:

- Multi1.C1.wav
- Multi1.G1.wav
- Multi1.D2.wav
- Multi1.A2.wav…

To import the file(s), simply do the following:

1. Drag and drop your WAV/AIFF file(s) on to the oscillator waveform view (or alternatively choose “Import Multisamples as SFZ” from osc waveform dropdown menu)
2. Enter the name of the SFZ file to create, and save!

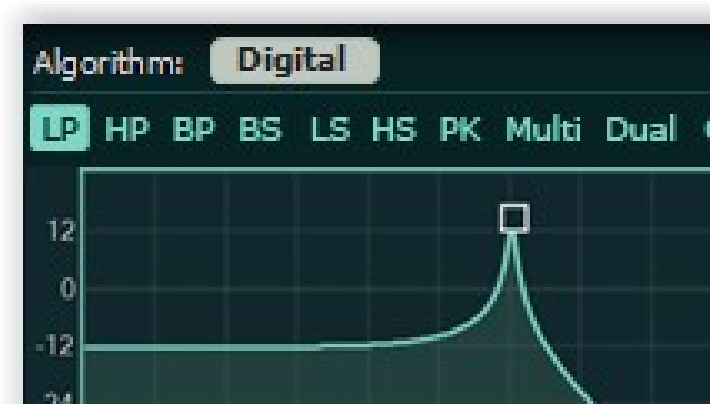
Modulators



A modulator is essentially a “basic” oscillator, but it is not heard directly. It is used to modulate frequency, phase (pulse width for pulse) or amplitude of Osc 1/Osc 2 or other modulators.

The only extra parameter a modulator has is the “DC Offset” parameter, which is used to add a constant value to the modulator output. This is useful in Frequency Modulation and Ring Modulation (which then becomes Amplitude Modulation when offset is added)

Filters

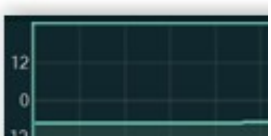
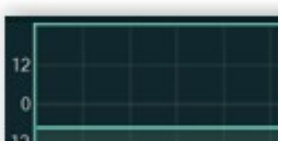


Filters in synthesizers are used to boost/cut certain frequency ranges based in their types. Each layer in SynthMaster has 2 filters with 6 different algorithm categories:

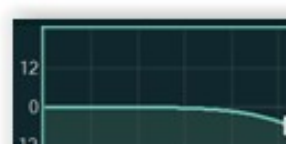
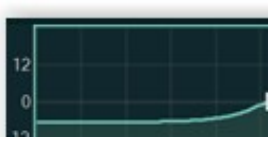
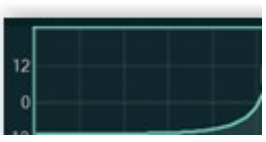
1. Digital
2. Virtual Analog
3. Ladder
4. Diode Ladder
5. State Variable Filter (SVF)
6. Bite Filter

For all categories, filters have the following common parameters:

Cutoff: is the frequency at which attenuation is -3 dB.

Cutoff = 30	*Cutoff = 60*	*Cutoff = 90*	*Cutoff = 120*
			

Resonance: emphasizes frequencies around cutoff frequency. For analog modelled filters (all categories other than digital), setting the resonance around the max value causes the filter to self-oscillate: i.e. to create a sine like tone at cutoff frequency even if there is no/very little input to the filter.

Resonance = 0	*Resonance = 30*	*Resonance = 60*	*Resonance = 90*
			

Key Tracking: Ranges between 0% and 100%. When set to max, the cutoff frequency follows the MIDI note 100%. Cutoff = 16 corresponds to the MIDI note frequency, Cutoff = 28 -> 1 octave higher, Cutoff = 40 -> 2 octave higher, etc.

PreGain: Before the input passes through the filter, it's first multiplied by the PreGain amount. Its value is between -20dB/+20dB. For analog filters, boosting the filter input using PreGain can create nice distorted filter sounds!

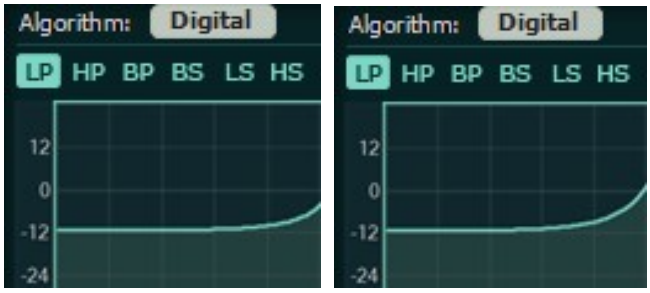
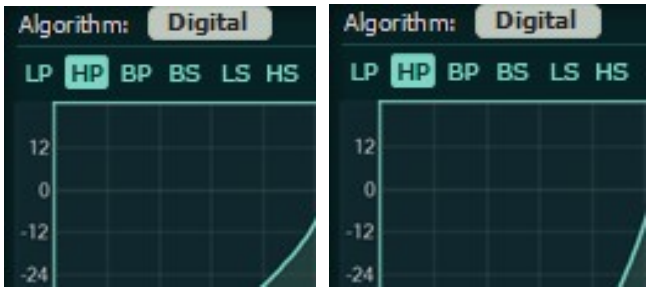
(Distortion) Routing: Each filter has its own distortion curve. This distortion can be turned off, or applied before or after the filter.

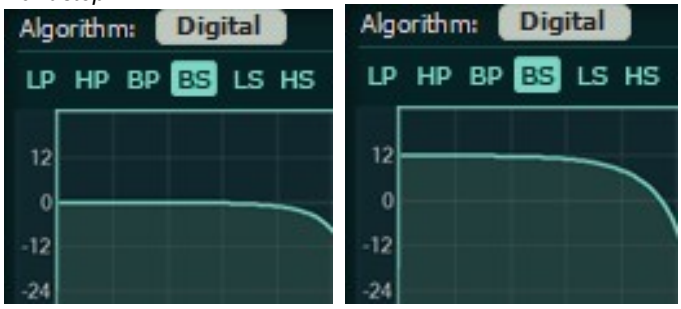
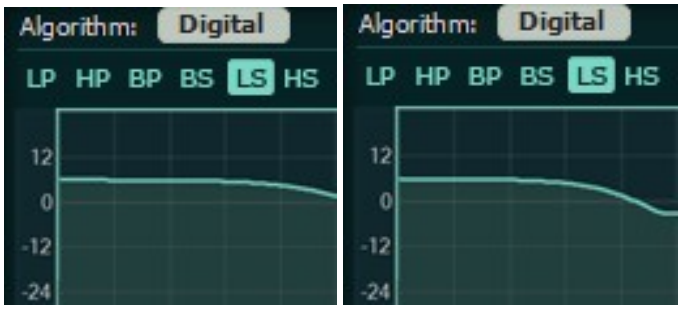
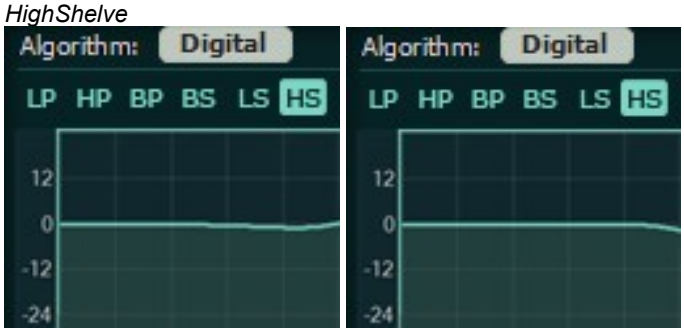
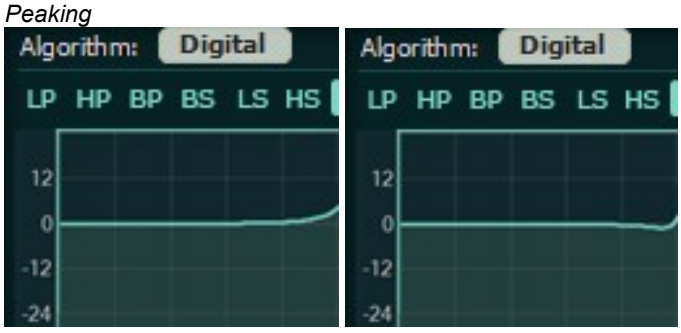
Digital Filter

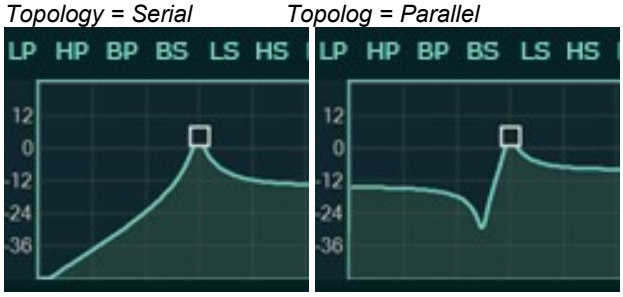
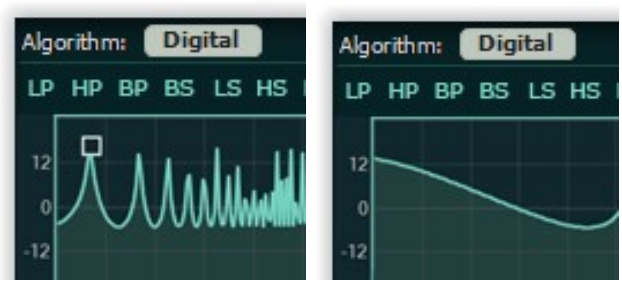
Digital filters don't try to model any analog filters. They are constructed using digital biquad filters, however after the filter stage there's a hard limiter internally which is triggered by an envelope follower whose attack and decay times are controlled by *Attack* and *Decay* parameters.

All filters except the Comb filter type have 2 different slopes: 12 dB/oct (2 pole), and 24 dB/oct (4 pole)

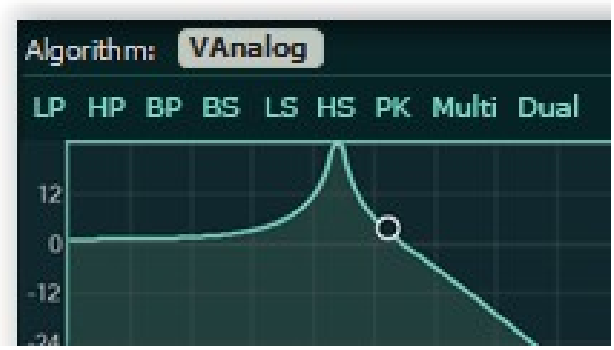
The following digital filter types are available in SynthMaster:

Lowpass 	Lowpass filter attenuates frequencies after the cutoff frequency. *Gain* parameter controls the gain applied after the filter. *Boost* parameter is used to compensate for the gain drop caused by increasing the resonance.
Highpass 	Highpass filter attenuates frequencies before the cutoff frequency. *Gain* parameter controls the gain applied after the filter.
Bandpass 	Bandpass filter attenuates frequencies before and after the cutoff frequency. The slope of bandpass filter is half of lowpass/highpass filters (6 dB & 12 dB instead of 12 dB & 24 dB) *Gain* parameter controls the gain applied after the filter.

Bandstop 	Bandstop filter attenuates frequencies before and after the cutoff frequency. The slope of bandstop filter is half of lowpass/highpass filters (6 dB & 12 dB instead of 12 dB & 24 dB) *Gain* parameter controls the gain applied after the filter.
LowShelve 	LowShelve filter is constructed by adding a lowpass filtered version of input to itself. *Boost/Cut* parameter controls the gain of the lowpass filtered input. Its value is between -12/+12 dB.
HighShelve 	HighShelve filter is constructed by adding a highpass filtered version of input to itself. *Boost/Cut* parameter controls the gain of the highpass filtered input. Its value is between -12/+12 dB.
Peaking 	Peaking filter is constructed by adding a bandpass filtered version of input to itself. *Boost/Cut* parameter controls the gain of the bandpass filtered input. Its value is between -12/+12 dB.
Multimode 	As its name suggests, multimode filter has multiple modes: According to the value of the *Mode* parameter, the filter switches from Lowpass to Bandpass to Highpass.

Dual Multimode *Topology = Serial* *Topolog = Parallel* 	In this mode, there are 2 multimode filters running simultaneously, with cutoff frequencies *Cutoff 1, Cutoff2* and filter modes *Mode1 and Mode2*. *Topology* parameter controls whether the filters run in parallel or in series. *1/2 Mix* parameter controls the parallel mix ratio of filter1 and filter2
Comb 	Comb filters are a kind of digital filters that are used in physical modeling of musical instruments. *Cutoff* parameter determines the delay line length of the comb filter *Feedback* parameter determines the feedback amount of the comb filter. *Damping* parameter determines the cutoff frequency of the lowpass filter in the feedback path of the comb filter.

VAnalog Filter



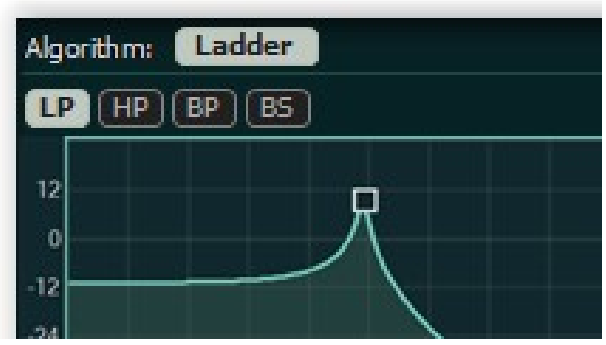
VAnalog filter is modeled after the famous ladder filter. It has continuously variable *Slope*, unlike the digital filters with fixed slope (This is a feature unique to SynthMaster). At high resonance values, the filter self-oscillate.

Drive: parameter is used to boost the signal within the four filter stages. It is useful when combined with *PreGain* and *Resonance* parameters.

Boost: is used in Lowpass mode to compensate for the gain drop due to increased resonance.

For VAnalog filters, there are 3 types of *Nonlinearities*: Basic, Normal and High. For realistic modeling High is the best one to use but it's costly in terms of CPU usage. For most cases (like low-mid resonance polyphonic patches), Basic should be sufficient.

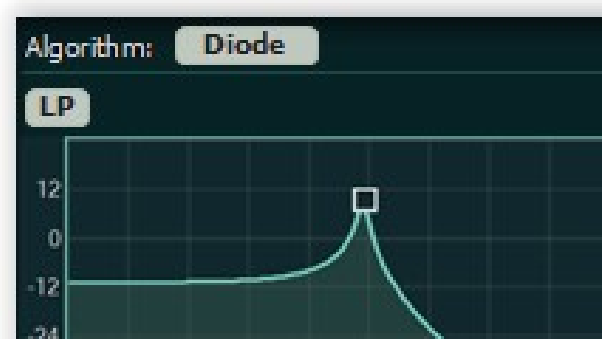
Ladder Filter



Ladder filter, similar to VAnalog filter, is modeled after the famous ladder filter, but is a zero delay feedback filter. Unlike VAnalog filters we added only 2 slopes (12 dB/oct and 24 dB/oct), and 4 filter types (LP, HP, BP and BS)

Acid: When this button is pressed, the filter resonance is coupled to the cutoff frequency: When cutoff decreases the resonance decreases as well. This gives a nice TB303 style "Acid" filter response!

Diode Ladder Filter

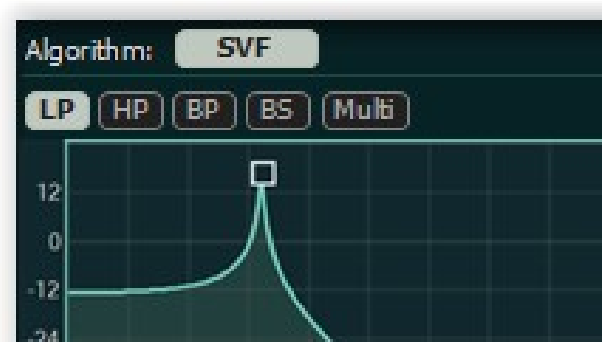


Diode Ladder filter is modeled after a well-known analog filter circuit found in synths such as the TB303. It is a zero delay feedback filter. There's only 1 filter type: Lowpass with 24dB/oct slope

Acid: When this button is pressed, the filter resonance is coupled to the cutoff frequency: When cutoff decreases the resonance decreases as well. This gives a nice TB303 style "Acid" filter response!

Boost: is used to compensate for the gain drop due to increased resonance

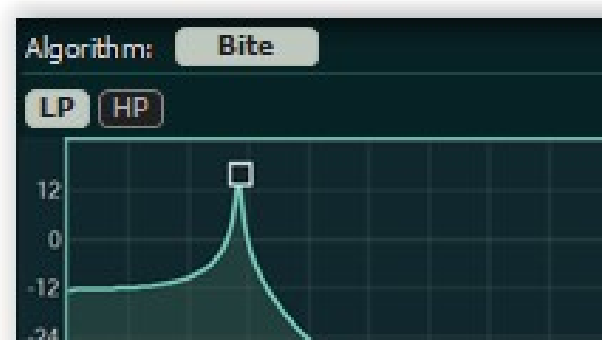
State Variable Filter



State Variable filter is modeled after analog state variable filters found in synths like the SEM. It is a zero delay feedback filter and is available in 5 types: Lowpass, Highpass, Bandpass, Bandstop and Multimode. When filter type is set to multimode, *Mode* parameter changes the type of the filter from Lowpass to Bandstop (Notch) to Highpass.

Acid: When this button is pressed, the filter resonance is coupled to the cutoff frequency: When cutoff decreases the resonance decreases as well. This gives a nice TB303 style "Acid" filter response!

Bite Filter



Bite filter is modeled after the analog 12 db/Oct lowpass & 6dB/oct highpass filters found in the famous MS20 synth. It is a zero delay feedback filter and available in 2 types: 12 db/oct Lowpass and 6 dB/oct Highpass

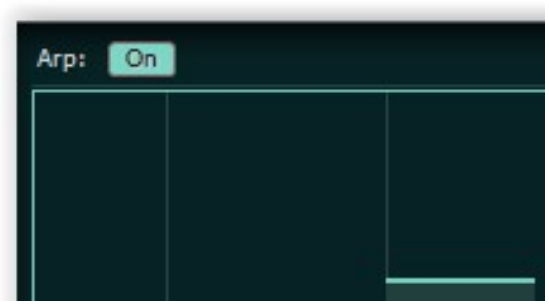
Acid: When this button is pressed, the filter resonance is coupled to the cutoff frequency: When cutoff decreases the resonance decreases as well. This gives a nice TB303 style "Acid" filter response!

Arpeggiator/Sequencer

SynthMaster features a very powerful arpeggiator/sequencer, with up to 32 steps each step having its own

Velocity, Length, Slide, Hold, Delta (used in Arpeggiate mode) and *Note number*(s) (used in Sequence mode). Using the arpeggiator, you can create rhythmic arpeggios, sequences or drum patterns. The arpeggiator receives MIDI input, and sends MIDI output.

TIP: For the VST version of SynthMaster, you can record the output of the arpeggiator and use it on other tracks as well!



Arpeggiator/Sequencer has the following modes:

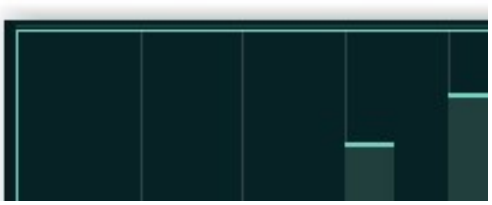
- Classic Modes: Up, Down, UpDown, DownUp, UpDown2, DownUp2, As Played, Chord
- Sequence
- Drum Kit

For each mode, the following parameters are common:

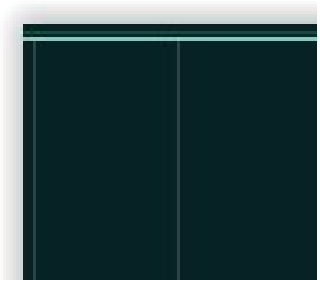
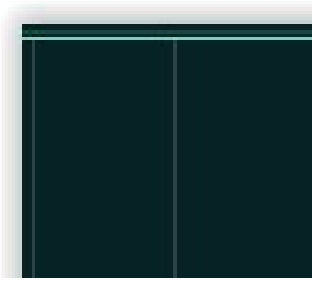
Steps: This parameter determines the total number of steps, which can be between 1-32 steps. There's also a special value "- -" for classic arpeggio modes, where the number of steps is variable: When the current playing step note falls out of the "Range" the current step is reset back to the first step.

BaseTime: This parameter determines the base length of each step, synchronized to host tempo/BPM. So for instance if base time is quarter notes (1 beat) at a tempo of 120 beats/sec, each step will have a length of: 60/120 seconds -> 0.5 seconds.

Duration: The note on duration of each step is calculated by *BaseTime X Duration X Step Length*. If duration is at maximum value and Layer polyphony is set to *Mono*, notes are tied:

Duration = 0.25 (Hold off)	*Duration = 0.50 (Hold off)*	*Duration = 0.75 (Hold off)*	*Duration = 1.00 (Tied)*
			
If Hold is on for the step, then duration is set to max value:			

Swing: increases and decreases consecutive step lengths by the swing amount.

Swing = 0, ratio of lengths = 1	*Swing = 0.33, ratio of lengths = 2*	*Swing = 0.5, ratio of lengths = 3*
		

Range: For classic/arpeggiator modes, it changes the range of the arpeggios. For sequence mode, the sequence is repeated at upper octaves based on the range value. For drum kit mode, this parameter doesn't have any effect.

Volume, Velocity: Each step generates a corresponding MIDI note on/off message. The velocity of the note on message is determined by the following formula (Input Note Velocity refers to the velocity of the pressed notes):

- When Velocity = Step ->*Volume X Step Volume*
- When Velocity = Note -> *Input Note Velocity*
- When Velocity = Step + Note -> *Input Note Velocity + Volume X Step Volume*
- When Velocity = Step x Note -> I*nput Note Velocity X Volume X Step Volume*

Step Volume: Each step has a volume that's between 0 and 1. When the step volume is zero, the step is considered as a rest, i.e. it doesn't generate any MIDI note on/off messages.

You can edit the step volume in 2 different ways:

1. Move mouse to the right top corner of the step. The cursor will change to :  . Click on the mouse and move it up/down to change the step volume amount.

2. Move mouse over the step and then use the mouse wheel up or down to change the step volume amount

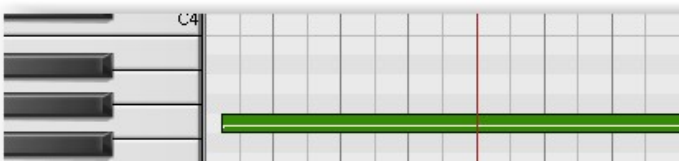
Step Length: Each step has a length that's between 1 and 8. The note on duration of each step is calculated by *BaseTime X Duration X Step Length*

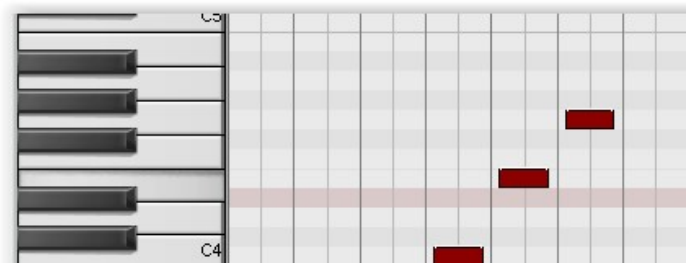
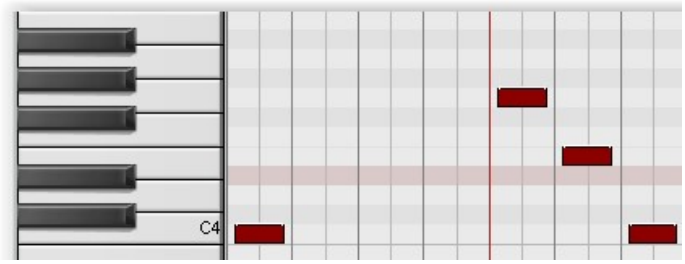
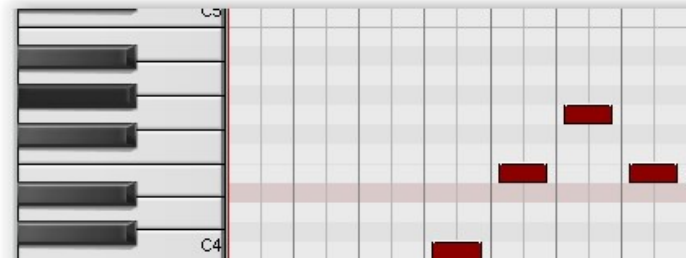
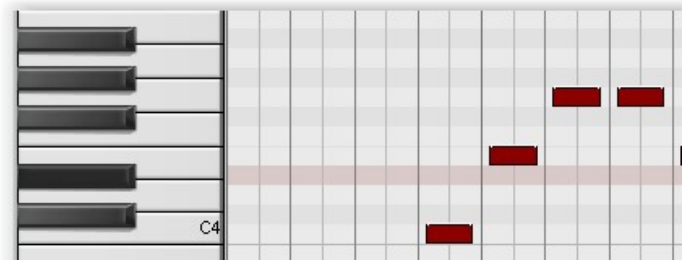
To edit the step length, move mouse to the right corner of the step. The cursor will change to: 

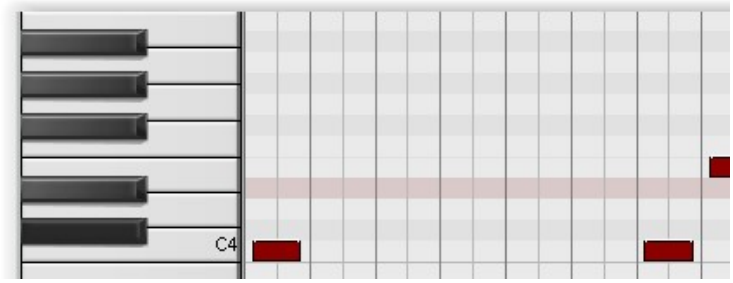
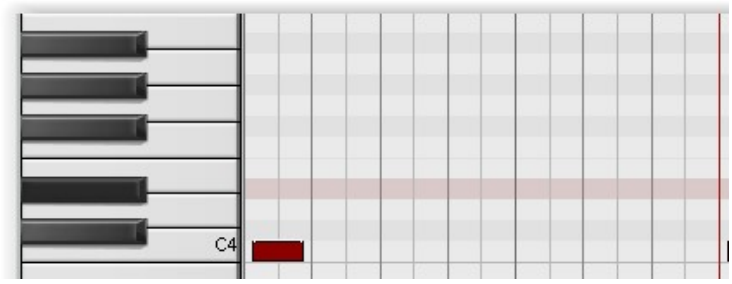
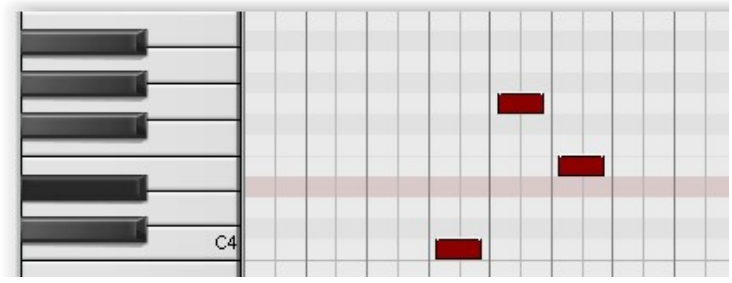
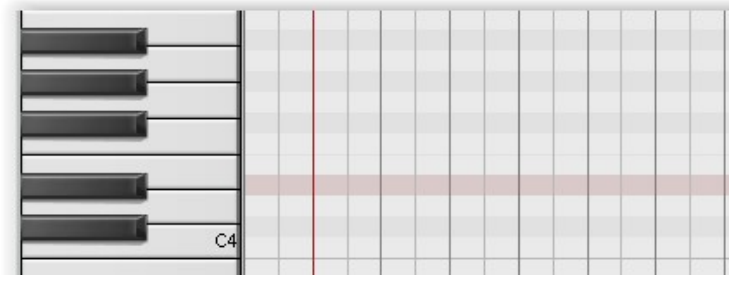
Click on the mouse and move it left/right to change the step length amount.

Classic Modes

Below we explain how the classic modes work using the following input notes: C3, G3 and E3. The range of the arpeggiator is set to 2 octaves and the number of steps is set to 8:

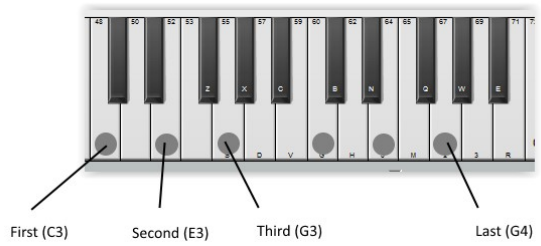


Up  	In this mode, the arpeggio starts from the first note (C3) and increases until the 2 octave range has been reached. When the range has been reached, the arpeggio goes back to the first note (C3), and loops like that. When the step number exceeds the number of steps (8), the arpeggio resets back to the first step (first note) again.
Down  	In this mode, the arpeggio starts from the last note. Since our range is 2 octaves, the last note is C5 when the arpeggio starts. Then the notes are decreased until the first note is reached. When the step number exceeds the number of steps (8), the arpeggio resets back to the first step (last note) again.
UpDown  	In this mode, the arpeggio starts from the first note (C3) and increases until the 2 octave range has been reached. When the range has been reached, the arpeggio start moving in the opposite (down) direction. When the step number exceeds the number of steps (8), the arpeggio resets back to the first step (first note) again.
UpDown2  	This mode is very similar to *UpDown*, with only one difference: The first and the last notes are repeated twice. When the step number exceeds the number of steps (8), the arpeggio resets back to the first step (first note) again.

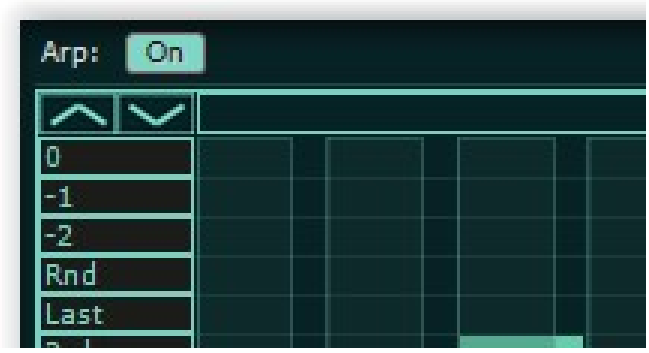
DownUp 	In this mode, the arpeggio starts from the last note (C5 at the time of start) and increases until the 2 octave range has been reached. When the range has been reached, the arpeggio start moving in the opposite (down) direction. When the step number exceeds the number of steps (8), the arpeggio resets back to the first step (first note) again.
DownUp2 	This mode is similar to *DownUp*, except that the first and the last notes are repeated twice. When the step number exceeds the number of steps (8), the arpeggio resets back to the first step (last note) again.
As Played 	In this mode, the notes are played in the order they are pressed (C, G and then E), for each octave in the range. When the step number exceeds the number of steps (8), the arpeggio resets back to the first step (first note) and first octave again.
Chord 	In this mode, the notes are played all together to form a chord. When the step number exceeds the number of steps, the step number is reset to the first step and the octave number is increased by one. When the octave number exceeds the range, it is reset back to the first octave again.

Arpeggiate Mode

SynthMaster features a very unique “Arpeggiate” mode where you can design your custom arpeggios. In this mode, you can adjust the successive note increments/decrements, within the set of notes that are formed by the arpeggiator input notes and the octave “*Range*” parameter. For instance, if the arpeggiator input is C3, E3, and G3, and the *Range* is set to 2 octaves, the set of notes will be:



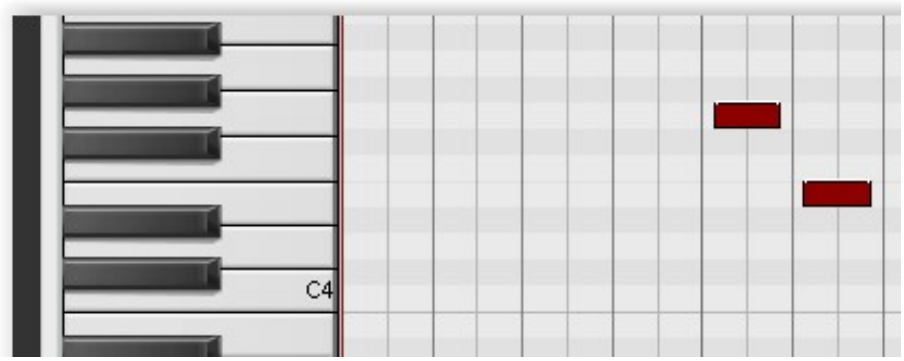
To understand this mode better, let’s analyze the below pattern:



Assuming that the arpeggiator input notes are C3, E3 and G3, the generated notes will be:

Step Number	Delta Value	Generated Note
1	1st	The first note in the set, which is **C3**
2	2nd	The second note in the set, which is **E3**
3	3rd	The third note in the set, which is **G3**
4	2nd	The second note in the set, which is **E3**
5	Last	The last note in the set, which is **G4**
6	-1	Go 1 down from G4: **E4**
7	-2	Go 2 down from E4: **G3**
8	0	Stay at the previous note: **G3**

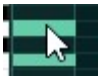
When we run the arpeggio, the following notes will be rendered:



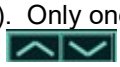
Sequence Mode

In Sequence mode, you can edit, record or import monophonic or polyphonic (chord) sequences.

In this mode, each step can have up to 4 notes.

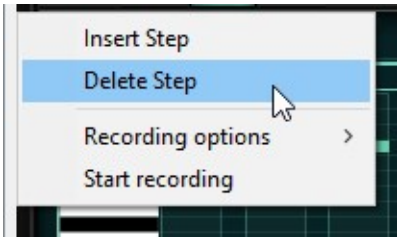
To add a new note, click on a cell on the grid  , the note will be inserted at the cell: 

Similarly, to delete an existing note click on its cell, it will be removed.

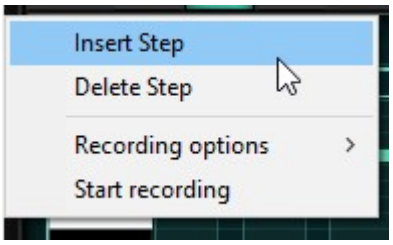
The octave range for each step is between -24/+24 semitones (4 octaves). Only one octave of that range is visible. To view a different octave, you can click on the up/down arrows  or move the mouse over the piano keys and use the mouse wheel to scroll up or down.

If the number of steps exceeds 16, the scrollbar becomes active. In that case, you can click on the left/right arrows  to scroll between the steps.

If you want to delete an existing step completely, right click on the mouse while its over the step, and select “Delete Step” menu from the popup menu:



If you want to insert a step into the sequence, bring the mouse over the step you want to insert the new step, right click on the mouse and select “Insert Step” menu from the popup menu:

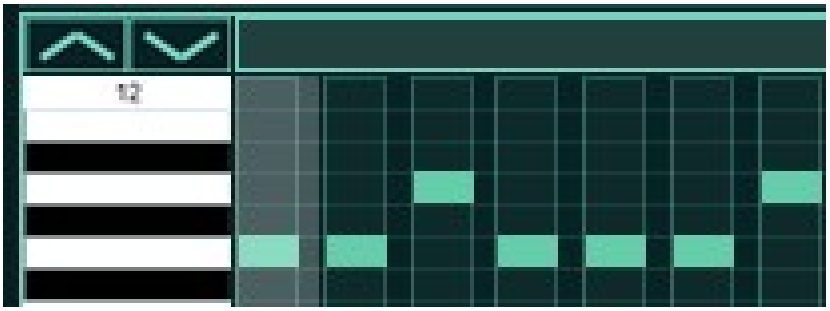


Recording Sequences Using MIDI Input

The easiest way to enter sequences is to record them by sending MIDI to the arpeggiator/sequencer! Starting with version 2.8, SynthMaster can record steps using MIDI input. When the layer is in *Poly* mode, up to 4 notes per step can be recorded.

To start recording, click on the arpeggiator bypass button, it'll change the state to "Recording"

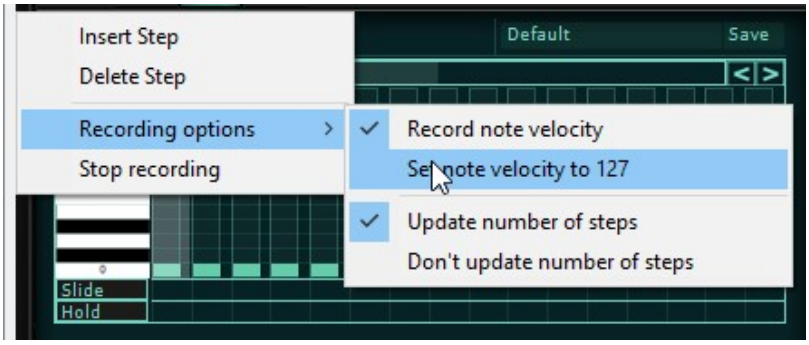
When recording, the current step will be highlighted: and the first note received by the sequencer will be the reference (zero) note:



Whenever a new note/chord is received, the current step will be incremented by one. If the step index exceeds number of steps, the number of steps is automatically incremented, until the maximum number of steps (32) is reached.

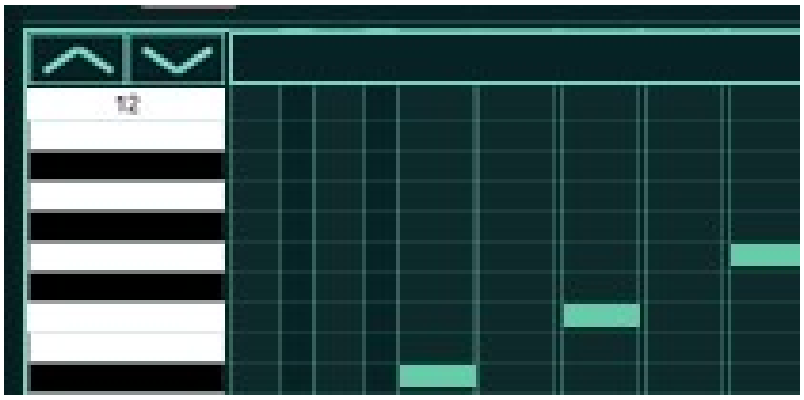
When you are done with recording steps, click on the arpeggiator bypass button again. Recording will stop and arpeggiator's state will change to

When recording MIDI input, the input note velocity is recorded as well. If you want to turn off velocity sensitivity during recording, move mouse over the arpeggiator view and right click the mouse. Choose "Recording Options" menu from the popup menu, and then click on "Set note velocity to 127" sub menu.



Recording Monophonic Sequences Using MIDI Input

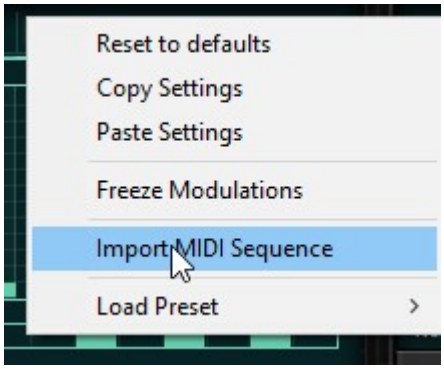
If the layer is in *Mono* mode, the sequencer records only one note at a time. It also detects tied notes, and turns on the Hold for that step automatically.



Importing MIDI Sequences into Arpeggiator

It is possible to import monophonic or polyphonic (chord) MIDI sequences into the arpeggiator/sequencer. To do that you can either:

1. Drag and drop the MIDI file on to the arpeggiator view.
2. Or Select "*Import MIDI Sequence*" from the arrpeggiator presets menu, then select the MIDI file to import.

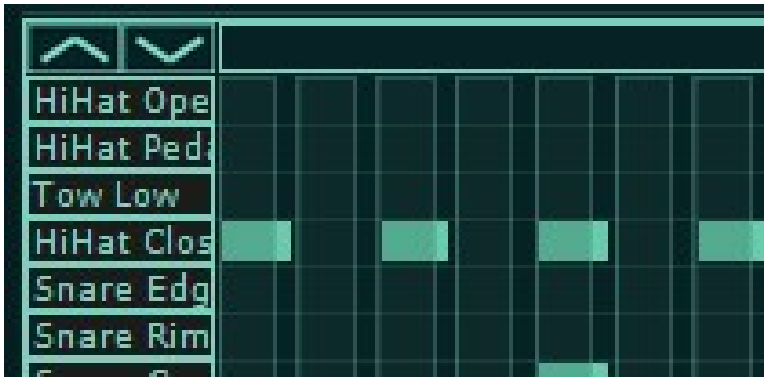


When the MIDI data is imported, the mode is set to *Sequence*, and the *Number Of Steps*, *BaseTime* and *Sync Speed* parameters are calculated automatically from the MIDI data:

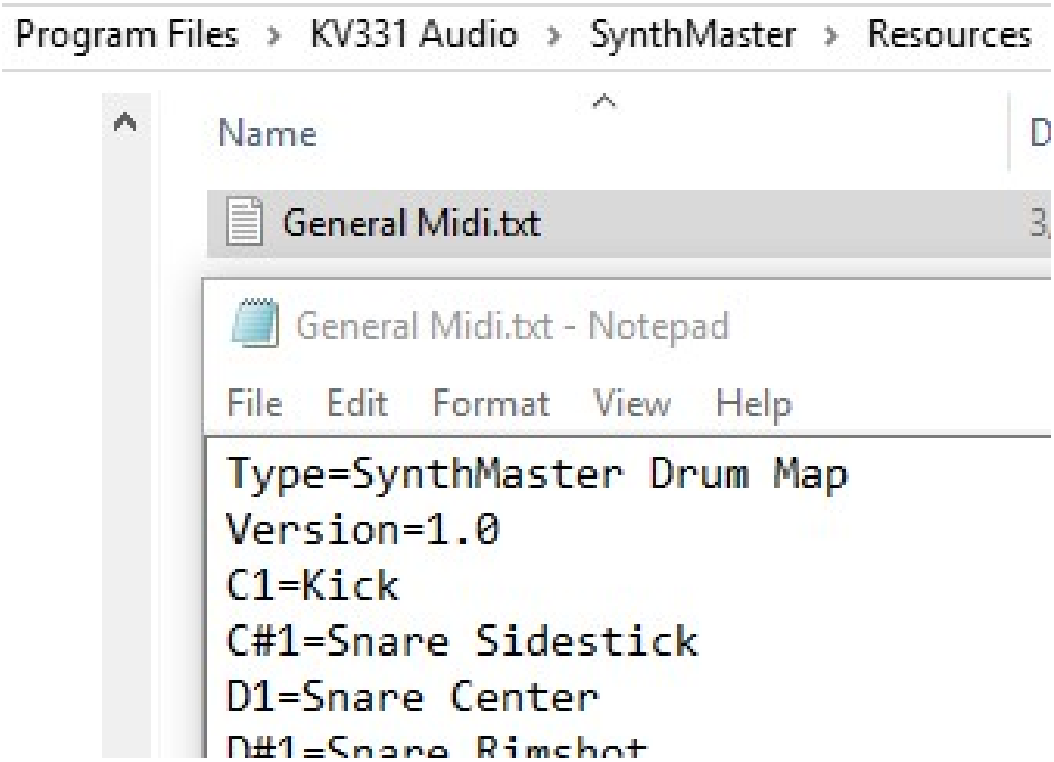
TIP: Before importing the MIDI file make sure you quantize the note durations!

Drum Kit Mode

Starting in SynthMaster 2.8, we added a new mode for the arpeggiator/sequencer where you can create drum patterns:



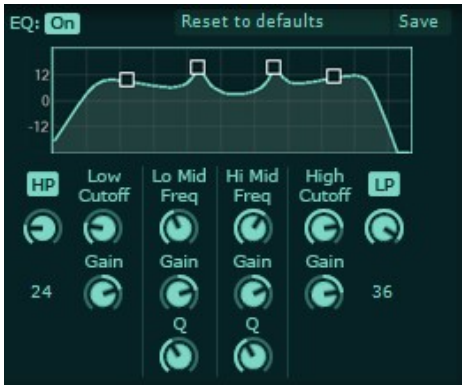
Drum Kits are defined in text files located at *<SynthMaster Data Folder>\Resources\Drum Maps* folder. The instruments of the kit and their corresponding notes are defined as below:



There can be up to 16 instruments per kit in a drum kit definition file. The file doesn't reference any sample data. Samples for each instrument is loaded into the Additive oscillators using SFZ definition files:

Layer Effects

6 Band EQ

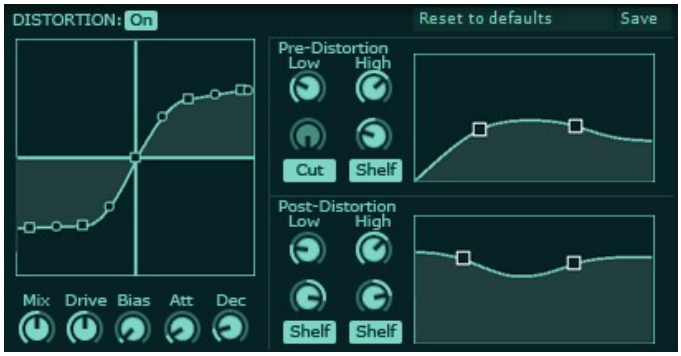


The Highpass and Lowpass bands of the EQ can have a slope between 12-48 db/octave. They can be turned on/off.

The LowShelve, HighShelve bands have 6dB/oct slope.

The Lo Mid, Hi Mid bands have 6 db/oct slope, with variable Q.

Distortion



The Distortion effect in SynthMaster consists of a 2 Band EQ followed by a distortion stage followed by a 2 Band EQ.

The EQ Bands can be cut or shelve.

The distortion curve can be drawn by the user.

The distortion effect has also an envelope follower whose output can be used to add a *bias* to the distortion stage.

LoFi

The LoFi effect is used to apply bit reduction and sample rate reduction (through sample and hold)

The output bits can be controlled by the *Bits* parameter

The output sample rate can be controlled by the *S-H* parameter.

The effect also has a resonant filter that has *Cutoff* and *Reso* parameters.

Phaser

The Phaser effect is 4-8-12-16 stage analog modelled phaser.

With the *Feedback* parameter, the phaser output can be feedback to its input.

Initial Cutoff, and *Cutoff Spacing* parameters can be modulated by the internal LFO of the phaser. The speed of the LFO can be controlled with the *Speed* parameter.

The internal LFO has stereo output, L-R outputs can have different phases or speeds controllable by *L/R Phase*, *L/R Ratio* parameters. The LFO speed can be synced to the tempo as well by turning on *Sync* parameter.

Chorus

Chorus effect is used to add time varying delays to its stereo inputs.

The amount of delay modulation is controlled by *Mod Depth* parameter.

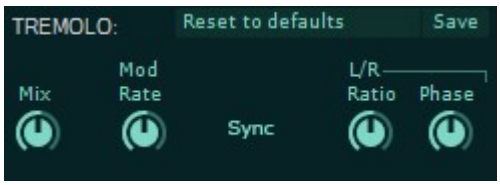
The delay modulation speed is controlled by *Mod Rate* parameter.

The feedback of the delayed output can be controlled by the *Feedback* parameter.

The internal LFO has stereo output, L-R outputs can have different phases or speeds controllable by *L/R Phase*, *L/R Ratio* parameters. The LFO speed can be synced to the tempo as well by turning on *Sync* parameter.

The stereo width of the chorus output is controlled by *Width* parameter.

Tremolo

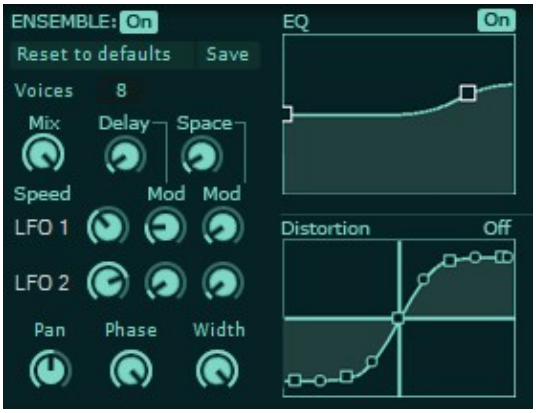


Tremolo effect is used to modulate the amplitude of its stereo inputs.

The internal LFO of the effect is used for amplitude modulation

The internal LFO has stereo output, L-R outputs can have different phases or speeds controllable by *L/R Phase*, *L/R Ratio* parameters. The LFO speed can be synced to the tempo as well by turning on *Sync* parameter.

Ensemble



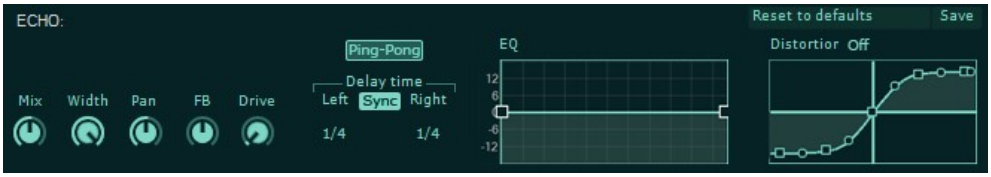
The ensemble effect is up to 8 voices running in parallel at different delay modulations.

There are 2 LFOs at 2 different speeds that can modulate the initial delay/delay spacing..

Each LFO has multiple outputs, at different phases. *Phase* parameter controls the phase difference of each LFO output. LFOs can modulate the delay or spacing of each voice.

The stereo width of the ensemble output is controlled by the *Width* parameter.

Delay



Delay effect is used to add EQed and/or distorted delay to its stereo inputs.

The delayed + EQed Left/Right signals can be feedback using the *Feedback* parameter, creating Echo.

When *PingPong* button is pressed, left output is feedback to right input, and right output into left input vice versa.

The 2 Band EQ is used to filter the delayed outputs.

The distortion stage after the EQ can be turned on/off.

The stereo width of the delay outputs is controlled by the *Width* parameter.

Reverb

SynthMaster features a powerful Reverb effect, used to simulate rooms/spaces

Early/Late EQs are used to change the tonal characteristics of the early/late reflections of the effect.

Eary/Late reflection mix ratios can be controlled using the *E/L Mix* parameter.

The (late reflections) reverb time (time it takes to decay 60 dB) is controlled using the *Reverb Time* parameter.

The *Room Size* parameter calculates the early reflection tap delays/gains behind the scenes.

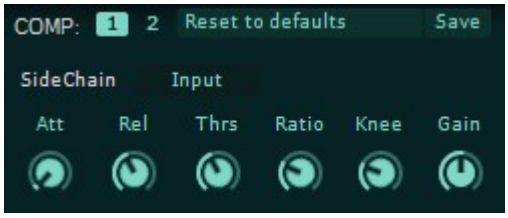
The *Distance* parameter controls the distance between the listener and the reverb inputs.

The *Damping* parameter controls the high frequency loss that takes place when reflections in a room bounce off of walls.

The *Mod Amount*, *Mod Speed* parameters control the amount and speed of random modulations that

slowly change the delay line lengths within the reverb algorithm.

Compressor



Compressor effect is used for dynamic gain reduction.

The *Ratio* parameter controls the compression ratio, that is between 1:1 – 1:20 (in dB)

The *Threshold* parameter controls the level at which compression starts.

Knee controls the smoothness of the compression curve. At zero value, the compression curve is the sharpest.

Vocoder

The vocoder in SynthMaster consists of 16 analysis and 16 synthesis filters (1 LP + 14 BP + 1 HP)

The analysis filters are at fixed frequencies (similar to analog vocoders). The initial frequency and frequency spacing of the synthesis filters, on the other hand, can be controlled by *Start Frequency* and *Frequency Spacing* parameters.

The analysis filter outputs are displayed on the Modulator Spectrum display. They can also be used as global (synth) modulation sources.

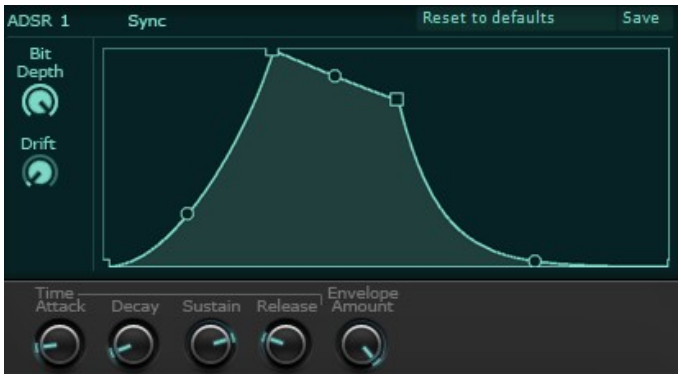
Modulation Sources

Each layer in SynthMaster has the following voice modulation sources, which are available separately for each voice (as opposed to global modulation sources such as MIDI CC, synth LFOs, etc):

- 4 ADSR envelopes
- 2 Multistage envelopes (up to 16 points)
- 2 2D envelopes (up to 16 points)
- 2 Voice LFOs
- 4 Keyscalers
- MIDI Velocity
- Unison Index
- Bipolar/Unipolar Random
- Alternating

ADSR Envelopes

There are 4 ADSR (Attack, Decay, Sustain, Release) envelopes available for each layer voice as a modulation source. The output of the envelope is unipolar (between 0.0-1.0). The envelope has basically 3 stages: Attack, Decay (ending in sustain), and Release.



Attack (time) controls the time it takes to reach from initial envelope level to the attack level.

Decay (time) controls the time it takes to reach from attack level to sustain level. When the envelopes reaches the *sustain level*, the envelope stays at that level until the voice receives a MIDI note off message (if Hold pedal is pressed the envelope stays at sustain level until the pedal is released)

Release time controls the time it takes to reach from sustain level to final level.

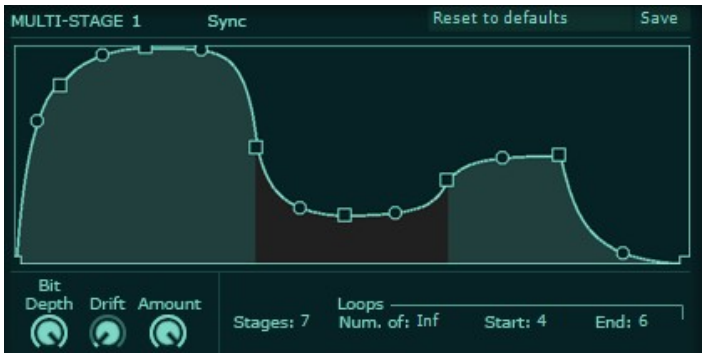
Envelope amount controls the volume of the envelope (It's useful for modulating envelope output with other sources such as MIDI velocity)

By using *Bit Depth*, the output bit depth of the envelope can be quantized between 2-24 bits.

By using *Drift*, the output volume of the envelope can be slightly modulated by a random glide LFO.

Multistage Envelopes

There are 2 Multistage envelopes available for each layer voice as a modulation source. The output of the envelope is unipolar (between 0.0-1.0).



Number of stages sets the number of envelope stages. Each stage has 3 parameters: *Length*, *Slope*, and *Final Value*.

A loop can be defined between 2 segments by setting *Loop Start* and *Loop End* parameters. The loop can repeat itself either indefinitely, or between 1-32 times, based on the *Number of Loops* parameter.

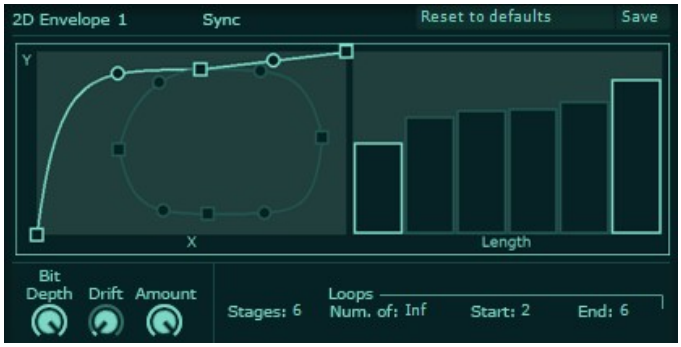
Envelope amount controls the volume of the envelope (It's useful for modulating envelope output with other sources such as MIDI velocity)

By using *Bit Depth*, the output bit depth of the envelope can be quantized between 2-24 bits.

By using *Drift*, the output volume of the envelope can be slightly modulated by a random glide LFO.

2D Envelopes

2D envelopes are similar to multistage envelopes, but with one major difference: They are 2 dimensional and therefore have 2 separate outputs, X and Y.



Number of stages sets the number of envelope stages. Each stage has 3 parameters: *Length*, *Slope*, and *Final Value*.

A loop can be defined between 2 segments by setting *Loop Start* and *Loop End* parameters. The loop can repeat itself either indefinitely, or between 1-32 times, based on the *Number of Loops* parameter.

The length of each stage can be set by adjusting the bars on the right side of the envelope view.

Envelope amount controls the volume of the envelope (It's useful for modulating envelope output with other sources such as MIDI velocity)

By using *Bit Depth*, the output bit depth of the envelope can be quantized between 2-24 bits.

By using *Drift*, the output volume of the envelope can be slightly modulated by a random glide LFO.

LFOs

There are 2 LFOs (Low Frequency Oscillators) available for each layer voice as a modulation source. The output of the LFO can be either bipolar (between -1.0 +1.0) or unipolar (between 0.0-1.0), based on the *Bipolar* parameter's value.

There are 3 LFO types in SynthMaster:

1. Basic LFO
2. Step LFO
3. Glide LFO

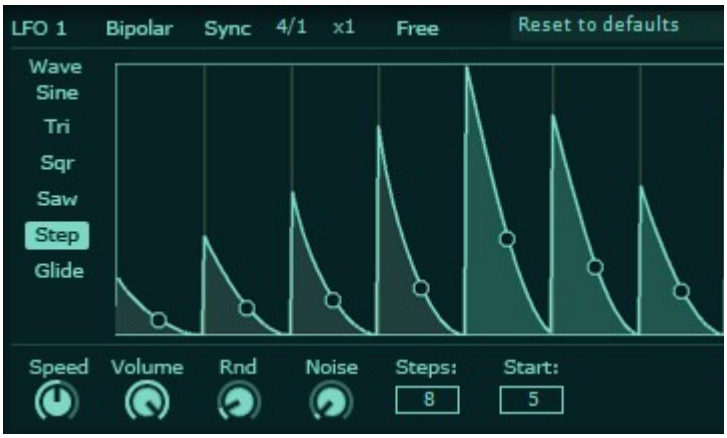
For all 3 types, the LFO has a 2 stage Attack/Release envelope: Attack Slope/Time and Release Slope/Time parameters are available for the envelope.

Basic LFO can have one of the 4 basic wave shapes: *Sine, Triangle, Square and Sawtooth*

The LFO start phase can be controlled by adjusting the *Phase* parameter.

The LFO speed can be controlled by adjusting the *Speed* parameter.

The LFO speed can be synced to host tempo by turning on *Sync* parameter. If *Sync* is on, *Speed* parameter multiplies the synced speed (between 1/128 – 128/128)



In *Step LFO mode*, *Steps* parameter controls the number of steps the LFO has, while *Loop Start* controls the loop start step. The loop end step will always be the last step.

The duration of each step is controlled by the *Speed* parameter.

By turning on *Sync*, step durations can be synced to host tempo. If *Sync* is on, *Speed* parameter multiplies the synced speed (between 1/128 – 128/128)

For each step, there are 2 parameters: *initial value*, and *slope*. The final value of the step is always zero.

Glide LFO mode is very similar to *Step LFO*, with one exception: The final value of a step is the initial value of the next step.

Keyscalers

Keyscalers are used to modulate parameter values based on the current MIDI note number.

The keyscaler graph can have upto 16 points, and the graph determines the scaling for each MIDI note between 0-127. The scaling amount is unipolar, between 0.0-1.0