

Hyperion Synth Plugin – User Guide

Document version 2.3

(updated as of version 1.36 of Hyperion Synth)

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Introduction

Welcome to Hyperion plugin synthesizer.

With Hyperion synth you can design your own sounds in a modular way by selecting from multiple sound generation, sound processing and control nodes.

Multiple layers of sounds (patches) are possible with the ability to send control data between layers, as well as use macros to simultaneously affect all layers.

Each patch has dedicated velocity and note zones, as well as dedicated chord, midi echo and arpeggiator functionality.

Each layer can have its own dedicated bus effects, and audio from each layer can also be sent and received between patches using one of 4 effect busses.

More usage details and releases news will be found at hyperionsynth.com.

By purchasing a license you will enable continuous improvement of Hyperion with additional features and enhancements, patch packs and training videos.

Developing Hyperion has been a huge endeavor, and we really appreciate your support in purchasing a licensed copy and providing constructive feedback. Thanks in advance!

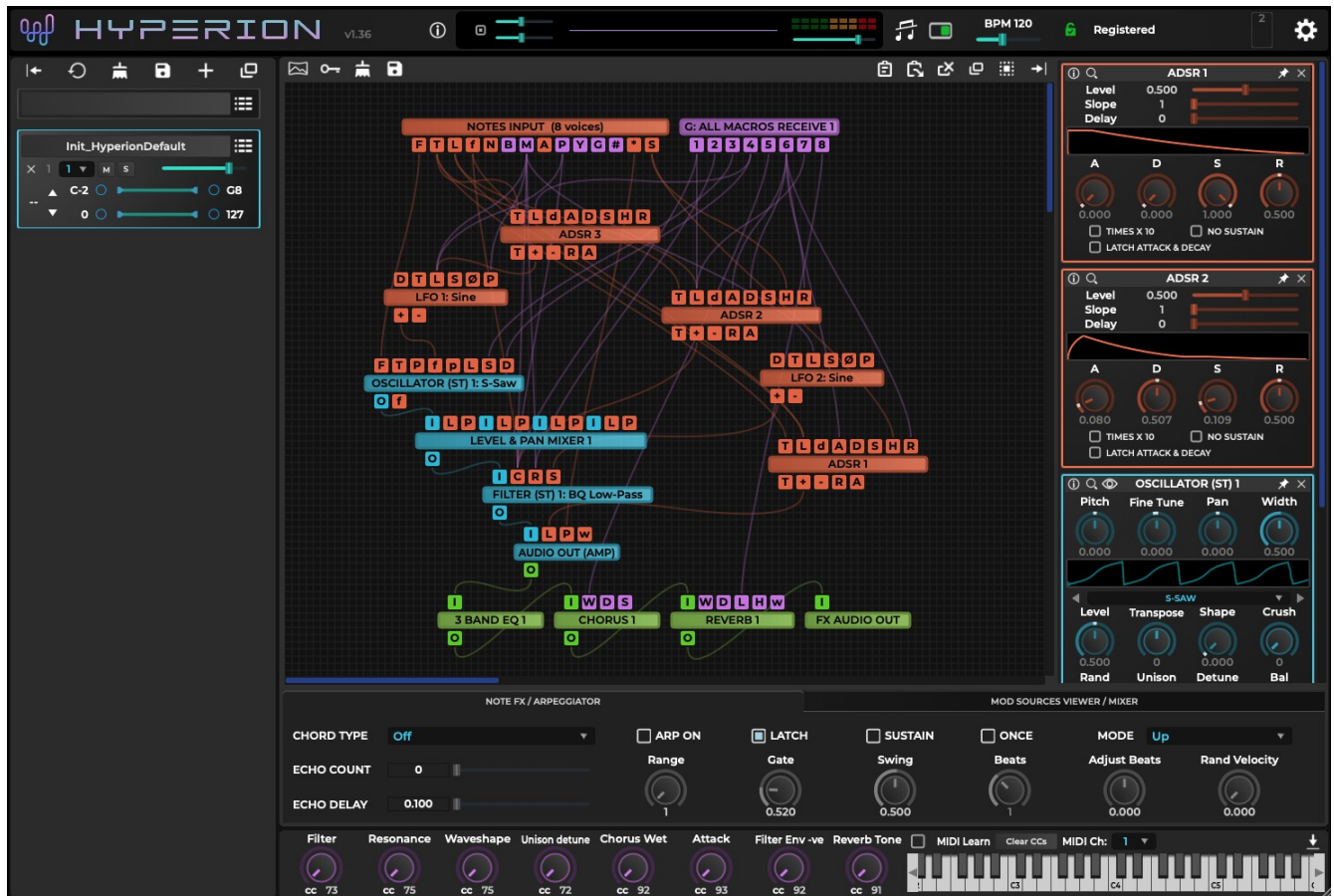
Whilst this user guide does its best to summarize the functionality of Hyperion there is a lot to cover and not all the very latest features might be mentioned as features and improvements to existing features are being made all the time.

Node descriptions for each of the nodes are available in the Node selection toolbox and info panels within the UI.

Additionally to the manual, there is a lot of information available in tutorial videos posted in the Hyperion youtube channels, and you can join the Hyperion channels in the Wavesequencer discord server to chat with the developer and other users to ask questions that remain un-answered.

Interface overview

The initial interface of the plugin when launched looks like this.



The interface is split into sections that can be hidden to increase the amount of patch editing space visible or simply to concentrate on playing and adjusting the currently selected layers.

Top bar



The top bar of the interface is always visible and has the following elements:

This area shows the version number, the registration status, and an info button that opens up some general and quick start information about Hyperion synth.

Oscilloscope view with master volume control

The left hand controls of the oscilloscope allow to change the time and level scaling as well as turn the updates off (checkbox).

The oscilloscope is a view on the total mix – to monitor/analyze the sound of one layer only, use the solo button control.

The level meter will show the overall output mix of this instance of the plugin in your DAW.

Notes off button

Stops all MIDI notes – even notes that were latched by the arpeggiator.

Master audio switch

Turn audio on or off.

BPM control

This control is visible in standalone mode only, otherwise the plugin host/DAW will set the tempo.

Tempo is used for setting the arpeggiator speed as well as for delay times and LFO rates when those are set to link to the tempo.

CPU load

At the far right hand side of the ‘Top bar’, the audio CPU load is shown (this is audio processing specific – not the main CPU load).

Settings button:

The cog icon-button opens up a general UI settings panel.

Before Hyperion is registered, there is an unlock button which opens up the unlock UI where you will need to input your Tracktion user name and password – or use the offline registration code method.

Unless Hyperion is registered and unlocked with a valid purchased license it will run in restricted mode where audio will be muted every few minutes, and saving is disabled.

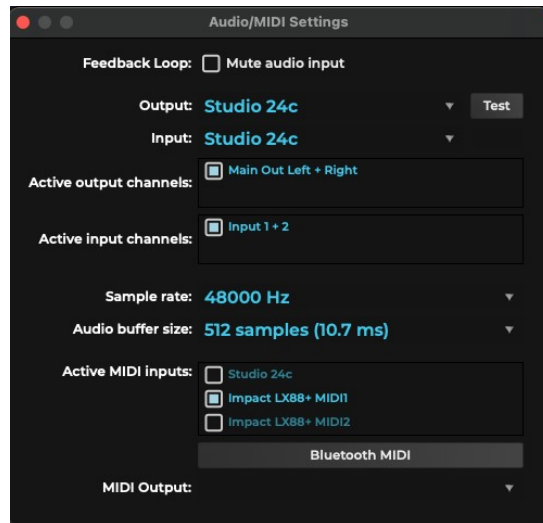
Stand-alone mode controls

The BPM control appears in standalone mode (otherwise tempo is set in the DAW/plugin host).



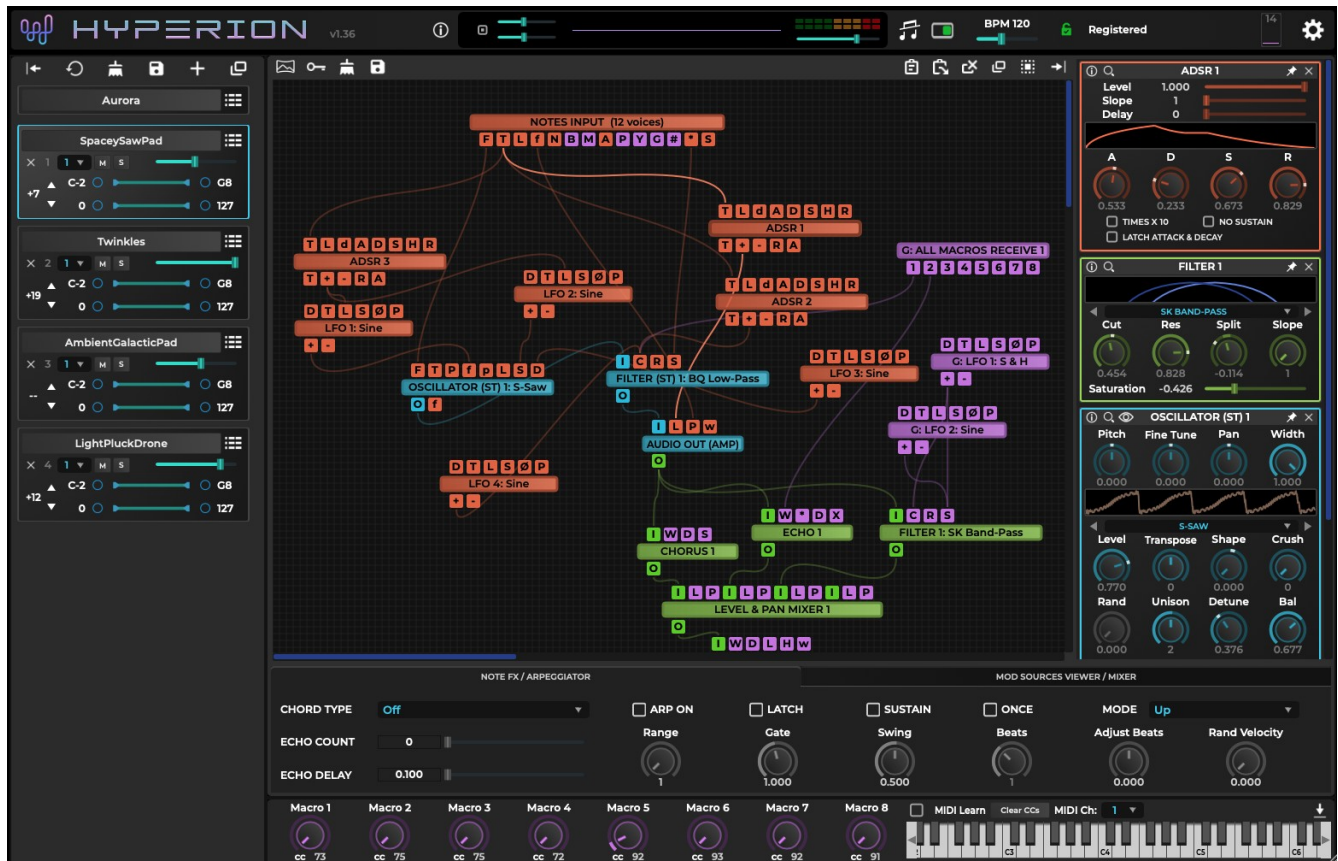
The MIDI out device selector is available in the options area (click the options button that appears on the top left when in standalone mode) – and will enable forwarding of MIDI control data/notes generated by patches.

The options panel is also used to select audio device and MIDI input device settings.



Main User Interface (UI) Sections

Most of the buttons in the main interface have 'tool-tips' that appear just below the oscilloscope view in the patch editing space when the mouse cursor is placed over them, as well as directly next to the mouse pointer.



The left most panel is the layers section – which shows the currently loaded patch or patches (a multi-layer patch set is referred to as a combi-patch).

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The top most tab is the ‘combi’ tab – which when clicked on opens up the combi view which features a selectable layout and background and large macro controls/keyboard. The macro names can also be renamed here by click on them.



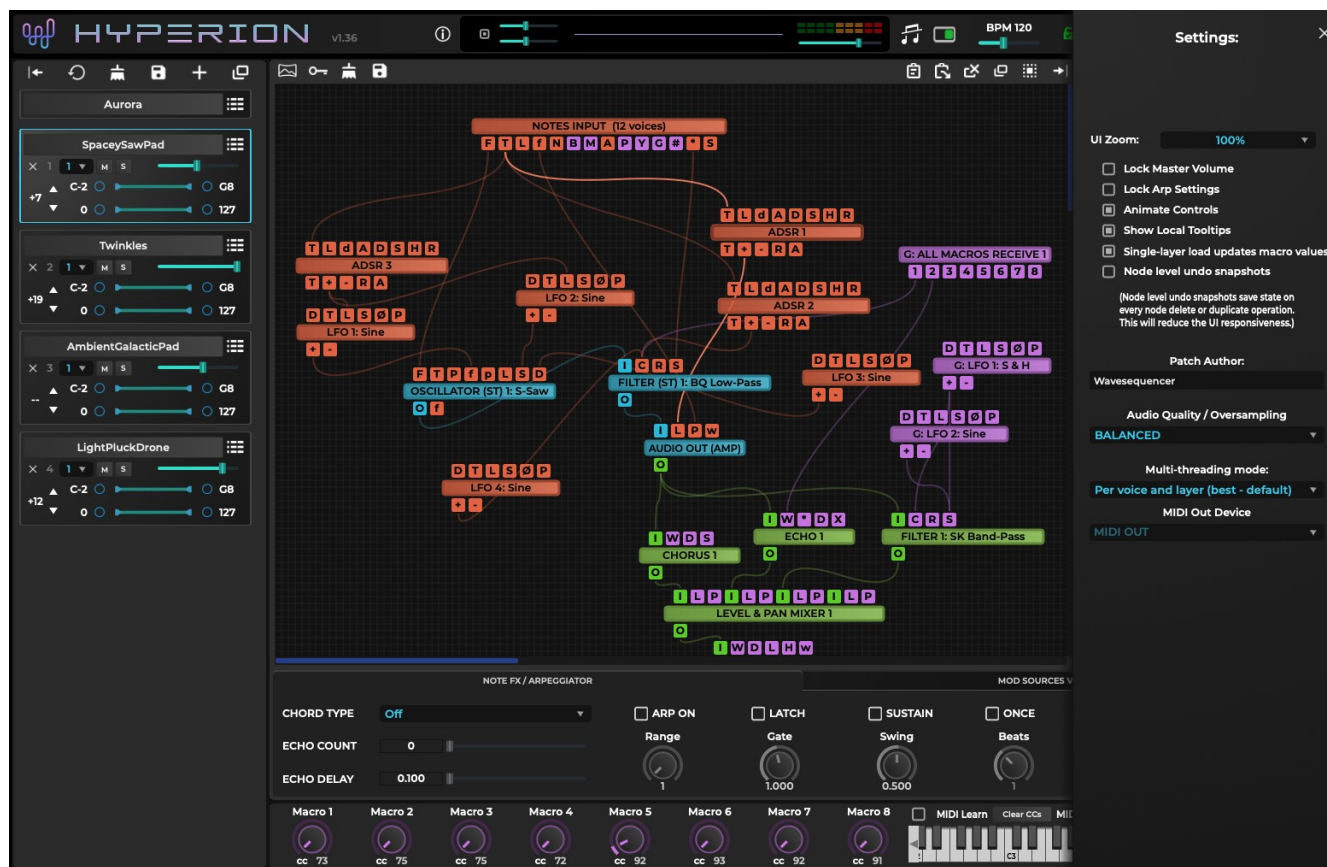
(combi controls/macros view)

The central part of the GUI shows the patch editing area for the currently selected layer or the patch browser.

At the bottom part of the patch editing area is the macro-controls / virtual-keyboard section – which can be minimized or restored with the arrow icon.

Macro controls send data to the macro control input nodes on all layers, regardless of the selected MIDI channel of each layer. The virtual keyboard will send MIDI notes to all layers on the selected channel. Macro controls are DAW automate-able parameters, or can be optionally controlled with MIDI cc.

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The 'Settings' panel is accessed by clicking the 'Cog' icon at the top right hand side of the UI - it allows to optionally lock the master volume and arpeggiator settings – which would normally be overridden when loading combis or patches respectively.

'Animate Controls' option enables to switch off knob modulation value animation – which can reduce the UI load on the CPU a little.

'Show Local Tooltips' option enables to turn off the pop-up help messages that appear when the mouse is hovering above a control or node pin.

'Single layer load updates macro values' – when you load a single layer patch the values of the macro knobs will get updated with the saved values in the single layer patch if this is selected.

'Node level undo snapshots' is an extra option for saving snapshots of the plugin state on every node delete or duplicate operation (additional to layer delete or patch/combi load event undo snapshots). Whilst this is useful for some, it can slow the UI experience and is disabled by default.

The 'Audio Quality / Oversampling' pull-down list lets you select from 4 oversampling quality levels for the standard oscillators.

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The multi-threading mode pull-down list provides options for how to utilize a multi-core CPU – the best setting is usually ‘per voice and layer’ for maximum usage of CPU cores/threads.

‘MIDI Out Device’:

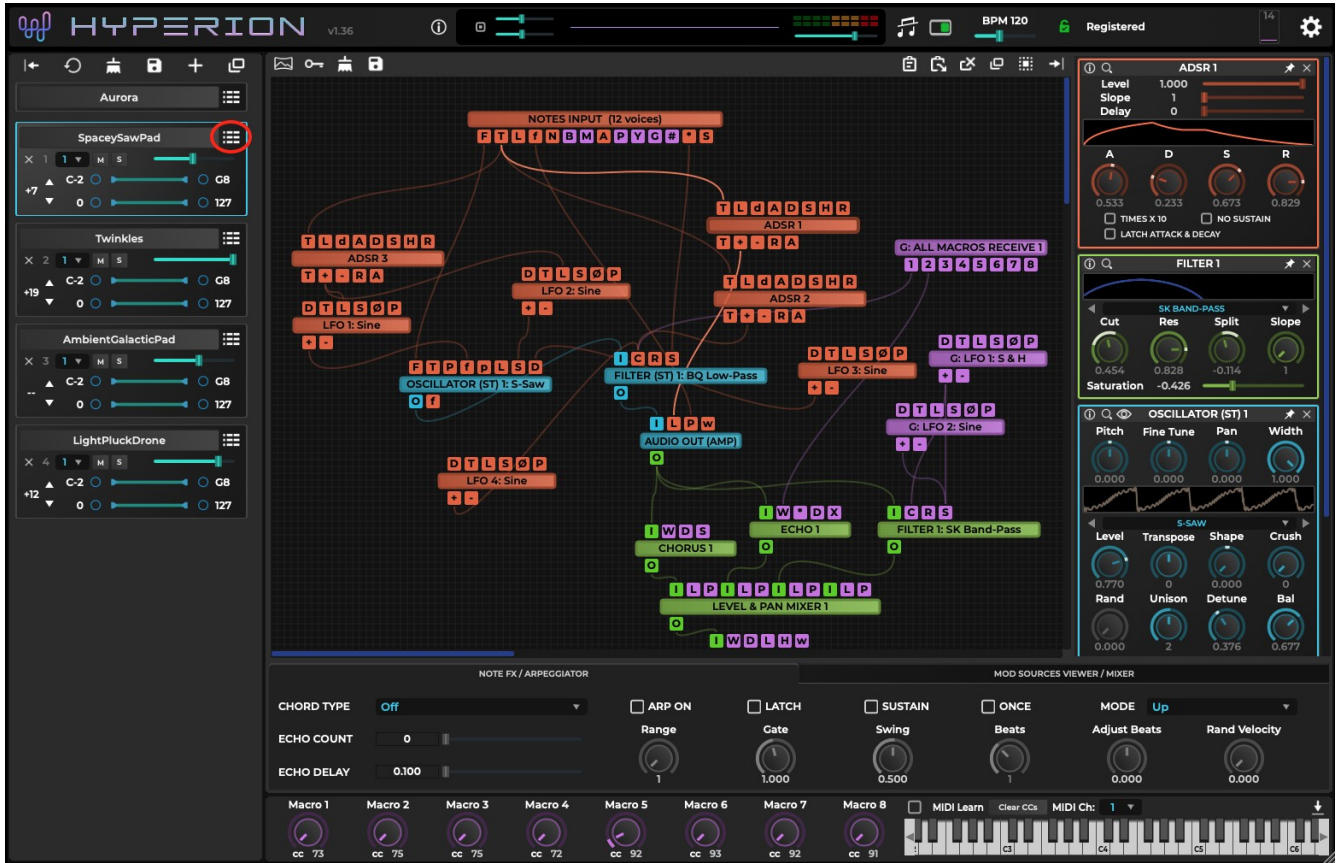
In the standalone application mode, it’s possible to select the MIDI target device for MIDI data generator nodes here too.

This option is not visible in the VST3/AU plugin version since this would be controlled by the DAW itself.

In standalone mode, the options button at the top-left hand side of the UI (in the title bar) enables selection of the audio i/o hardware settings and MIDI i/o devices.

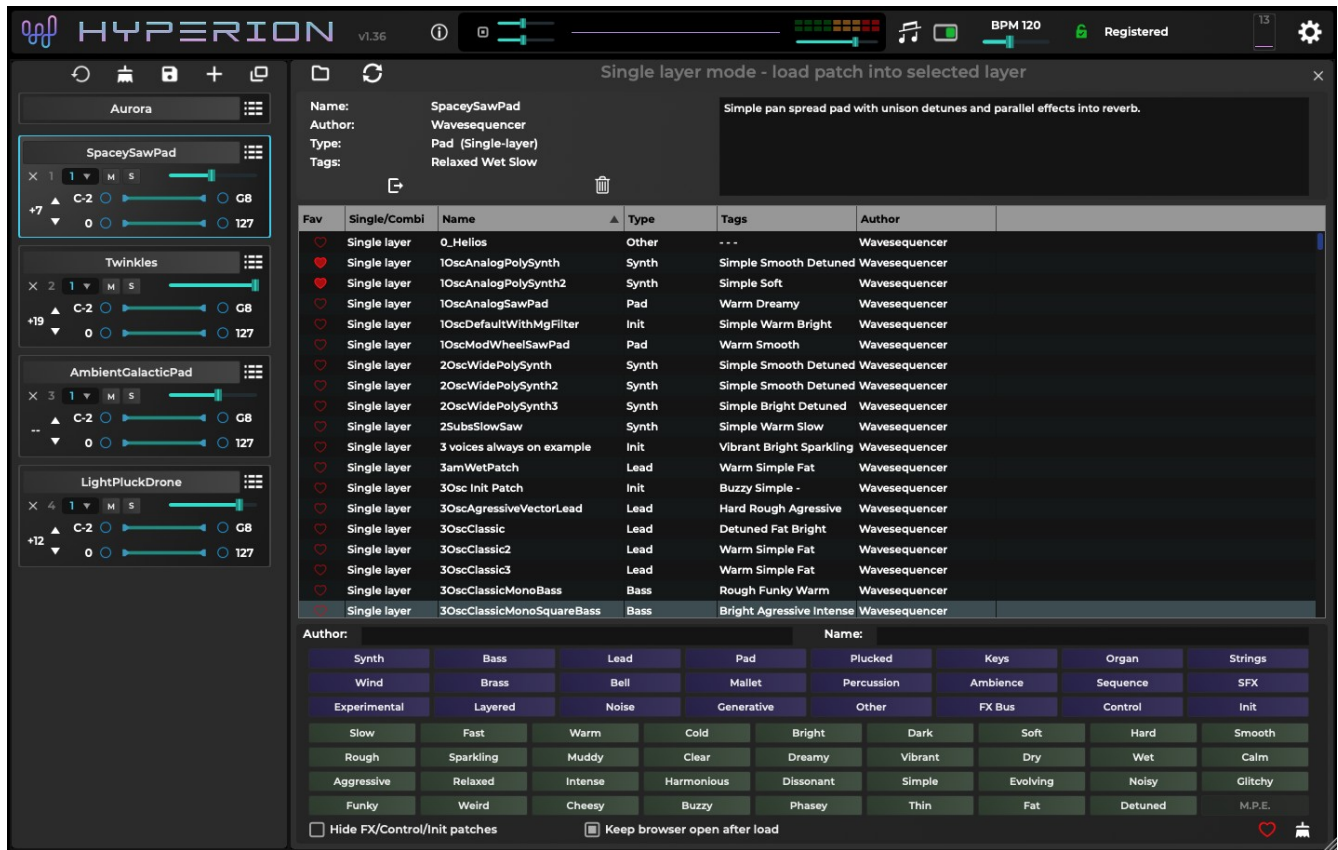
Patch browser and directory setting

Click the browser icon to open the browser for loading into the combi (all layers) or the selected layer.



After launch and any time after setting the patch directory or saving or deleting a patch/combi-patch the patches will be scanned and the list will be updated alpha-numeric order.

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The patch list shows all available patches in the currently selected folder, unless filtering options are applied – you can select an instrument type, and up to 3 category tags, as well as filter by patch author (type in a partial or full name) or patch name.

Set the current patch folder by clicking on the folder icon on the top left of the browser area (click on it again to hide the system folder browser).

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Patch Filters:

Typing in an author or patch name will filter the patch list displayed by removing non matching patches.

Selecting patch filter instrument type, and tags will remove patches from the list that don't contain those tags and that don't match the instrument type selected.

You can set patch filter category tags and the instrument type when you save a patch.

Hide FX/Control/Init toggle button: will hide patches saved as 'FX', 'Control' or 'Init' type.

Heart button: toggle filter by favorites.

Brush button: clear all the filter settings (show all available patches in the current directory).

Meta-data:

The area above the patch list shows ‘meta-data’ about the patch – including any comments written when saving the patch, and is updated each time you click on either a layer, or on a patch in the list – and it is set to default values when adding a new layer or clearing the currently selected one.

The patch meta-data shown here is also the default meta-data that will be visible if you open the save combi/patch dialog.

Favorites:

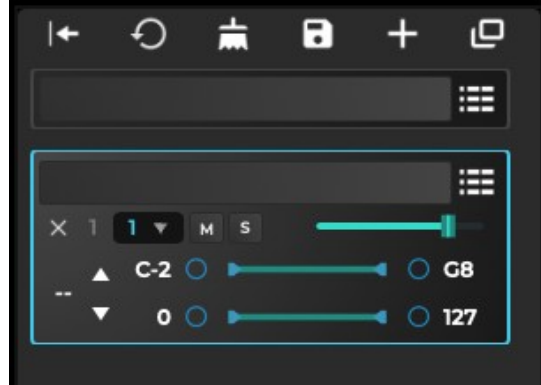
The patch filters area features a heart icon-button which will enabling filtering by favorites – to toggle a patch as a favorite, click the heart icon on the patch’s line in the patch list.

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To begin getting familiar with Hyperion it's good to look at a simple 'Init' type patches or you can immediately start editing the default patch.

To find init patches, select the 'Init' type filter and you can load 'Init_Sine' or 'Init_TrainingPatch' for example.

Layer buttons:



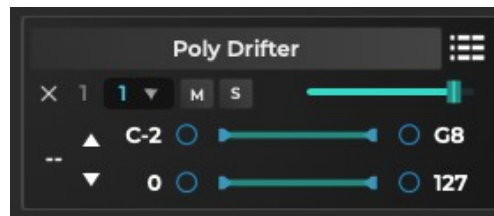
The buttons at the top of the layers panel are as follows from left to right:

- Hide layers area – hides the layers panel.
- Undo button – opens a dialog box to select a UI undo state to restore.
- Clear all layers – reset all the layers to empty patches and clear the combi settings leaving just 1 layer enabled/visible.
- 'Save Layers as combi patch' - will allow to save all the current layers as well as the macro control settings into a combi-patch – allowing to recall the state of all layers later.
- Add layer – add a new patch layer – the patch editing UI will switch to the new layer.
- The 'Duplicate Layer' button will duplicate the currently selected layer into a new one (assuming less than 16 layers already exist):

The currently selected layer has a light blue surround.

Combi patches are saved as a collection of all the individual patches data, when you save a combi, it saves all the layers into the combi patch, but does not overwrite the layer patches with new data if you changed something in the layers.. so if you want to re-use layer changes, they must be saved into a new single-layer patch, or overwrite the existing single-layer patch.

Layer controls



Each layer can be set to respond to a dedicated MIDI channel. The required dedicated MIDI channel is selected from the drop down list. The layer number is the grey number to the left of the MIDI channel drop down list.

Layer controls also include (inclusive) MUTE and (exclusive) SOLO buttons, as well as level control slider.

‘Exclusive mute’, and ‘Inclusive solo’ are enabled by holding the SHIFT key whilst clicking the mute or solo buttons.

Modes summary:

Inclusive mute: when you mute a layer, other layers don't change status (default behavior).

Exclusive solo: when you solo a layer with exclusive solo mode, all other layers become un-solo'd (default behavior).

Exclusive mute: when you mute a layer all others get un-muted.

Inclusive solo: when you solo a layer with inclusive solo mode, existing solo'd layers remain solo'd/audible – enabling you to hear several layers whilst others remain silenced.

When a layer is actively playing audio you will see a mini level meter immediately to the left of its level control slider (avoid the level reaching the red zone to avoid audio clipping/distortion).

The bottom half of the layer controls allow you to set the semi-tone note transpose offset of the layer (up/down triangle buttons), and to set key and velocity zones.

Key and velocity zones can be learnt by clicking the circular check buttons and playing notes on your MIDI device (or move the double ended sliders).

Layers are deleted by clicking the X button immediately to the left of the MIDI channel selector (this removes the layer – be sure to save your patch first if needed).

Undo snapshots:

When loading a new layer or combi or deleting a patch, an undo snapshot will be saved (as of v1.18) – this can be useful to return to a previous state if the current layer was erased accidentally for example.

The undo button is next to the ‘clear all layers’ button.

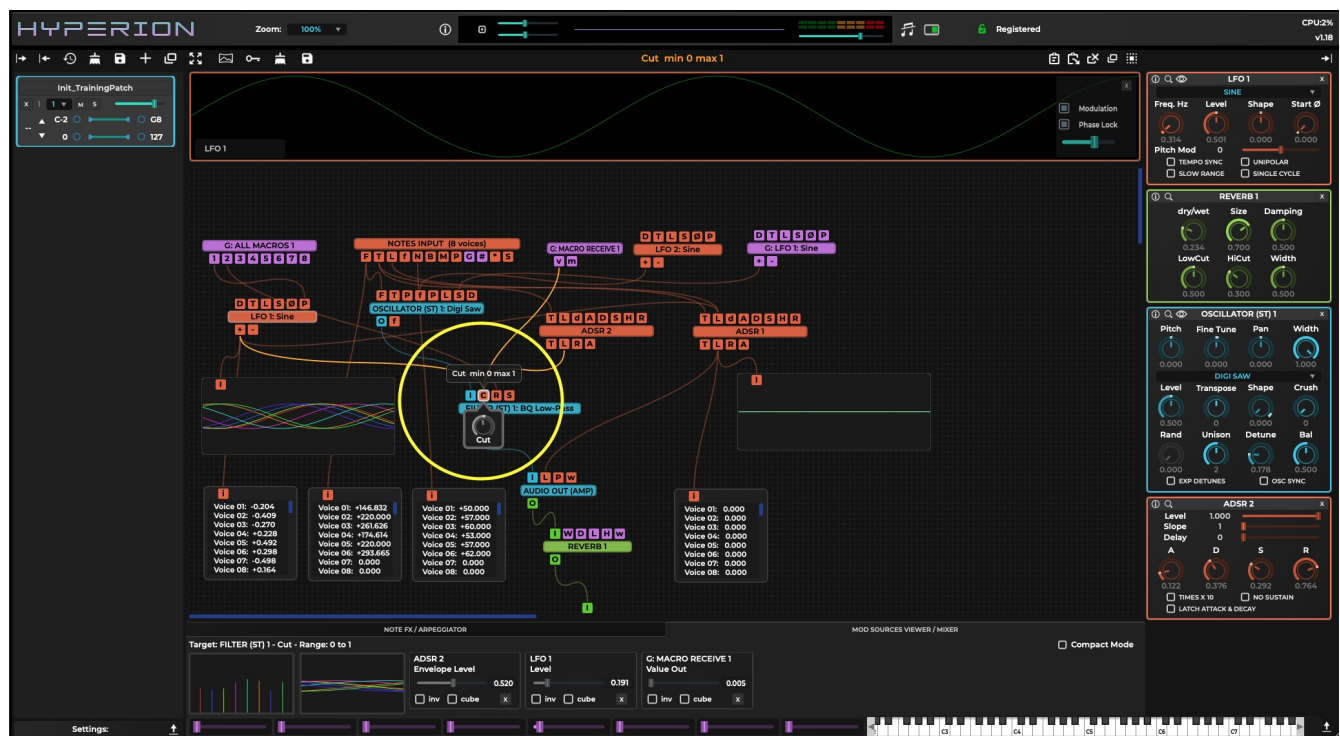
Other UI features:

Localized pop-up tooltips and controls

1. To see pop-up tool-tips and controls, make sure the “Show local tooltips” checkbox is checked in Settings – this is the default setting on first-time loading of the plugin.

Hovering the mouse above node pins and buttons will open a tool-tip if tool-tips are enabled in the synth settings.

Additionally some input parameter pins will have a pop-up rotary control shortcut to allow editing the value without opening the node toolbox.



Pin Highlighting

There is pin highlighting for potential/valid target pins when dragging a cable from a source pin.

The T (trigger) and F (frequency) pins will have extra highlighting to help with finding the matching target pins. Matching valid T and F pins on other nodes will be highlighted when a cable is started from a T or F pin – even before dragging the cable over to those pins.

Cable Highlighting

When clicking on a node or a pin, the attached cables become brighter on the graph display.

This can help to see the paths and understand the sources and destinations of the cables.

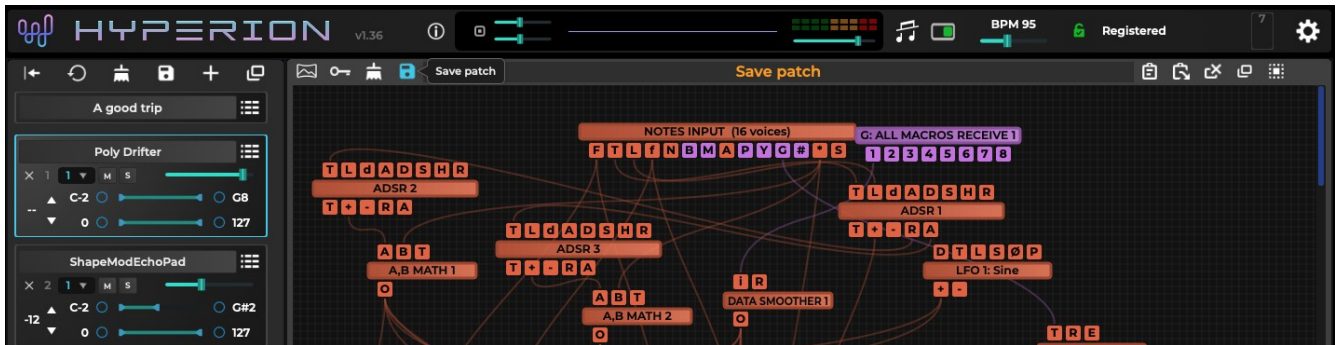
Clicking on the node highlights all cables connected to that node's pins.

Clicking on pin only highlights the cables connected to that pin.

Patch Editing

The main patch editing area is contextual – related to the currently selected patch in the layers pane.

To save any changes made to the patch, click on 'Save patch' button (right most disc icon, above the node graph) – just be aware that it will only save the individual layer you can see / are editing – it will not save the other layers.



When you save a patch, the directory that you save to becomes the new default location that is opened on consequent patch saving – and this will also be the directory that is scanned and displayed in the patch list.

If you manually copy patch files to the currently viewed patch directory (in your system file browser) you'll need to click the 'refresh' button to have the patch list updated and show the new patches.

To switch to a different patches folder, click the folder button above the patch list to select a new folder – if there are patches present the GUI will find them and update the list automatically.

Hyperion currently only lists patches in a single folder at a time, and will not show patches in sub-folders unless you select the folder.

To save all the current layers, as a combi-patch, click the 'Save combi' button (disc icon) directly above the layers list.

Node and cable colors:

The modular patching nodes visible in the patch editing area have different colors representing their function as well as color coded patch cables to help visualize and understand the design of a patch.



Node categories

Orange nodes / Multi-voice control data nodes

These are polyphonic nodes – whilst you see one instance on screen, there is a duplicate processing node for each enabled voice in the patch.

If you want to make a patch that responds to MIDI notes you need a 'notes input' node – it's within this node's settings that you can set the voice count/polyphony of the patch.

Without a 'notes input' node the patch will be monophonic/single voice by default.

Purple nodes / All-voice control data nodes

These are control data nodes that affect all voices with the same value – referred to as global control nodes, they are pre-pended with the letter 'G:' to clarify that they are not multi-voice nodes.

Global control allows to affect all active voices with the same control value – for example sweeping the filter cut-off for all notes playing with the same master/global LFO.

Blue nodes / Audio nodes

These are audio nodes and they can be generators (e.g. oscillator, sampler) or processors (e.g. filter, distortion).

They are polyphonic and run as many copies as the current voice count setting for the patch.

To be able to hear any audio from a patch you need to have a 'Audio Out' node.

Voices are summed in the 'Audio Out' node which provides a green audio output pin for connecting to effects bus nodes, as well as a FX wet/dry and output trim control.

Green nodes

These are effects bus nodes – they process the sum output / mix of all voices.

To be able to hear any audio effects the patch also requires a 'FX: Audio Out' node as the final node in the effects chain.

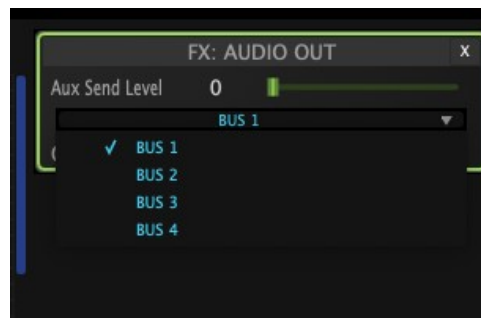
FX busses

There are 4 FX audio busses – you can send audio from one layer to another layer by using the Aux send level parameter and bus selector pull-down list in the 'FX: Audio Out' node.

There is a 'FX: Aux Return' node – when you add it to a patch, the Aux send control of the FX: Audio Out node will be disabled – this is to prevent audio feedback.

Multiple aux returns can be added to a patch.

The Aux send and return features are quite useful to make a dedicated FX processing patch/layer and save CPU load for example by only having one master reverb instead of using reverb in every single layer.



Aux send is post the layer fader control – so the amount of audio sent to the aux bus will be scaled by the layer volume control – so that when you turn down the layer volume any further FX on other layers gets attenuated by the same amount.

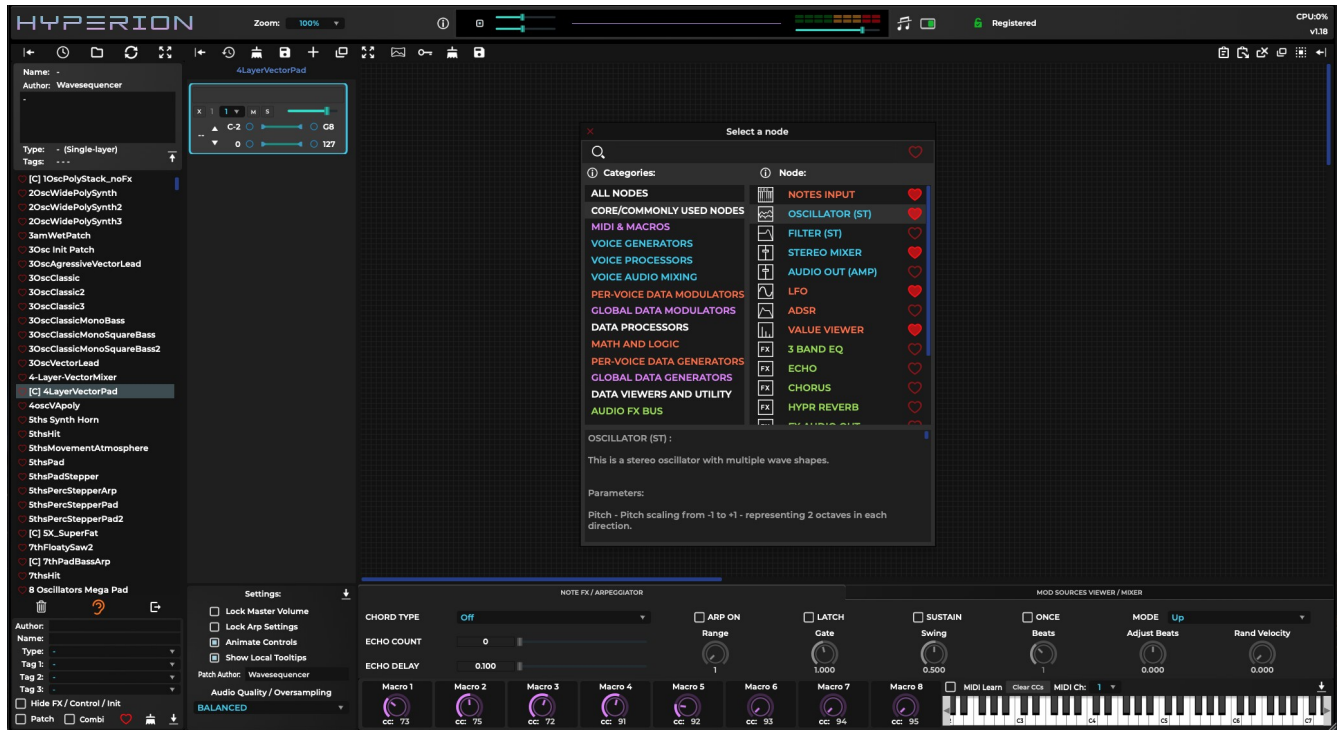
Navigation

You can navigate the patch design area by using the scroll bars, however you can also click on the graph area to drag the view around.

You can also use the cursor keys to move the view around – which enables to connect a cable to a pin outside of the visible area.

Adding new nodes

To drop a new node into the patch 'graph' area, right click on the mouse (or press the alt-key) in the editing area (when not over a node or node-connector pin) to open the node selection toolbox:



Nodes in the toolbox are grouped in categories on the left and the list is searchable by keywords.

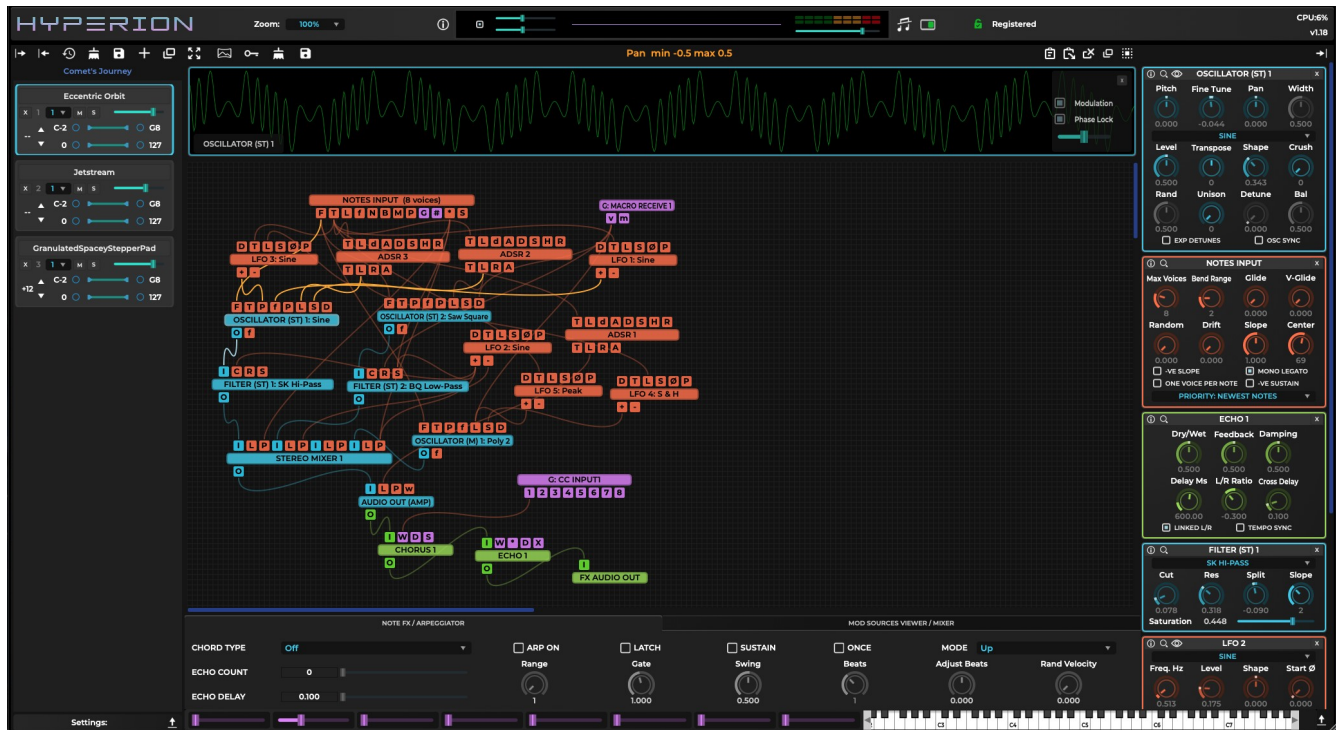
The node selection toolbox includes an info panel which shows information about the currently selected node in the list on the right hand side.

Node types can also be set as favorite by clicking on the heart icon in the node list, and nodes can be filtered by favorite by clicking the heart icon above the list.

More info about the node selection toolbox is available by clicking the info buttons inside it.

Editing node parameters

To edit node parameters, left click on the node – here for example we are opening up the edit pane for the 'Oscillator (ST) 1' node (as well as others previously opened).



Clicking multiple nodes one after the other adds more node edit panels to the node edit pane – when there are more than fit on the screen you can scroll to see them all. The most recently clicked node will be placed at the top of the editing pane automatically.

The 'eye' icon in the edit panels will pop open a waveform preview panel above the graph showing a render of the waveform directly at the source (for standard/wavesequene oscillators and LFOs currently).

Clicking the 'magnifying glass' icon on the panels will auto-scroll the graph area to the node.

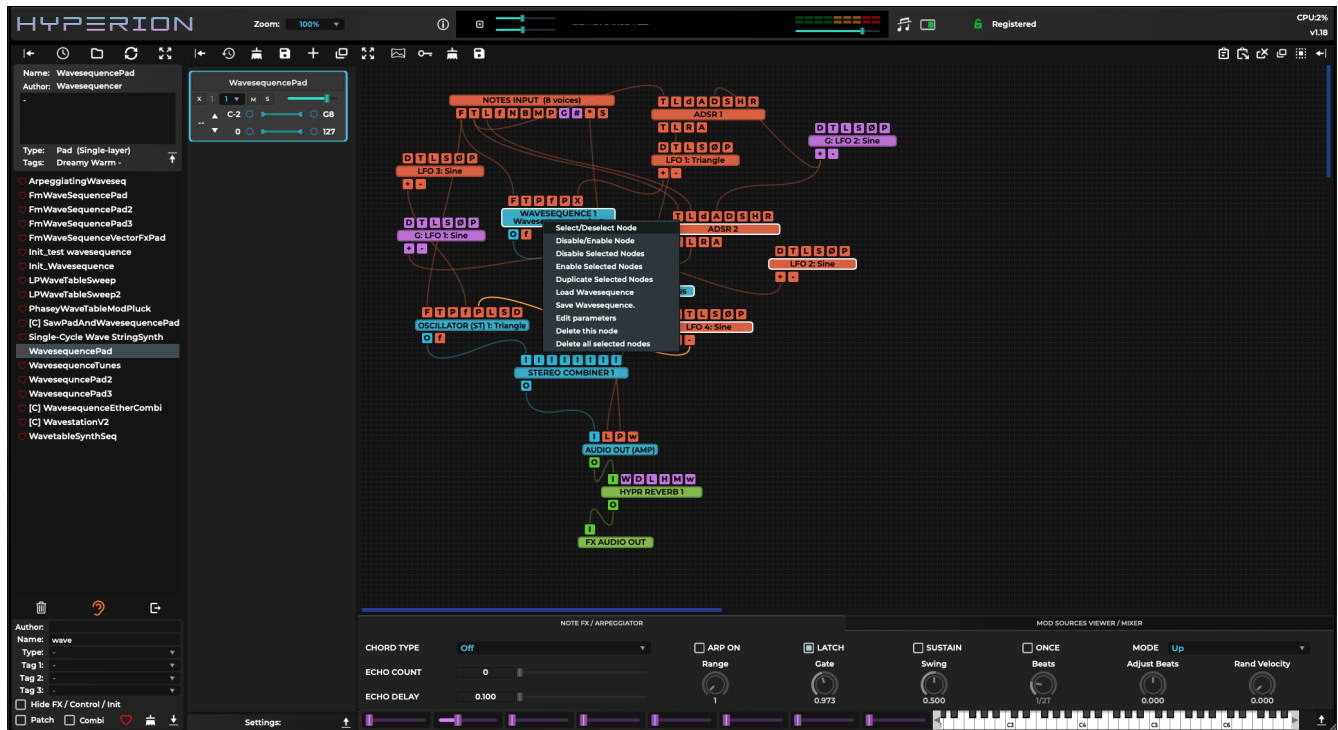
(You can also drag the edit panels of each node to swap their order by clicking and dragging on the edge of the panel.)

Node parameters can be edited by dragging the mouse (hold the 'cntrl' key when dragging for more accuracy) or by using the scroll wheel. To scroll the panels area move the mouse over the scroll bar.

To remove a node edit panel from the list, click the X button on the title bar of the edit panel.

Node menu

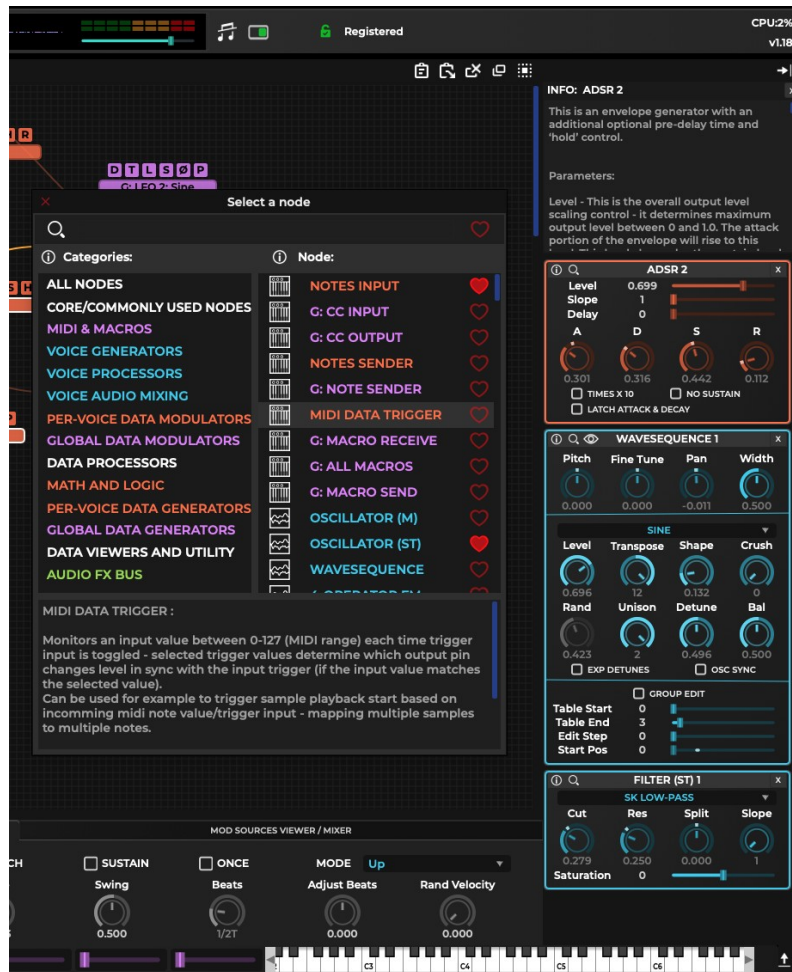
Right clicking on a node brings up a node contextual menu item list – in some cases used to load or save data related to the node (e.g. wavesequences or samples).



This list also allows to select and deselect the node, select or deselect, duplicate or delete multiple selected nodes (if more than one node is selected), temporarily bypass the processing of that node ('Disable/Enable' option) or delete it from the patch.

Node information

There are many available node types, to get more information about each node, you can click on the node in the node selection toolbox, or you can click the info button in the edit panels.



Drag and drop support

Whilst you can select samples, sound-fonts and wave-sequences via the right click menu on a node, you can also drag and drop compatible file types directly from your system file-browser by dragging the file over the node.

Connecting cables between pins (patching)

To make new patching connections between nodes, move the mouse until it is over the node pin you want to connect to/from – and either hold the left mouse button and drag the mouse away from the pin, or press and release the 'TAB' key to start a new cable. Once the cable has started you can release the mouse button until ready to make the connection.

To dismiss the cable just click anywhere on the patch editing area that is not a node pin.

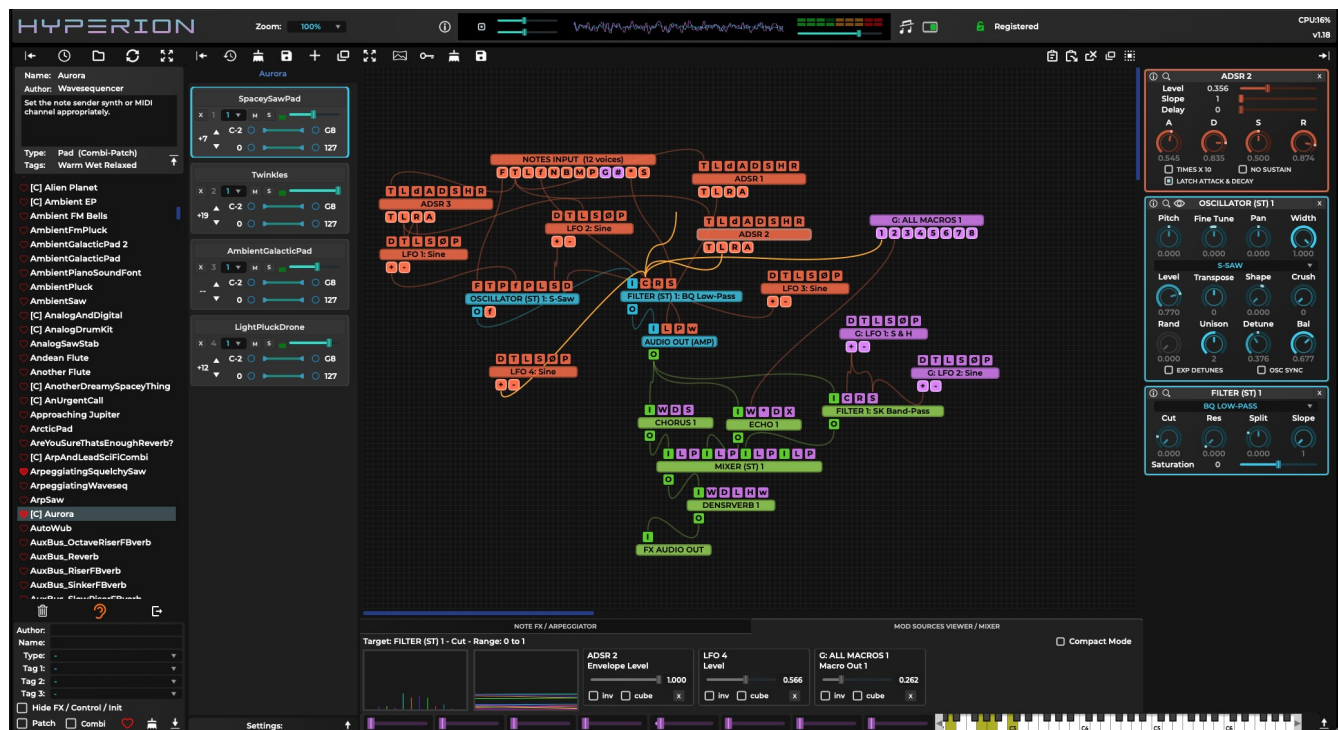
To select the target pin to connect to, move the mouse pointer until the cable is touching the targeted pin – on doing so it will become highlighted by a white square surrounding the pin.

To make the connection, either click the left mouse button or press the 'TAB' key when the mouse cursor is over a pin.

To delete a cable, right click the input pin (pins on top of the nodes) to select the cable source pin to remove, you can also delete connections in the Mod Sources tab.

Audio inputs can only accept one source cable. Audio pins cannot be connected to control pins.

Control data input pins can have multiple sources – to more clearly see where those cables are going, if you click on the pin, just those cables connected to the pin will become highlighted in a brighter color.



Copy/Paste/Move

Newly added since v0.9 release, the copy/paste operation buttons to the top right of the node graph area allow to:

- Copy selected nodes to temporary clipboard.
- Paste selected nodes – into this patch or a patch in another layer.
- Delete selected nodes.
- Duplicate selected nodes into the same layer.
- Select all the nodes at once.

Select nodes by putting the mouse cursor over the node and press the tab key, or right click on the node and use the select/deselect option.

You can also select nodes with a drag/select rectangle activated by holding the middle mouse button or the shift key.



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Selected nodes are surrounded by a white border.

Clicking anywhere else in the graph area will clear node selections.

Selected nodes can be dragged around together, and right click menu on the main editing area will allow to copy/duplicate and paste one or more selected nodes.

'select all nodes' is handy to move the whole patch design around in the graph area to make some space.

Nodes can be copied from one layer and pasted into another layer.

Copied or duplicated nodes will retain their node settings (and data such as samples/wave-sequences) will be preserved but cable connections are not copied over.

Mod Sources tab

When you click on a control data input pin, it will also switch the contextual panel at the bottom of the patch editing area to the 'MOD SOURCES' tab, where you can visualize the animated lines showing the value for each active voice as well as the scope view for each voice value.

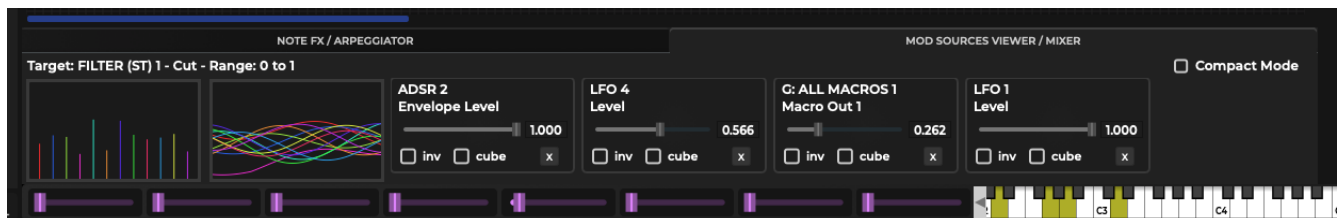
You can also switch to this view by right-clicking on the edit panel knobs that match the input pin.

Here you can also adjust the amount each modulation source contributes to the modulation target. The value shown for each voice is the original value of the knob/slider + the sum of the input data connected to the input pin (which is a different color trace of each active voice).

Modulation data will be added together and clipped to the input range of the input pin.

You can control the amount each modulation source affects the input pin with the slider for the source – as well as choose to invert the data or apply 'cubing' to the data – this enables making the input data act more like an exponential curve for both positive and negative input values.. especially useful for data inputs in the value range 0 to 1 or -1 to +1 (for example it can be useful to use this with the note level value from the 'Notes input' node).

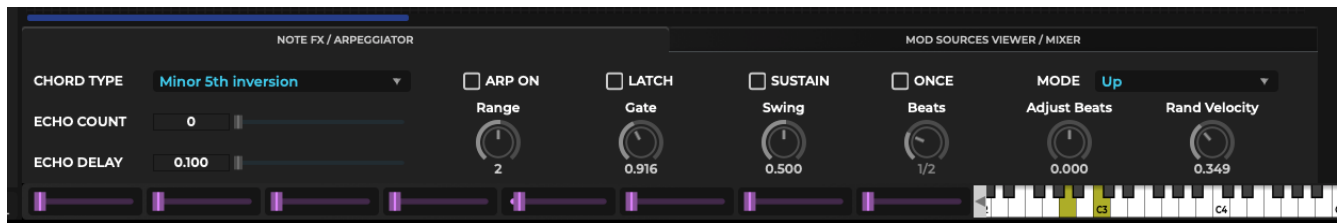
Whilst it's possible to set the level of a modulation source by directly setting the output level within the node (for example the LFO), in many cases it's handy to send the same control data source to multiple different input control pins (and multiple target nodes) – and so this allows to tailor the modulation depth at each pin/node, whilst keeping the master level of the data source the same.



Note Fx / Arpeggiator tab

The 'Chord Type' pull down list lets you select a chord that will play notes automatically above each note pressed (beware this quickly eats up polyphony – and so playing only one or two notes in this case is suggested). The chord feature only works if you enable enough voices in the patch.

The MIDI echo feature will repeat incoming notes and will also divide down the velocity level of the repeated notes to produce an echo effect – to hear a good effect you need to use the 'L' level output pin of the 'Notes Input' node – for example connect it to the level control of an ADSR node.



The arpeggiator controls are fairly standard – however extra options are:

'Once' option: will only play the arpeggiation once until all keys are released and a new set of notes are played – this can be used for a 'strum' effect, or to play a slow sequence once in a while.

'Adjust Beats' control: allows to have a slightly different beat time on each layer – which can produce some interesting rhythmic effects.

'Rand Velocity': allows a varying degree of randomization of the velocity of the generated arpeggiation notes.

'Sustain': allows to use the sustain pedal input as a temporary latch of the arpeggiator.

Every layer has it's own note processor for chord, echo and arpeggiator – so some pretty complex combinations of patterns can be created.

Also setting layers to different pitch offsets can have some interesting results when multiple layers are running the arpeggiator.

Keyboard Shortcuts and Mouse Operations Summary

Within the node graph, short left click on a node will open the node edit panel - long left click will enable to move the node without opening the panel, and also refresh the 'NODE INFO' tab (check that tab to learn about the nodes).

Click on node pin and drag to start a cable - or mouse over the pin and hit the tab key - tab key can terminate a connection when mouse is over the target, or you can use the left click again, or just release the mouse button if it was held whilst moving the cable.

Left click anywhere in the graph area to dismiss a cable that is not yet connected.

Other keyboard modifiers/shortcuts:

Mouse over node and tab key = select.

Shift key + left click mouse on node = select.

Shift key + right click mouse on node = delete node.

Shift key + left mouse button down/drag OR middle mouse button down/drag = rectangular group select of nodes.

Right click or Cntrl/Cmd + left click on graph/node/pin brings up the relevant menu.

Mouse over graph/node/pin + ALT key will also bring up the menu for each item respectively.

ESC key to exit menus.

Cursor Keys and Enter key are available in menus/pull-down lists and the patch list.

When mouse is in the graph area:

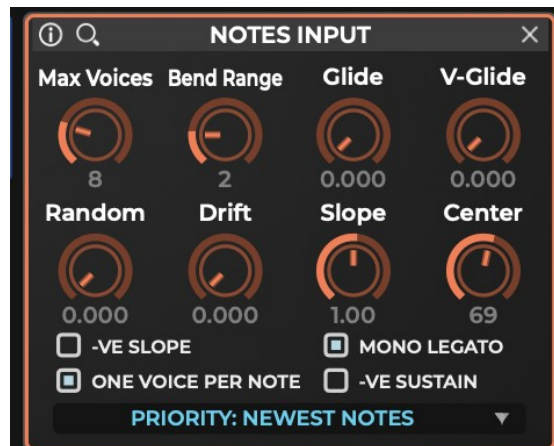
Cntrl/Cmd + a=select all nodes, d=duplicate selected nodes, r=remove/delete selected nodes, c=copy selected nodes, v=paste selected nodes.

Advanced considerations

The voice pool / note stealing:

A voice becomes 'inactive' once the volume level for that voice reaches 0 at the main audio out node, otherwise it is assumed to still be running. If you never let the volume reach 0 at the audio out node, all voices run all the time, and so a voice will be stolen on every new note played.

Voices and notes are usually not related, but one mode does link them, in the sense that if a new MIDI note is received, it can steal the voice that was previously triggered due to that received MIDI note - that is the 'one voice per note' mode:

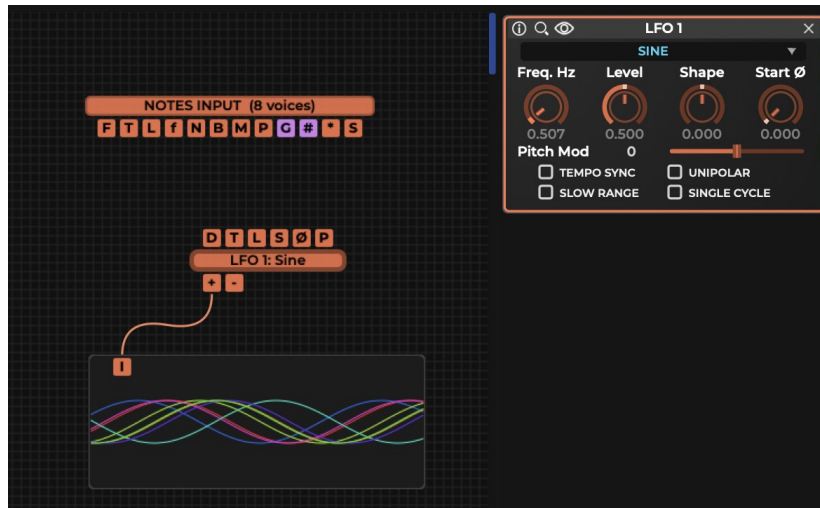


Otherwise, you can re-trigger the same note multiple times, and use multiple voices, to get overlapping (same) notes which is the default behavior of Hyperion and most polyphonic synths.

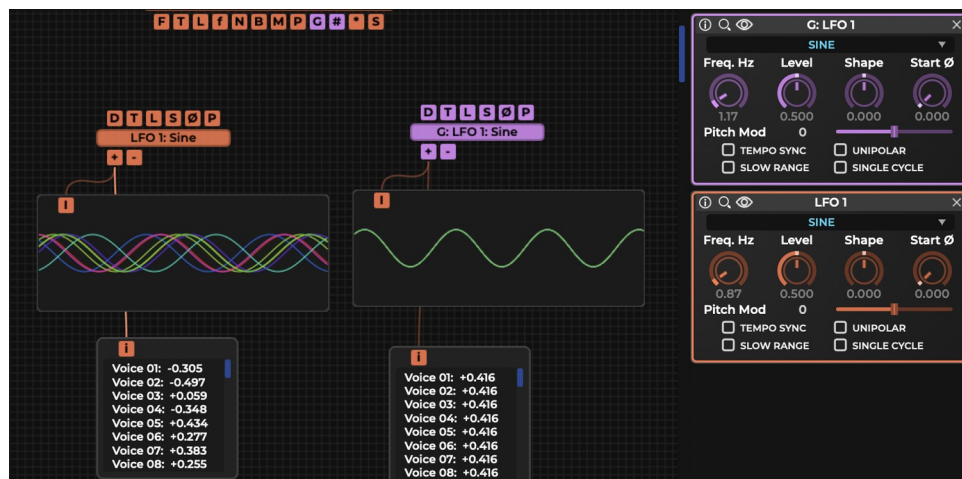
Polyphonic vs Global (All voices) modulation:

Let's take the example of using an LFO:

When you enable multiple voices in a patch you are enabling one LFO per voice, unless using a 'Global LFO', so in the mod sources viewer or the value viewer node you are going to see multiple traces all drawn on top of each other - and by default they will all be at a random start phase.



If you want all voices to modulate with the exact same phase, use a global LFO.



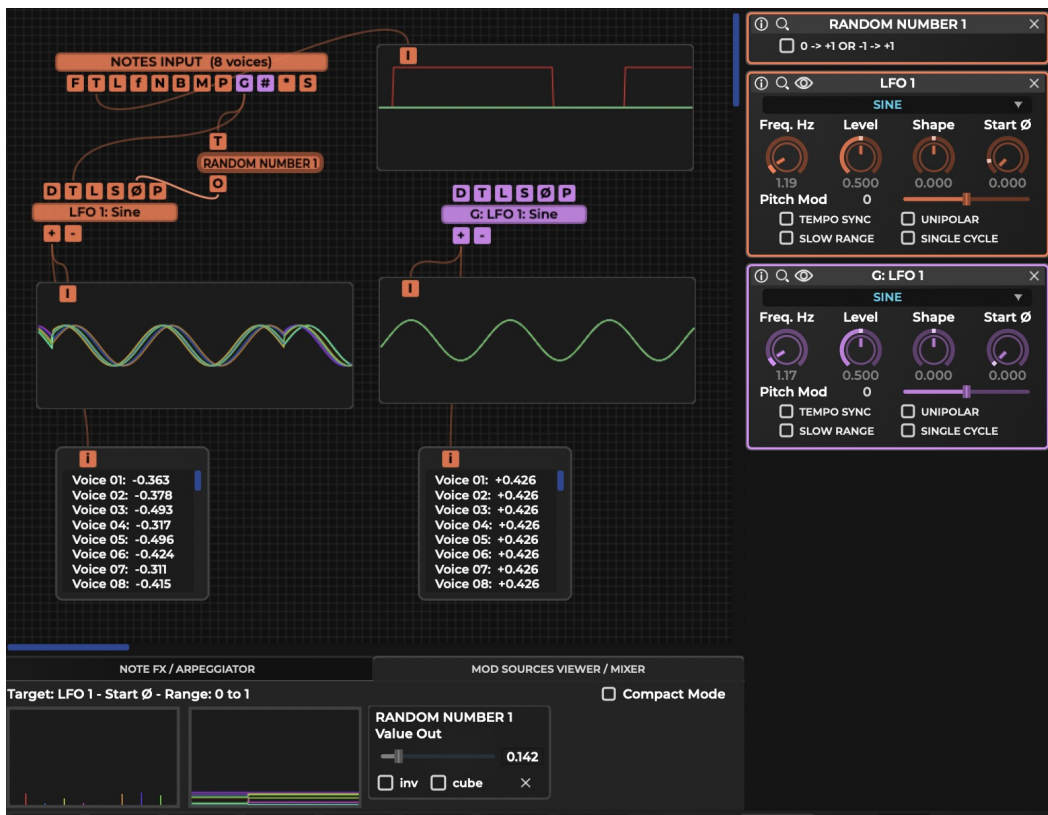
You can also reset the phase of the polyphonic LFO (T trigger input) to achieve the same result (with the global note trigger).. and you may ask, what is the point of that, since then I can just use a global LFO.. however.. since the polyphonic LFO can be modulated by other polyphonic modulation sources, the frequencies and levels of those per-voice waves in the poly LFO can be changed per voice, so they can go out of phase again - which can be a nice effect - start in phase and gradually go out of phase by

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using another polyphonic LFO (whose initial level starts at 0 and then is gradually increased) to modulate the LFO pitch for example, or maybe use a polyphonic ADSR with slightly randomized level by way of a random number node...

The LFOs also have a start phase control, so you may wish to set that for some specific effects such as ramping up or down depending on start phase, and if you want to have each voice have a specific start phase, each different from the other, then you can add some randomization to the start phase with a random number generator...

Note that, if you want to reset the phase of all the individual voice waves of a polyphonic LFO, you need to do so at the same time, so in that case you'd need to use the global keys trigger:



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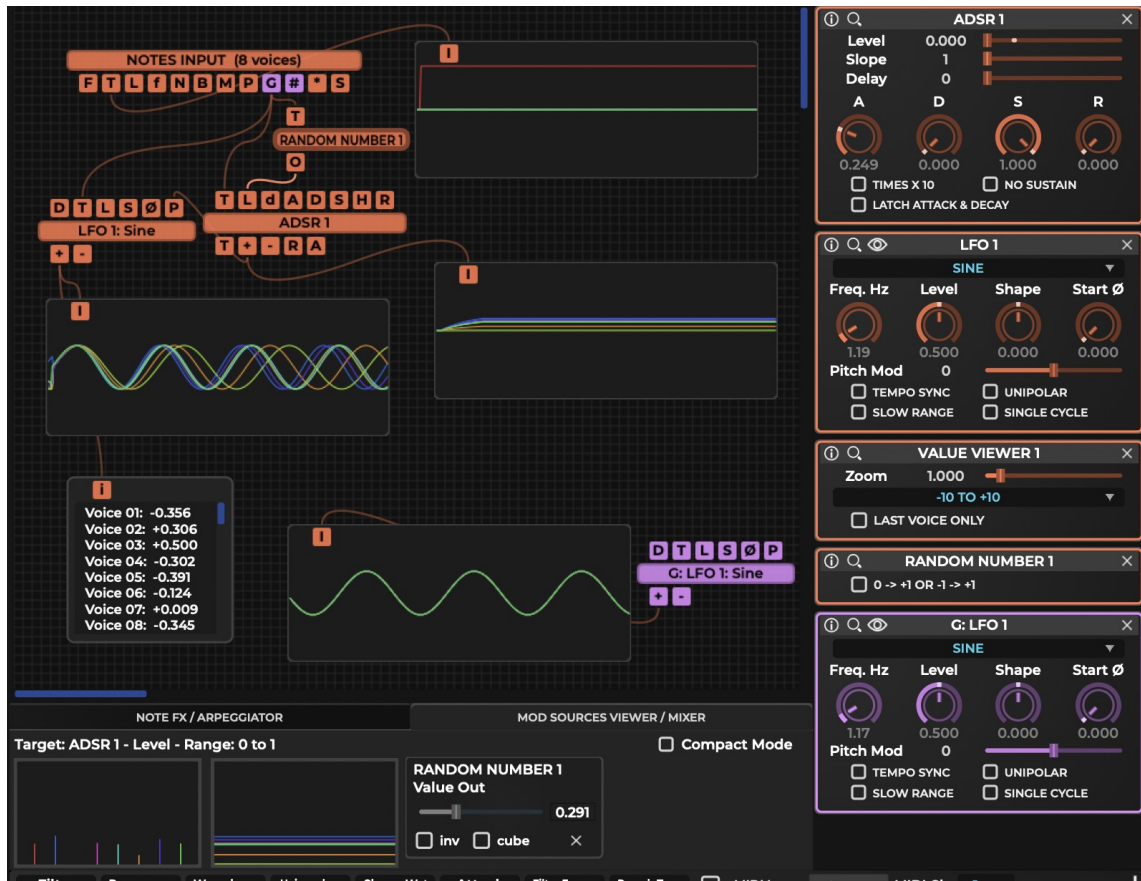
However, otherwise if you connect to the T output of the notes input node, only the phase on the next new note/voice LFO will get reset - which may be also exactly what you want.. (usually what you want for ADSR controlling filter or audio output level).

If this all gets a bit confusing, the text values viewer helps to clarify what is really going on.. and then you can switch the values viewer graph to only show the last triggered voice.

The screenshot displays the Hyperion Synth Plugin interface. At the top left, a 'NOTES INPUT (8 voices)' node is connected to an 'LFO 1: Sine' node. The 'NOTES INPUT' node has a 'T' output connected to a 'RANDOM NUMBER 1' node. The 'RANDOM NUMBER 1' node has an 'O' output connected to the 'LFO 1: Sine' node. The 'LFO 1: Sine' node has an 'I' output connected to a graph showing a sine wave. Below the graph is a 'Voice 01' to 'Voice 08' list with values: Voice 01: -0.130, Voice 02: +0.459, Voice 03: +0.390, Voice 04: +0.363, Voice 05: +0.500, Voice 06: +0.499, Voice 07: +0.449, Voice 08: +0.374. To the right, there are three 'VALUE VIEWER' windows: 'VALUE VIEWER 1' (Zoom: 1.000, -10 TO +10, LAST VOICE ONLY), 'RANDOM NUMBER 1' (0 -> +1 OR -1 -> +1), and 'LFO 1' (SINE, Freq. Hz: 1.19, Level: 0.500, Shape: 0.000, Start Ø: 0.000, Pitch Mod: 0, UNIPOLAR, SLOW RANGE, SINGLE CYCLE). Below these is another 'LFO 1' window (SINE, Freq. Hz: 1.17, Level: 0.500, Shape: 0.000, Start Ø: 0.000, Pitch Mod: 0, UNIPOLAR, SLOW RANGE, SINGLE CYCLE). At the bottom, a 'MOD SOURCES VIEWER / MIXER' window shows 'Target: LFO 1 - Phase Reset Trigger (+v edge) - Range: 0 to 1' and 'NOTES INPUT Note Trigger' with a slider at 1.000 and checkboxes for 'inv' and 'cube'.

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Here's an example showing how to use an ADSR to gradually make the waves of each voice of the polyphonic LFO go out of phase:



Finally...you can also consider to use the voice offsets node instead of the random number generator, to give specific same start phases to each allocated voice, note that voices however are not tied to specific notes on the keyboard (just drawn round robin from the current voice pool based on which voices are available and the current voice stealing mode), so if you need specific phases per key, then you need to use a MIDI data trigger node, to trigger specific pins on specific notes received.. to then set specific start phases to your poly LFO.

Wavesequence Nodes:



Wavesequence/FM Wavesequence nodes are a special kind of oscillator that allows you to define a wave-table of up to 32 steps.

Each step is a different oscillator configuration – including everything from the transpose pull-down list, to the 'Exponential Detunes' option.

You can set the start and end points of the table and you can select a specific step by double clicking the step slider number or using the slider.

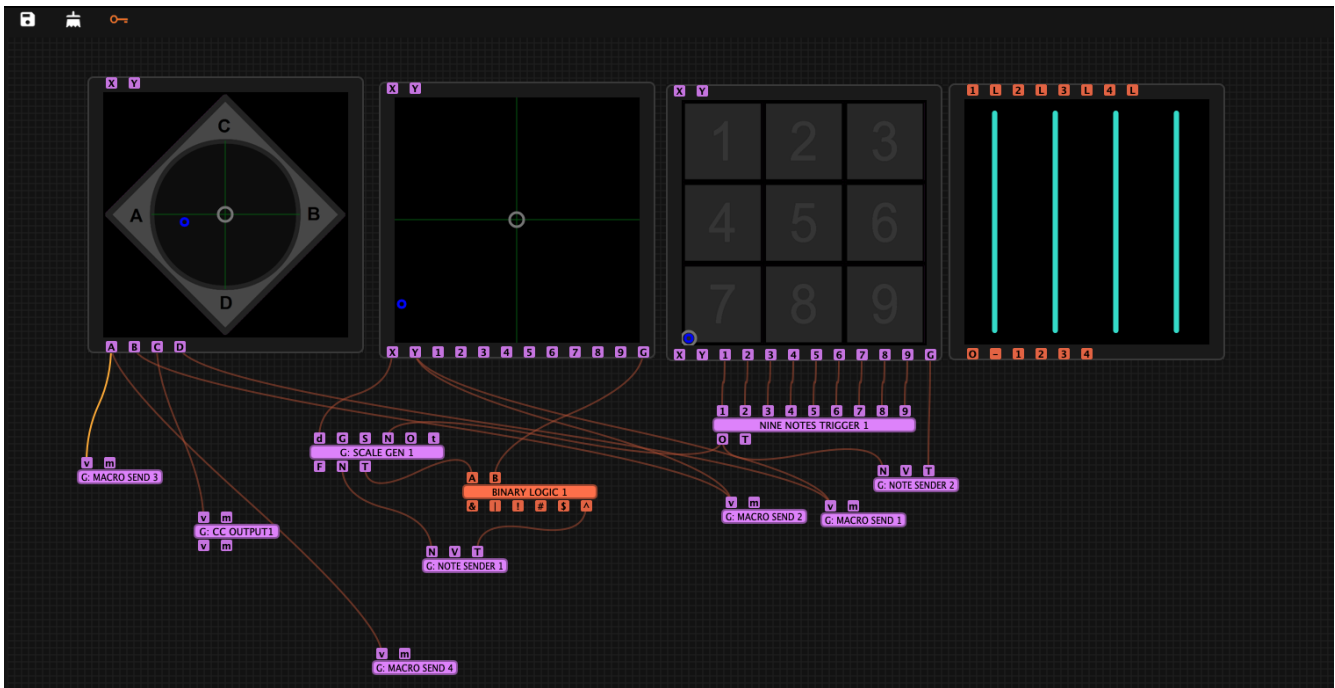
The 'Start Pos' control will let you decide where in the table the oscillator starts playing from – this position can then be modified by the 'X' input pin. Each step in the table will be smoothly cross-faded as the table is transitioned – this could be modulated with an LFO for example, or maybe the modwheel or a macro-control – this is up to you.

When the group edit check box is enabled, any change will affect all the steps – this is useful in setting the initial values of all steps before then modifying individual steps.

When editing a Wavesequence, it's helpful to disable any modulation source and manually move through the table with the 'Start Pos' slider to be able to audition the transitions between all the steps.

Wavesequences take double the CPU processing load as standard oscillators since there are always two oscillator configurations being mixed – however this doesn't affect polyphony directly.

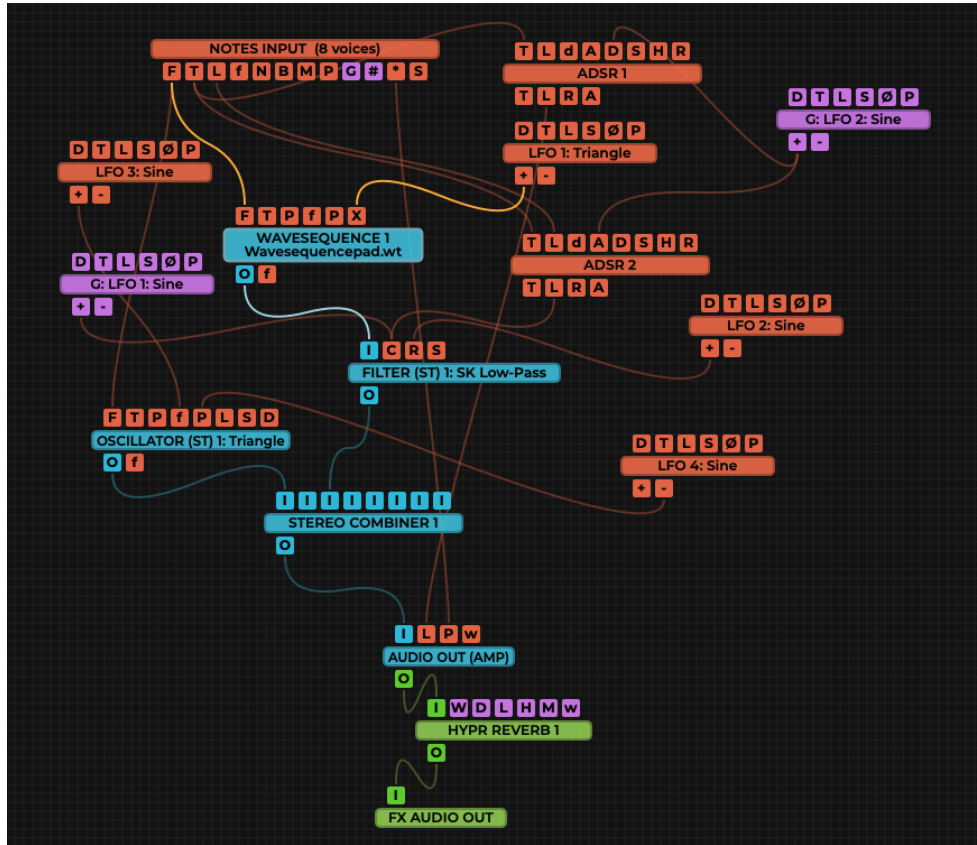
Additional touch interface oriented controls:



Some additional touch control oriented nodes were added as of v1.07 – these can be modulated from real hardware touch pads and joysticks or slider panels, however, they've been sized for finger gesture usage with touch screens.

As such there is now a lock toggle button (shown here in active state/orange) – which will prevent accidental dragging of any nodes whilst operating the patch with these controls.

'Global new key down' trigger:



The notes output node features an additional output trigger pin ‘#’ which is pulsed on every new note, but the same pulse is provided to all voices since it is a global pin – this is useful for triggering global envelopes on each key down, or for resetting LFO s on each key down.

Note that this global new note pulse can be applied to per-voice modulation nodes – for example multiple voice LFOs can have their phase reset, but if they are modulated by other LFOs or envelopes then their phase and levels can drift apart again.

FM synthesis:

Hyperion implements a 4 operator (A B C D) FM synth with multiple algorithms.

Operator D tracks the input frequency (frequency ratio 1.0).

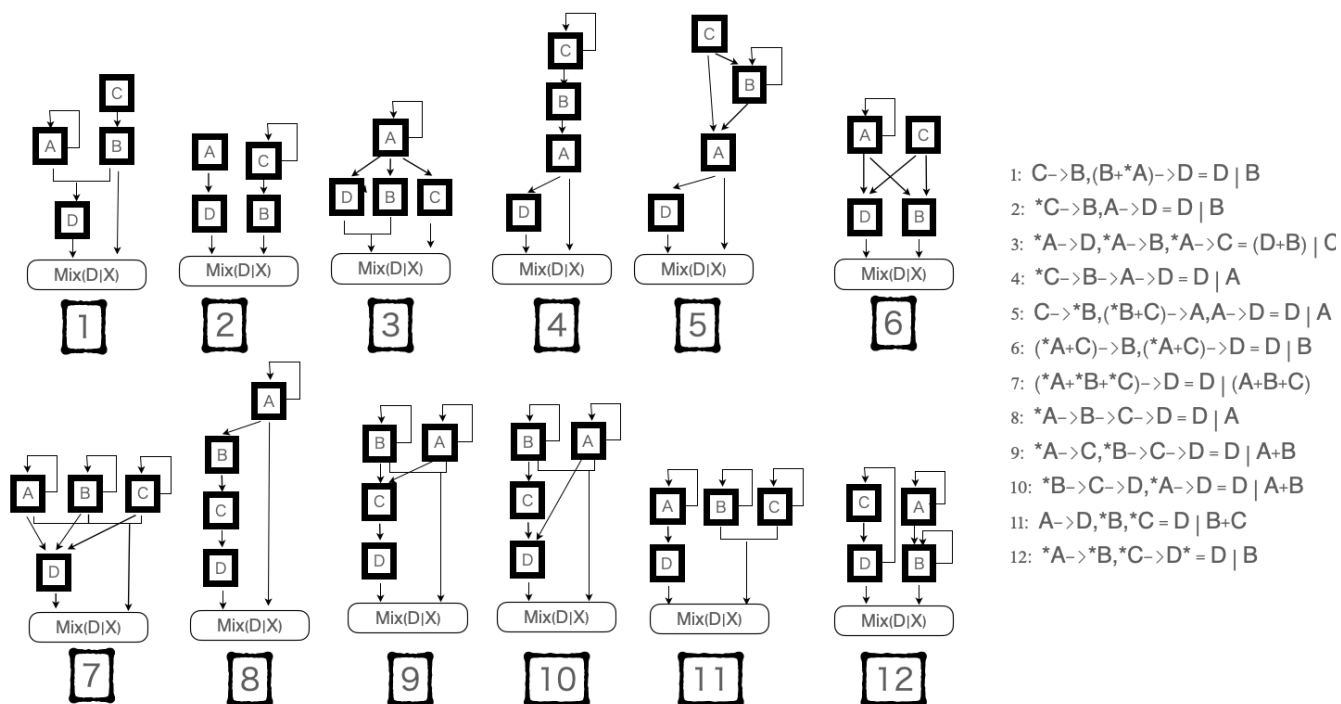
Each modulation operator has individual level and a set of pre-determined fixed frequency ratio controls.

FM algorithms are different ways of connecting the 4 operators - in this case D is always the carrier/main oscillator frequency, but these algorithms include one or multiple other operators as parallel audio outputs that can be mix controlled.

In algorithm descriptions -> represents frequency modulation input, * represents operator self feedback, + represents audio summing, | denotes balanced/mixable output in parallel with the output operators on either side.

The left side text before the = sign is the generator side of the algorithm, the right hand side of the = sign is the audio output.

Here's a 'cheat sheet' (courtesy of Hyperion user 'Satong') showing a graphical representation of all the algorithms:



Samples Playback:

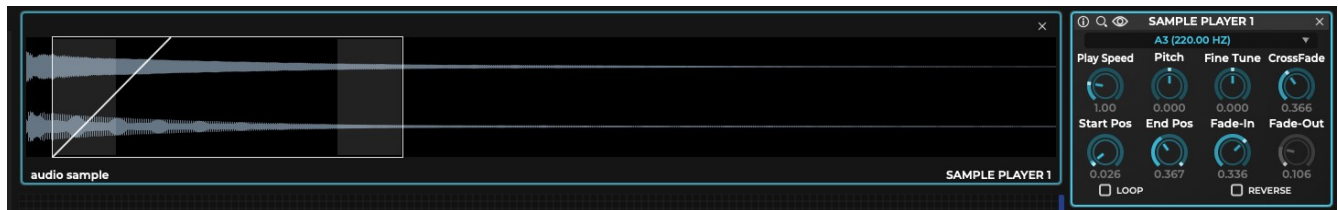
A sample file is selected in the node right click menu or you can drag and drop a file onto the node (wav, ogg, mp3, m4a)."

Small samples loaded into the sample playback node will be embedded and saved as part of the patch data.

Samples less than 2MB in size will be embedded in the patch file, otherwise they are imported to the 'Samples' folder in the current patch directory and will be referenced, so if you move patches with large samples to another location be sure to copy the 'Samples' sub folder.

When the frequency input is connected, the note frequency pull down list becomes available in the sample node edit panel and enables to select a different sample root note (assuming a pitched note sample).

The sample playback node includes loop start/end setting, fade-in/fade-out controls and cross fading of loops.



Cross-fade of audio starts from the beginning of the loop when the sample is playing back from up to halfway before the end of the current loop – as indicated by the grey-ed out areas of the sample loop window.

The fade-out parameter is disabled if cross-fade is enabled, since the end of the loop gain slope is now determined by the cross-fade.

Audio levels

Hyperion implements a volume limiter on the final output stage, so if the audio is constantly in the red zone you will get distortion of the signal – so adjust the main output level accordingly or adjust the individual layers until the level stays within the orange part of the main level meter.

Several of the audio processing nodes, including filters and effects nodes will soft clip the audio near 0db – in the case of the filters, this is actually something you can do on purpose by increasing the drive level (although for filters, the output level is then adjusted back post soft-clipping).

There are some sound generators or processors that can cause high audio levels that can quickly result in saturation:

e.g. some oscillator wave types, e.g. using sine waves/triangle/square,
certain settings in the FM oscillators which are based on sine waves modulating each other,
when using lots of resonance in the filters and lower the cut-off frequency,
or the resonator node or distortion nodes..

Try to lower the output levels of those nodes or use an amp stage to trim the level.

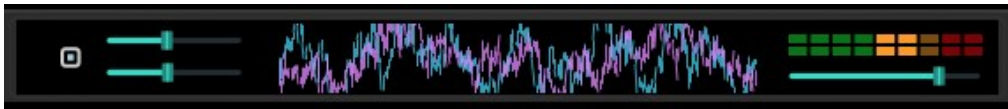
Be aware that the filters and resonators can self oscillate and the resultant high pitch can be very loud and potentially harmful to your speakers or your ears – this is not unique to Hyperion synth, but it's worth to note – please be careful with levels when experimenting with settings.

To avoid distorted audio, or simply to level match patches, in the final output stages of each layer, use the trim controls on both the audio output node and the FX audio output node.



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As a general rule – it's good practice to keep the audio level meter peaking at or below the second yellow segments when the main volume slider is turned up to the maximum level.



Ideally you can turn up the level of a layer to mid way or more before it starts to peak (shown by the mini-meter in the layer) – so if it's peaking into red at low levels you may need to trim the main audio output at the audio out/FX out node controls before saving a patch.

Macro controls

Whilst each individual layer can be assigned its own MIDI receive channel, the Macro receive node will receive the same Macro control values regardless of which layer-patch you put it in – so it allows macro control over all the layers from a single GUI/MIDI control.

The Macro controls area has a MIDI learn feature for quick assignment to external MIDI controllers. You can also choose the MIDI input channel to use for the Macro controls (which also affects the MIDI channel of the virtual keyboard).

Whilst the MIDI learn checkbox is enabled, you can highlight the value area for each control knob and it will learn the last CC control value when new CC data arrives (I.e turn a knob on your external MIDI controller).



Macro controls are also automate-able from your DAW.

When using DAW automation of the Macro parameters, be aware that if you recorded MIDI cc data controlling the Macro parameters, then adding macro control automation directly from the DAW visible automation parameters will conflict with the MIDI cc recorded data on playback.

You can rename the macros by double clicking the macro name – the name is saved with the patch/per-layer since the assignments are specific to each layer, even though the control is global to all layers.

Sending data between layers:

Macro data can be sent from within a patch to affect all other layers via the Macro Send node.

Note that any received DAW automation or MIDI cc control mapped to the Macros will clash with any Macro values sent from within a patch – so you need to choose which Macro values are controlled by what.

MIDI CC data and MIDI notes can also be generated within a patch with Note sender and MIDI CC sender nodes as well as 'Scale Mapper' node.

For those nodes that generate MIDI data, you can select an output MIDI channel (channel which the DAW will receive data on) and/or an internal Hyperion synth channel – also from 1-16. Selecting channel 0 will result in no outgoing data.

Sending MIDI notes and CC data on the internal synth channels or macro data to all the layers allows for deep inter-patch modulation..

Sending MIDI data to your DAW / Other plugins and devices:

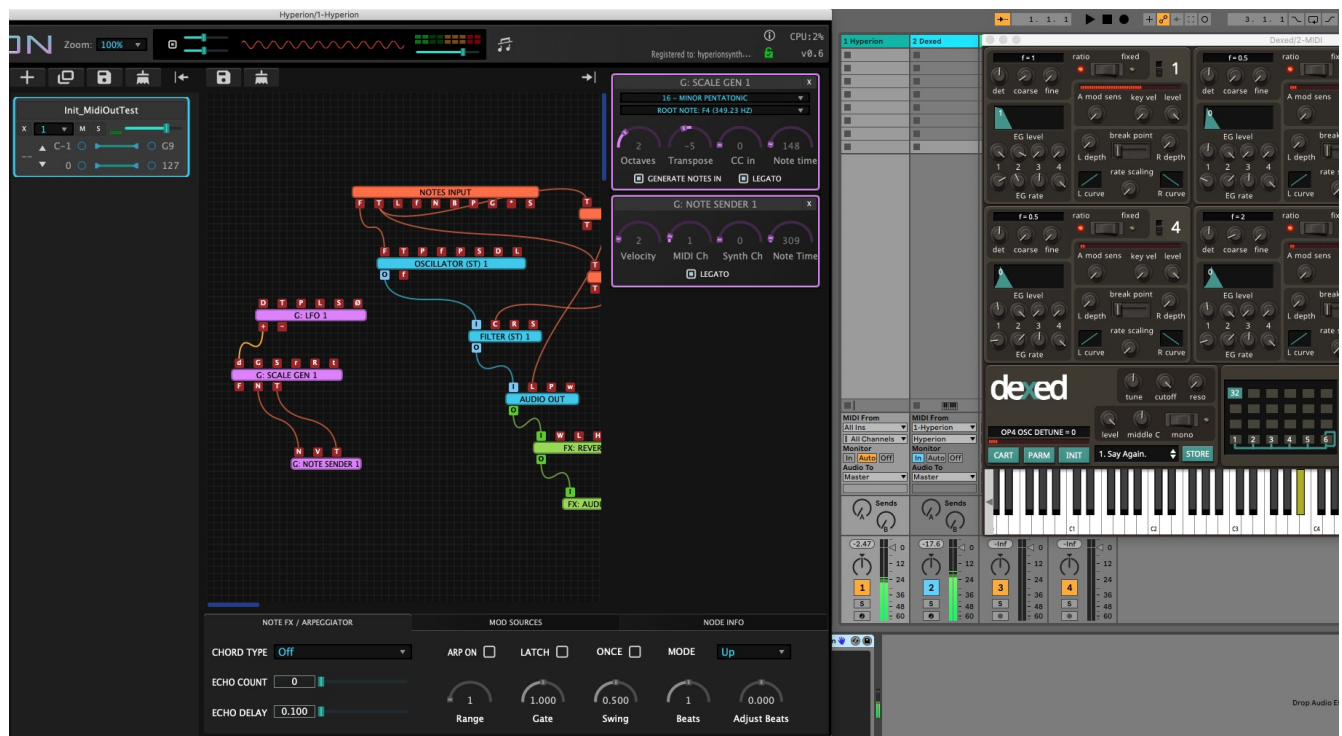
You can send MIDI cc and notes data to your DAW (or selected external MIDI device in stand-alone mode) from nodes which generate that data.

Here you can see Hyperion is driving Dexed on a separate MIDI track in Ableton – driven from a LFO modulating the data input of a scale generator node.

You can do the same with 'cc sender nodes', so you can use Hyperion purely as MIDI modulations generator if you like – or to design self playing generative patches that can also control multiple other instruments and effects.

Note sender or CC sender nodes have a controls to select either the external MIDI channel, or the Synth channel – the synth channel allow to send MIDI data to other layers on different channels.

When the MIDI or Synth channel output is set to 0, no data is sent on each MIDI bus respectively.



Feedback loops

Patch cables can be freely connected, and it's possible to create audio feedback loops in the effects section.

Please be careful with your speakers and ears when doing this.

I suggest to put filters in the loop and lower the levels of the input using the FX Stereo Mixer node (and experiment with low input levels to begin with).

You could also potentially create some MIDI loops that might overwhelm your system.. keep that in mind when sending MIDI data between layers and other devices.

Analog synth / natural instruments feel

Notes input node advance features:

Whilst you can achieve this directly in patch design with low rate LFOs and random number generation, there are some handy controls in the 'Notes Input' node that can help re-create some of the instabilities seen in analog circuits.

The 'Random' control will randomize the start frequency at each key-down, and the drift control will slowly modulate the pitch – both controls starting at almost un-noticeable amounts, until you reach full on 'this synth needs repairing' level. These controls work on a per-voice basis – so it really helps to provide some useful instability to remove some of the clinical nature of digital synthesis.

Another tool is the Slope control – small settings can simulate the CV pitch control of an analog synth not being perfectly tuned (the center note is the MIDI note where the correct pitch will play regardless of the pitch slope).

By default one voice per note is turned off, and new key presses even of the same note will trigger a new voice – this is pretty common for analog synths – but in some cases (on some hardware) playing the same note would re-trigger the same voice and the envelope would be restarted – that is what this control enables.



When only one voice is enabled in a patch, it will play consecutive notes without re-triggering the voice, assuming legato playing. You can set the patch to always re-trigger the voice by turning off 'Mono legato'.

With only one voice enabled previous note re triggering of held notes is enabled with the 'Note re trigger' option.

When in one-voice/mono mode, the Glide and V-Glide options will have an effect – producing varying portamento speed.

Glide or portamento is a common feature of classic analog mono-synths.

The V-Glide slider will slow the portamento speed on low velocities and make it faster on high velocities received (this can be useful for some natural expression when simulating acoustic instruments) – the depth of the effect depends on the V-Glide value.

Another tool in the box to 'fatten up' sounds is the unison control in some of the sound generator nodes – this will enable detuned copies of the main oscillator – the higher values result in some pre-set semi-tone offsets of the detuned copies.



The 'Exponential Detunes' checkbox changes the detune stepping of each unison copy pair.

(Unison detune values result in 2 extra oscillators per value – alternatively detuned positively and negatively – and in the case of stereo oscillators, also alternatively spread in the stereo field by the width control)

The Rand control will affect the phase offsets of all the detuned copies – this only has an effect if the oscillator 'Trigger' input pin is connected.

Setting 'Rand' to 0 or just above can result in some very interesting phasing effects when the unison detune amount is small.

Setting it to high values ensures immediate 'Thickness' by having randomized start phases.

(Oscillator unison detune phases are randomized by default, but this control allows a lot of flexibility in setting the initial tone of an oscillator on key-down)

One thing to remember with the Unison control is that more unison copies = more CPU load, and actually sometimes less is more – just settings of 1 or 2 can actually result in easier to hear differences from the main oscillator.

The balance control controls the mix between detuned unison copies and the main oscillator sound.

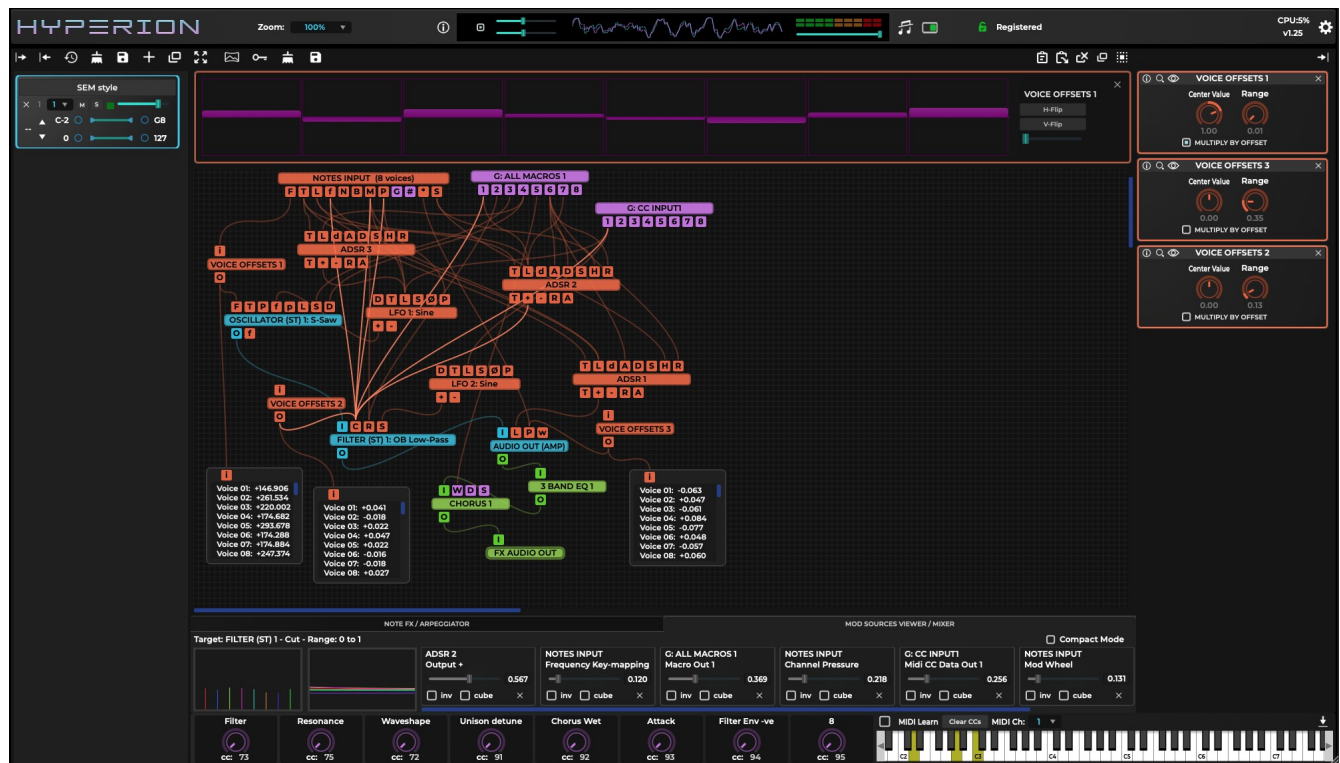
Fixed voice offsets:

Another tool in the box for analogue synth emulation is the voice offsets node.

Rather than have constantly changing randomized parameters affecting fine tuning or panning, or envelope times etc. the voice offsets node allows you to specify fixed values that apply to each voice which will remain the same.

This was a feature on some Oberheim synths for example where you could individually pan each voice on a back panel.

For some well aged analogue synths, the envelope times or filter cut-off may have slight differences on each voice bank, so again, such variations can be introduced without resorting to constantly changing or randomized values.



(An example of voices offsets applied to tuning, panning and filter cut-off)

Figuring out what is going on

Hyperion patches can be pretty complex, and sometimes it's really helpful to understand how things are being modulated, and what is actually the current value at a voice control output pin.

To help see what is going on, other than the modulation sources tab – which shows the how each voice is affected by multiple source pin connections, you can use value viewer and text value viewer nodes to get a clear picture of what an LFO or envelope is doing for example.. or to check the frequency values being sent to an oscillator.. etc..

These data viewer nodes will show values/or graphs of each individual active voice.

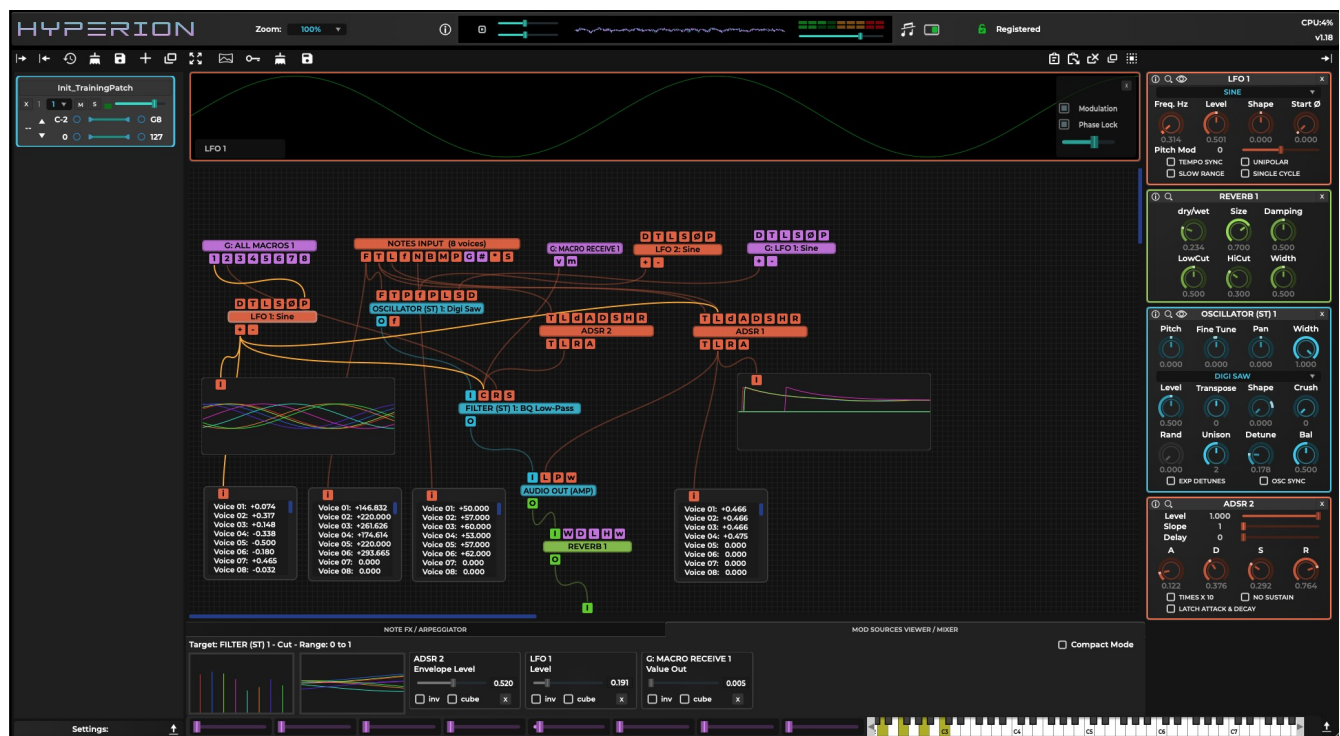
They are useful for debug, but do take up some CPU time, so I suggest to remove them from final patch designs.

You can see this in the example init patch 'Init_TrainingPatch'.

To understand what each input and output pin does and what it's value range is, if you put the mouse cursor over the pin, the pin information will be shown at the top of the patch graph area.

Click on the node info tab, and then click on the nodes to see summary information about the node.

Additionally since v1.06 modulation is shown as an animated 'current value' on the rotary knobs and sliders in the edit panels. This animation is based on the last triggered note voice data.



Processing load

To reduce processing load, audio nodes will stop processing audio once the level control of the Audio Out node reaches close to 0.

This is very important – if you don't hook up an envelope generator (or some other control data output that ends up at 0 level) to the level control of the Audio Out node you will hear all of the voices audio output continuously, which in some cases may be desired – but in most cases you won't want that. Other than it potentially sounding bad, it also will waste CPU time if the level control never reaches 0.

(Having said this there are times when you will want to control the audio output level in a different way, such as with generative patches and drones type patches – so it's not a strict requirement to use a note triggered ADSR.)

Usually a (non-global) ADSR will control the audio output level of the 'audio output' node - and is triggered from the T trigger output of the 'Notes Input' node – this means each key pressed will trigger the envelope for each voice.

When all voices envelopes reach 0 level, at that point the audio output node will halt audio node processing for all the audio nodes.

Control data nodes continuously process regardless of the audio output level, in order to capture new note inputs and so that envelopes and LFOs continue to update their phases.

A few strategies to keep processing loads low

Consider to limit the number of voices enabled in each layer.

Keep in mind that the more unison layers that are enabled in an oscillator the higher the processing load will be.

When applying wave shaping to an oscillator the load will go up – set 'Shape' to 0 to reduce the load.

Wave-sequence oscillators are double the load of standard oscillators since they run 2 oscillators with different settings at all times to enable the smooth cross-fading of the settings.

The number of filter passes affects the filter slope – and a steep slope is often useful, but this also increases processing load.

Reverb nodes are the most expensive of the FX bus nodes. You can reduce the processing load of a combi/multi-layer patch by making use of the Aux FX busses to send data to a layer dedicated to reverb processing.

CPU limitations

There's almost no limit to the number of audio & data processing nodes you can add in Hyperion (however the number of per-pin patching connections on each node control data input pin is currently limited to 16 sources – which should be plenty for 99.9% of normal human beings!).

Hyperion synth is designed to be as efficient as possible however, the nature of the synth means that it's quite easy to create multiple layers of extremely complex patches with multiple oscillators and other processing nodes.

Remember that most polyphonic synth plugins usually only have up to 4 oscillators and a couple of filters, envelopes and one FX bus – so it's worth to think about this when setting your expectations of what you can achieve with Hyperion synth, which can basically give you a multi-oscillator synth plugin on each layer – and being modular, there are certain processing optimizations that are harder to achieve vs a fixed architecture synth.

Having said this, Hyperion synth is designed to make the most of multi-core/multi-threading CPUs, and will perform very well on modern systems with 6 cores or more (more cores the better).

When the CPU audio load (amount of time spent in the audio callback) gets too high Hyperion synth will automatically try to drop notes from each layer.. however sometimes it will not be enough and you will hear audio glitches.

You can try to reduce the number of patch elements and layers as well as previously mentioned considerations and you can drop your sound card sample rate and increase the processing block size parameter in the your sound card settings, or get a faster CPU with more cores :)

Hyperion synth is designed to operate on a control data/audio block size of 256 samples or less. 48KHz at 256 samples buffer size is a good option for running on a recent computer.

If you have a fast machine, running at higher sample rates reduces aliasing and will increase the audio quality consequently, and at the same time it will reduce the effective latency too.

Hyperion synth is doing some strategic oversampling at different rates in specific processing nodes, rather than the entire audio chain, as well as using band-limited wave-tables – the oversampling quality options affect the standard/wavesequenece oscillator types however wave-folding and oscillator sync modes may still introduce some aliasing on very high notes.

Addendum:

V1.27 MPE mode updates:

V1.27 of Hyperion now includes MPE compatibility per synth layer.

MPE offers individual modulation of each played note in X/Y/Z axis – where X is pitch bend – usually a large range, and Z is per note pressure, and Y is a per channel midi cc number modulation input – typically cc74.

All of the MPE related changes are in the Notes Input node – where the relevant controls are in the edit panel, and two new output pins are available:



Controls:

Individual pitch bend up and down:

You can set the pitch bend range for up and down bend separately, up to 24 semi-tones.

Pitch bend rate control:

Pitch bending can be smoothed by up to 10 seconds (small amounts useful to filter out jitter).

Pitch bend note release options:

Pitch bend control of released notes can optionally

- Continue
- Reset to 0
- Freeze at the last pitch bend value

MPE mode option:

- Each layer can be a MPE compatible synth if this is set in the Notes Input node.
- Received notes are associated with MIDI channels as defined by the MIDI controller.
- Channel pressure is received per MIDI channel and hence per note.
- The layer channel should be set to the MPE control channel – and this channel is used by the other non-MPE MIDI receive nodes.
- Up to 32 voices can still be used.
- Note stealing operates as usual, where old notes will continue to fade out on their previously assigned voices even if new notes of the same note number are received (unless one voice per note is selected).
- Each available or stolen triggered voice is activated with the midi note and associated channel received, and will only be stopped by a corresponding channel note off message (unless stolen).
- Multiple voices can be played (and x/y/z modulated) at the same time with same MIDI note if the controller sends each note on a different MIDI channel (this can occur with fretboard style note layouts).

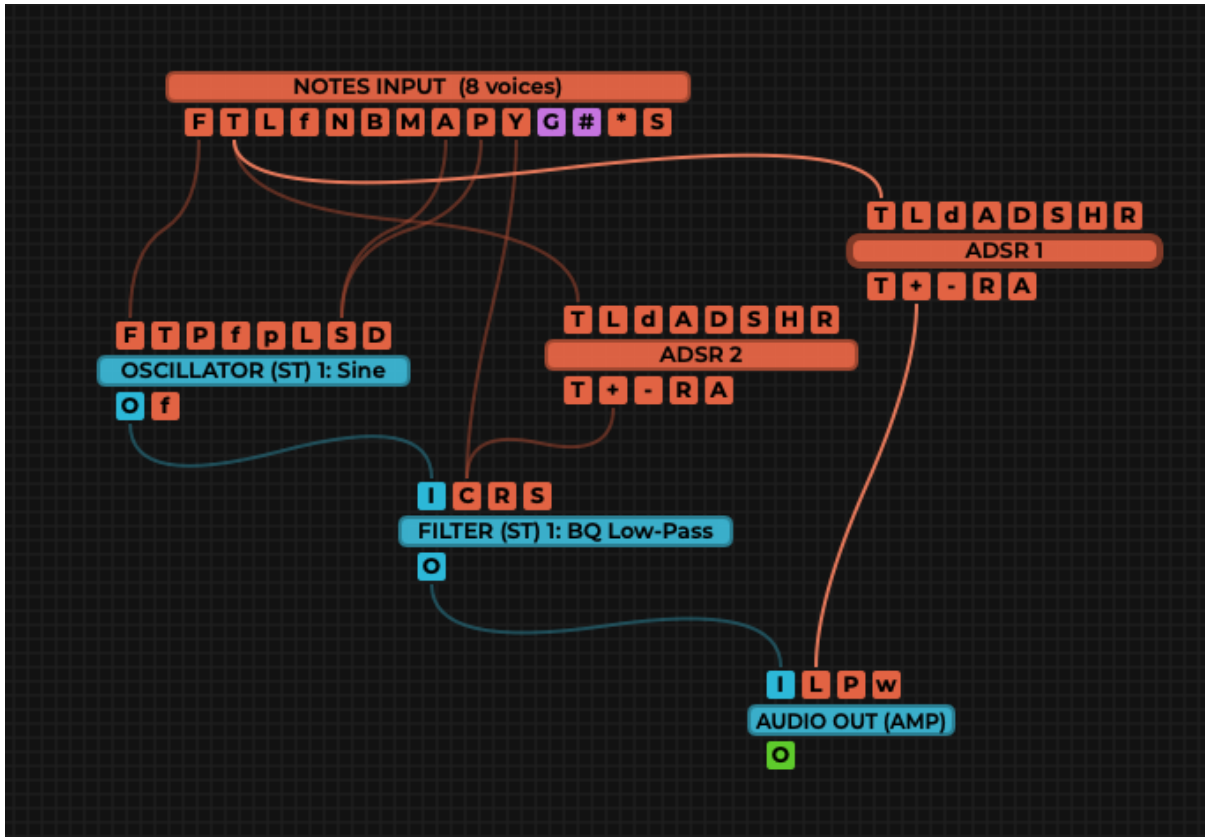
Average pressure option:

If polyphonic aftertouch or MPE mode pressure is received and this is set, the pressure value on each voice is averaged out from all the received channel/aftertouch-note pressures.

Y-axis cc number selection

MPE mode Y axis cc control number can be set - this will provide multi-channel output of the selected cc number in MPE mode, and standard single channel output of the same cc number in non-MPE mode.

Output pins:



New output pins:

A-output pin:

Aftertouch, supports polyphonic per note after-touch values output (non MPE mode.)

Y-output pin:

The MPE Y data output pin, either as multi-channel MPE mode or single channel non-MPE mode cc data.