

# **Hyperion Synth Plugin – User Guide – v1.3**

## Table of Contents

<a href="#">Introduction.....</a>	<a href="#">3</a>
<a href="#">Interface overview.....</a>	<a href="#">4</a>
<a href="#">Top bar.....</a>	<a href="#">5</a>
<a href="#">'Zoom' pull down list.....</a>	<a href="#">5</a>
<a href="#">Oscilloscope view with master volume control.....</a>	<a href="#">5</a>
<a href="#">Notes off button.....</a>	<a href="#">5</a>
<a href="#">Info area.....</a>	<a href="#">5</a>
<a href="#">Stand-alone mode controls.....</a>	<a href="#">5</a>
<a href="#">Main UI Sections.....</a>	<a href="#">6</a>
<a href="#">Patch browser and directory setting.....</a>	<a href="#">7</a>
<a href="#">Layers.....</a>	<a href="#">8</a>
<a href="#">Layer controls.....</a>	<a href="#">10</a>
<a href="#">Patch Editing.....</a>	<a href="#">11</a>
<a href="#">Node categories.....</a>	<a href="#">12</a>
<a href="#">Orange nodes / Multi-voice control data nodes.....</a>	<a href="#">12</a>
<a href="#">Purple nodes / All-voice control data nodes.....</a>	<a href="#">12</a>
<a href="#">Blue nodes / Audio nodes.....</a>	<a href="#">12</a>
<a href="#">Green nodes.....</a>	<a href="#">12</a>
<a href="#">FX busses.....</a>	<a href="#">13</a>
<a href="#">Navigation.....</a>	<a href="#">13</a>
<a href="#">Adding new nodes.....</a>	<a href="#">14</a>
<a href="#">Editing node parameters.....</a>	<a href="#">15</a>
<a href="#">Node menu.....</a>	<a href="#">16</a>
<a href="#">Node information tab.....</a>	<a href="#">17</a>
<a href="#">Drag and drop support.....</a>	<a href="#">17</a>
<a href="#">Connecting cables between pins (patching).....</a>	<a href="#">18</a>
<a href="#">Copy/Paste/Move.....</a>	<a href="#">19</a>
<a href="#">Mod Sources tab.....</a>	<a href="#">20</a>
<a href="#">Note Fx / Arpeggiator tab.....</a>	<a href="#">21</a>
<a href="#">Advanced considerations.....</a>	<a href="#">22</a>
<a href="#">Wavesequence Nodes:.....</a>	<a href="#">22</a>
<a href="#">Audio levels.....</a>	<a href="#">23</a>
<a href="#">Macro controls.....</a>	<a href="#">24</a>
<a href="#">Sending data between layers:.....</a>	<a href="#">24</a>
<a href="#">Sending MIDI data to your DAW / Other plugins and devices:.....</a>	<a href="#">25</a>
<a href="#">Feedback loops.....</a>	<a href="#">26</a>
<a href="#">Analog synth / natural instruments feel.....</a>	<a href="#">27</a>
<a href="#">Figuring out what is going on.....</a>	<a href="#">29</a>
<a href="#">Processing load.....</a>	<a href="#">30</a>
<a href="#">A few strategies to keep processing loads low.....</a>	<a href="#">30</a>
<a href="#">CPU limitations.....</a>	<a href="#">31</a>

## Introduction

Welcome to Hyperion plugin synthesizer designed and programmed by Paul Carter (AKA Wavesequencer).

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.

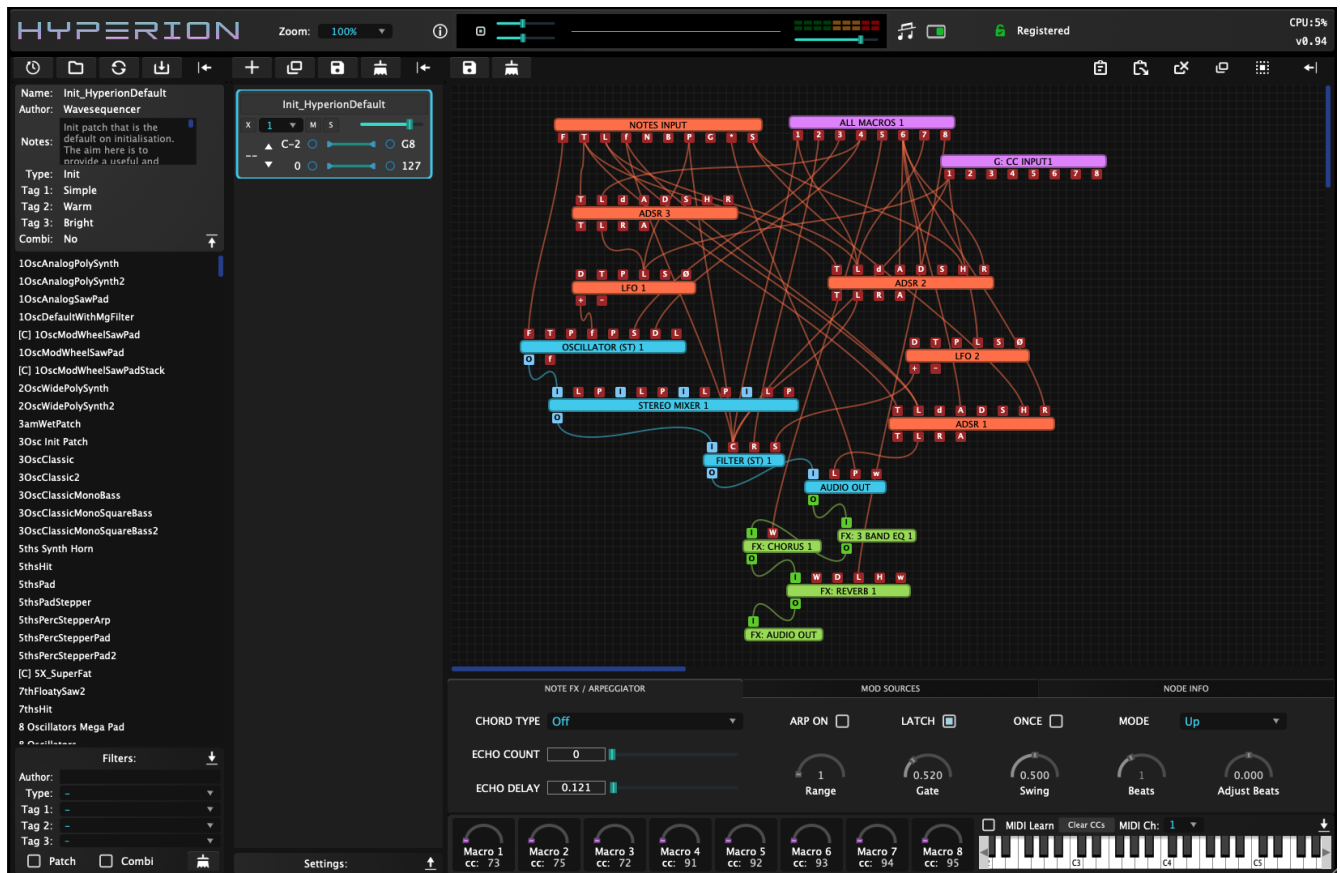
More usage details and releases news will be found at [hyperionsynth.com](http://hyperionsynth.com).

By purchasing a license (at [tracktion.com](http://tracktion.com)) you will enable me to continue to improve Hyperion with additional features and enhancements, patch packs and training videos.

Developing Hyperion has been a huge endeavor, and I really appreciate your support in purchasing a licensed copy and providing constructive feedback - thanks in advance!

## Interface overview

The initial interface of the plugin when launched looks like this – the patch list may be empty the very first time the plugin is launched on your computer.



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:

### **'Zoom' pull down list**

Lets you control the UI zoom/scaling factor between 80% and 200% (useful for high dpi screens).

### **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.

### **Info area**

Top right - shows the audio CPU load (this is audio processing specific – not the main CPU load), the version number, the registration status, and an info button that opens up some general information about Hyperion synth.

Before Hyperion is registered, there is a 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**

A tempo 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 – and will enable forwarding of MIDI control data/notes generated by patches.

## Main UI Sections

Most of the buttons in the main interface have 'tool-tips' that appear just below the oscilloscope view when the mouse cursor is placed over them.

On the left is the patch browser section.

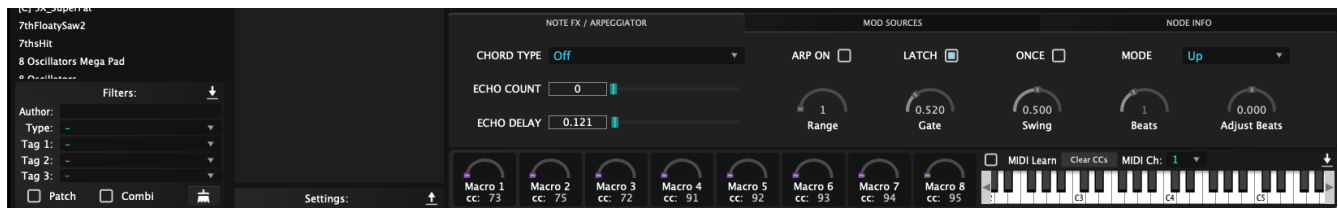
To the right of the patch browser is the layers section – which shows the currently loaded patch or patches (a multi-layer patch set is referred to as a combi-patch).

The right hand side of the GUI is the patch editing area for the currently selected layer.

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

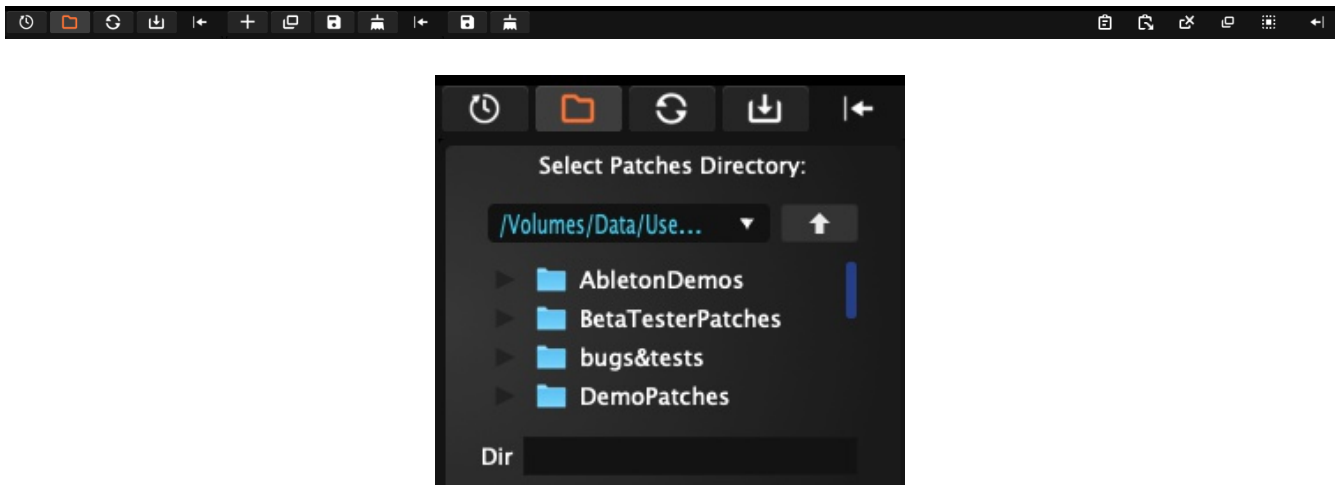
Macro controls send data to the macro control input nodes on all layers, regardless of the selected MIDI channel of each layer. The virtual keyboard will send MIDI notes to all layers on the selected channel. Macro controls are DAW automate-able parameters, or can be optionally controlled with MIDI cc.

The 'Settings' pop up panel at the bottom of the layers section allows to optionally lock the master volume and arpeggiator settings – which would normally be overridden when loading combis or patches respectively.



## Patch browser and directory setting

Click the directory button to show the directory browser, and select the folder where you extracted the demo patches/where you want to save future patches – you can switch between banks of patches this way – each bank will have it's own meta-data listing that allows filtering by types/category tags.



By default the browser pane on the left hand side of the screen will be shown – you can hide it by clicking the arrow button, or you can click the Auto-hide toggle button and it will hide after a few seconds when the mouse pointer is no longer over that area of the GUI.



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

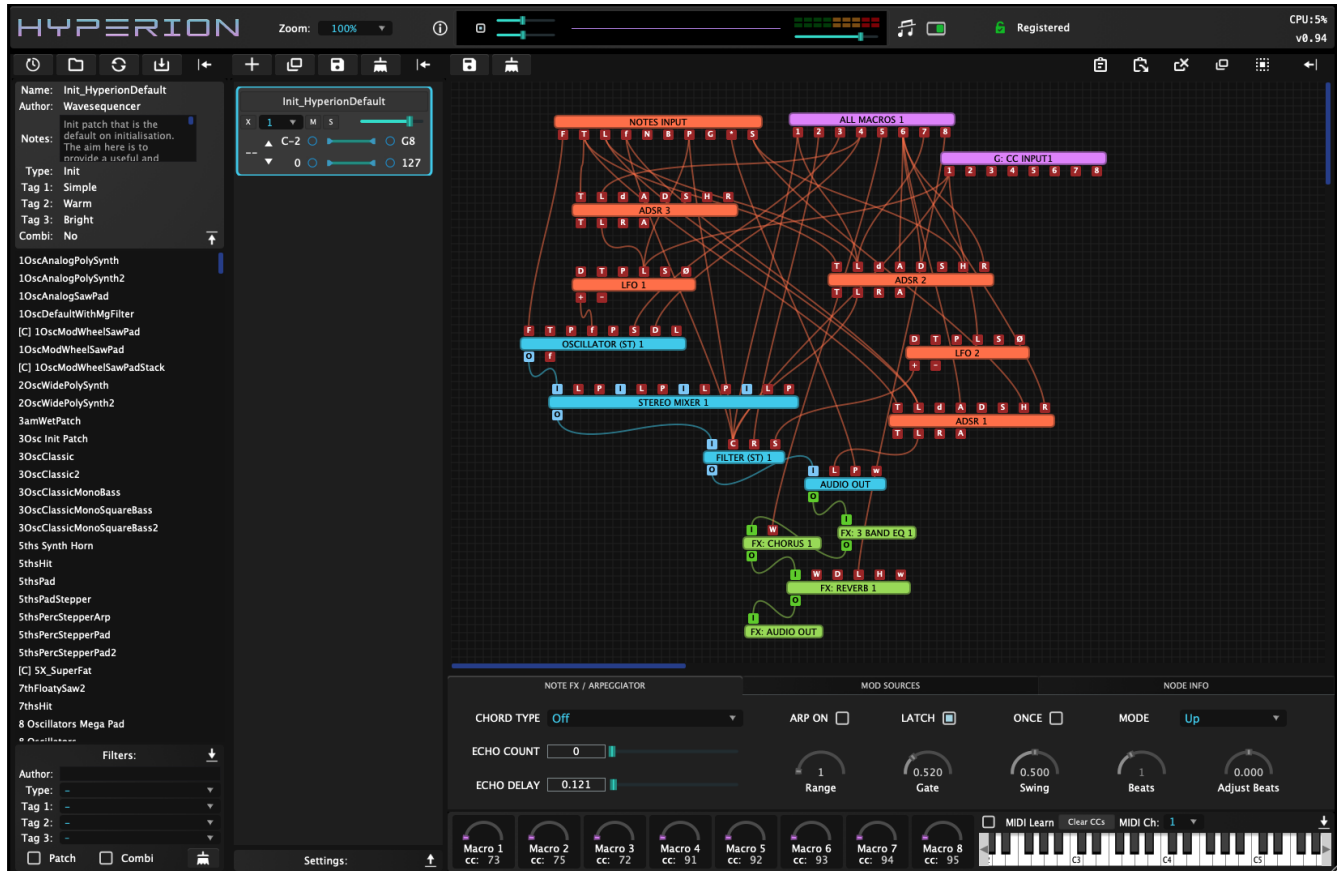
The patch list shows all available patches in the currently selected folder, unless filtering options are applied – you can select an instrument type, and up to 3 category tags, as well as filter by patch author (type in a partial or full name).

You can filter by 'Single' (1 layer) and 'Combi' patches – NOTE – loading a combi patch will remove all the existing layers that are active and replace them with the saved layers in the 'Combi' patch.

The patch filters and patch meta data areas can be hidden by clicking the arrow icons.

## Layers

If not restoring a previous state, the GUI will default to a single layer patch – the layers pane to the right hand of the browser shows all currently loaded layers and their controls.



To get started just for example to get a basic understanding – I suggest to look at a simple 'Init' type patch or start editing the default patch. To find init patches, select the 'Init' type filter and you can load 'Init\_Sine' or 'Init\_TrainingPatch' by either double clicking the item in the list or clicking the 'Load currently selected patch/combi' button:

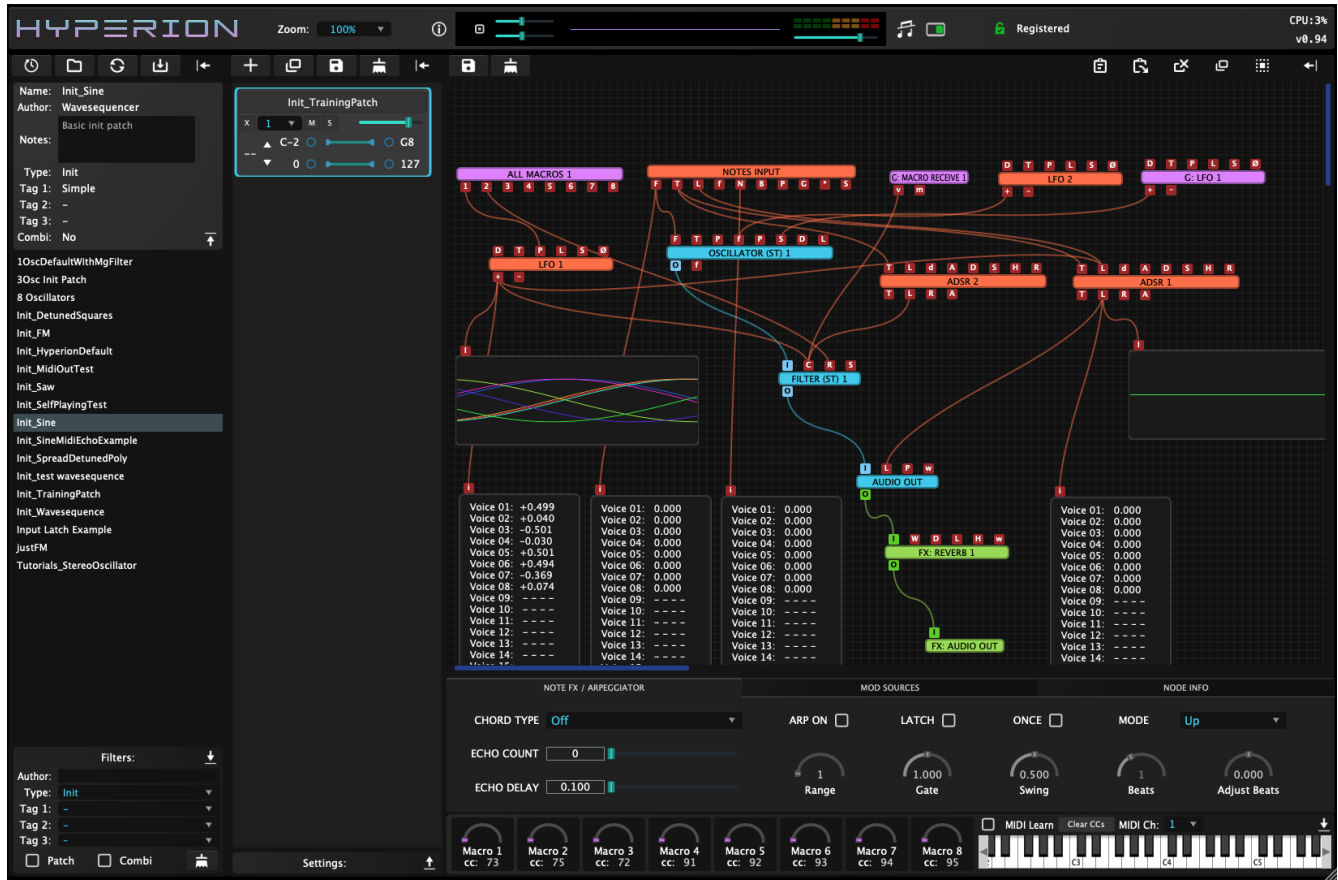


Once a patch is loaded into a layer it becomes the active patch, and the meta-data info area at the top of the browser pane will get updated to show the loaded patch meta-data.

If you want to see the meta data for a patch before loading it click on the patch or combi-patch. To populate the info area prior to saving a new version of the same patch, you can select the patch in

## Hyperion Synth Plugin – User Guide – v1.3:

the layers area. The last selected/loaded combi will be the default values shown in the save combi dialog.



You can add more layers by clicking on the 'Add Layer' button:



The currently selected layer has a light blue surround.

The 'Duplicate Layer' button will duplicate the currently selected layer into a new one (assuming less than 10 layers already exist):



'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.



Combi patches are saved as a collection of all the individual patches data, so they will not be affected

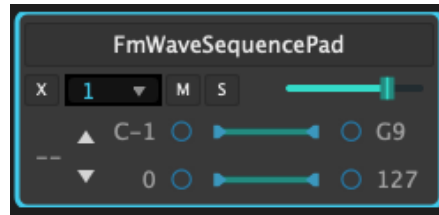
## Hyperion Synth Plugin – User Guide – v1.3:

by edits to the original patches that were saved into the combi.

'Clear all layers' will remove all the patches and revert to the default state of 1 empty layer.



### Layer controls



Each layer can be set to respond to a dedicated MIDI channel.

Layer controls also include MUTE and SOLO buttons, as well as level control slider.

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

The bottom half of the layer controls allow you to set the semi-tone 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 to the left of the MIDI channel selector (this removes the layer – be sure to save your patch first if needed).

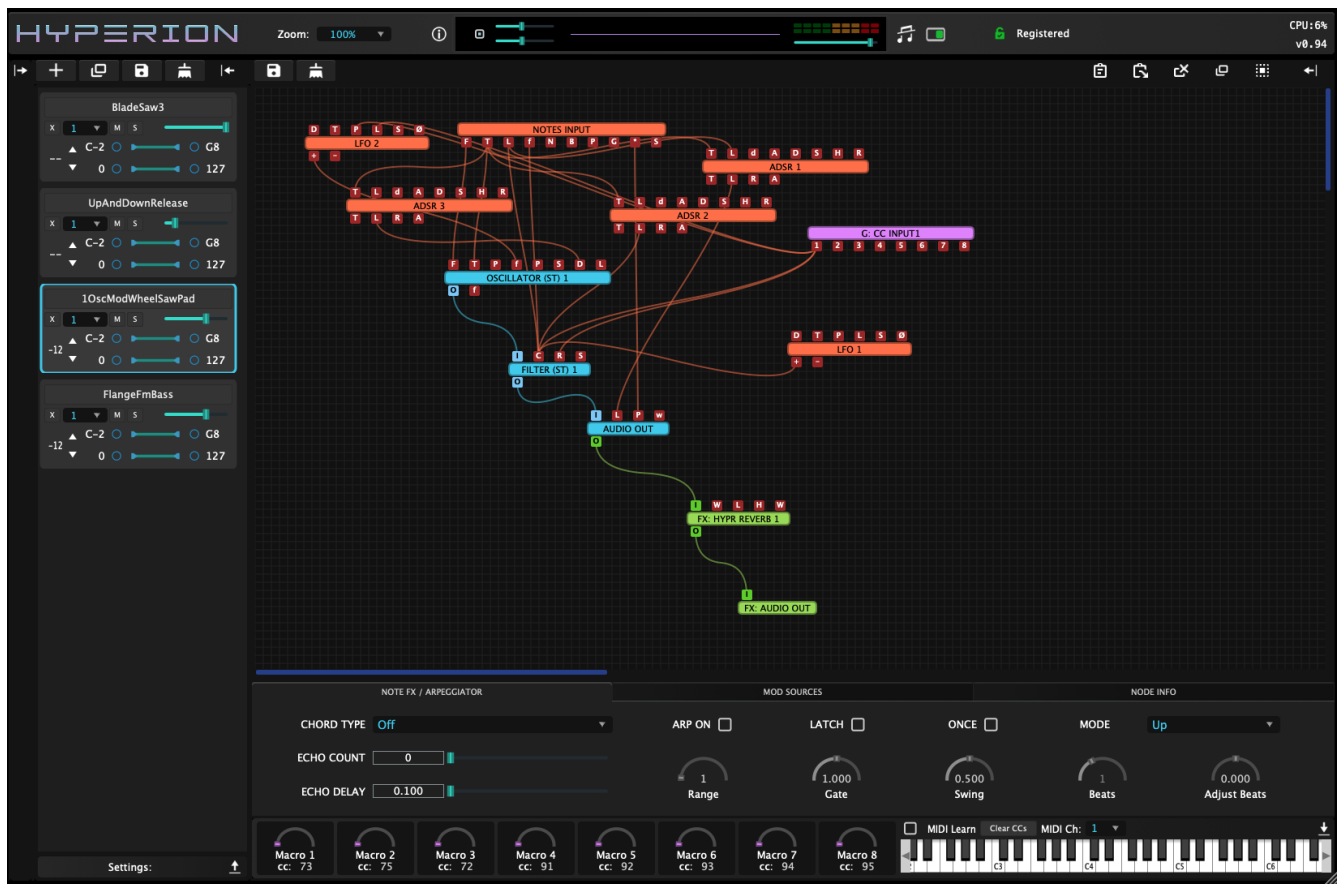
## Patch Editing

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 – just be aware that it will only save the individual layer you can see / are editing – it will not save the other layers.



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.

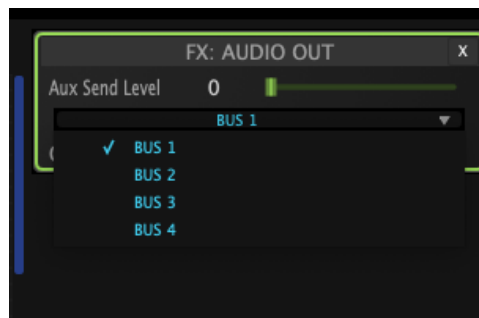
## FX busses

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.

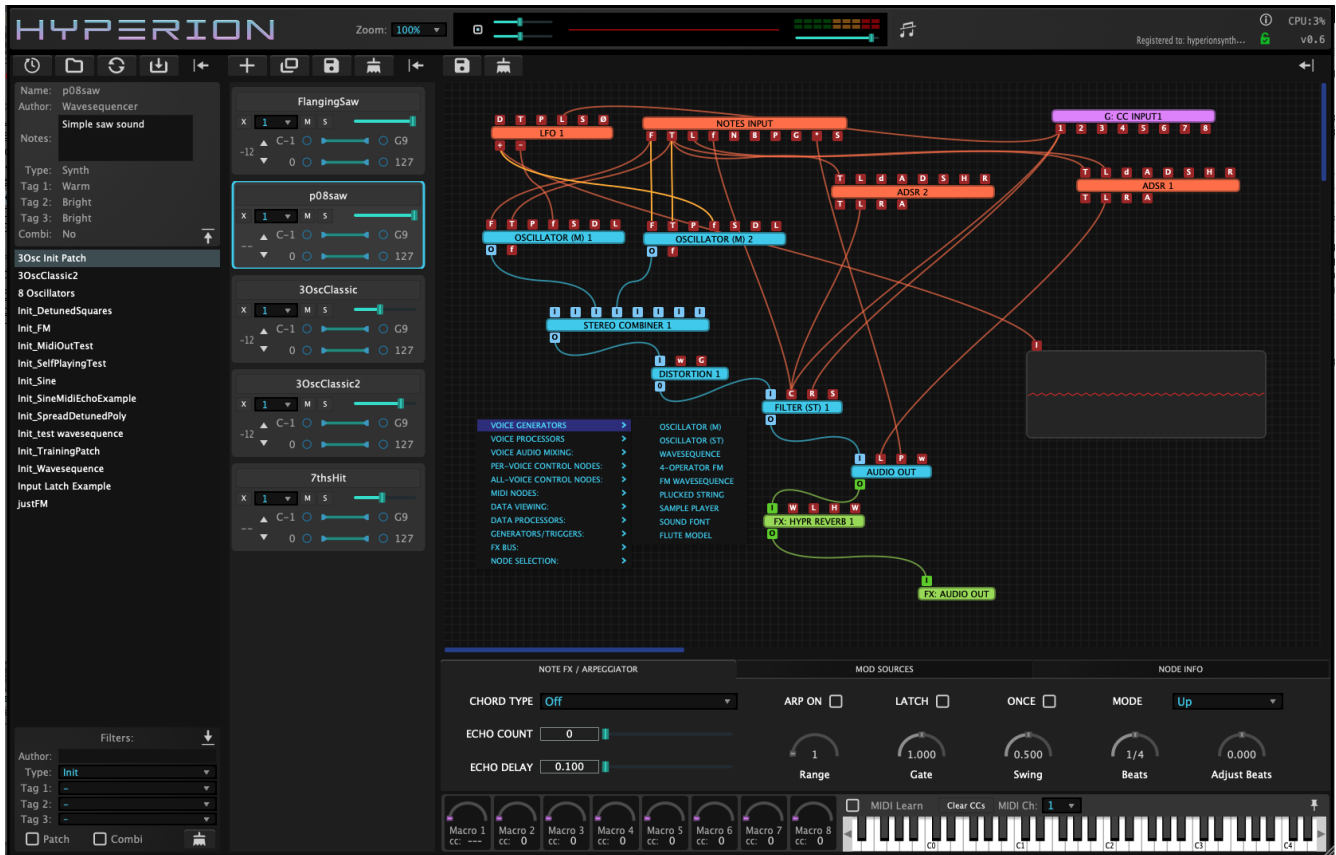
## Navigation

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

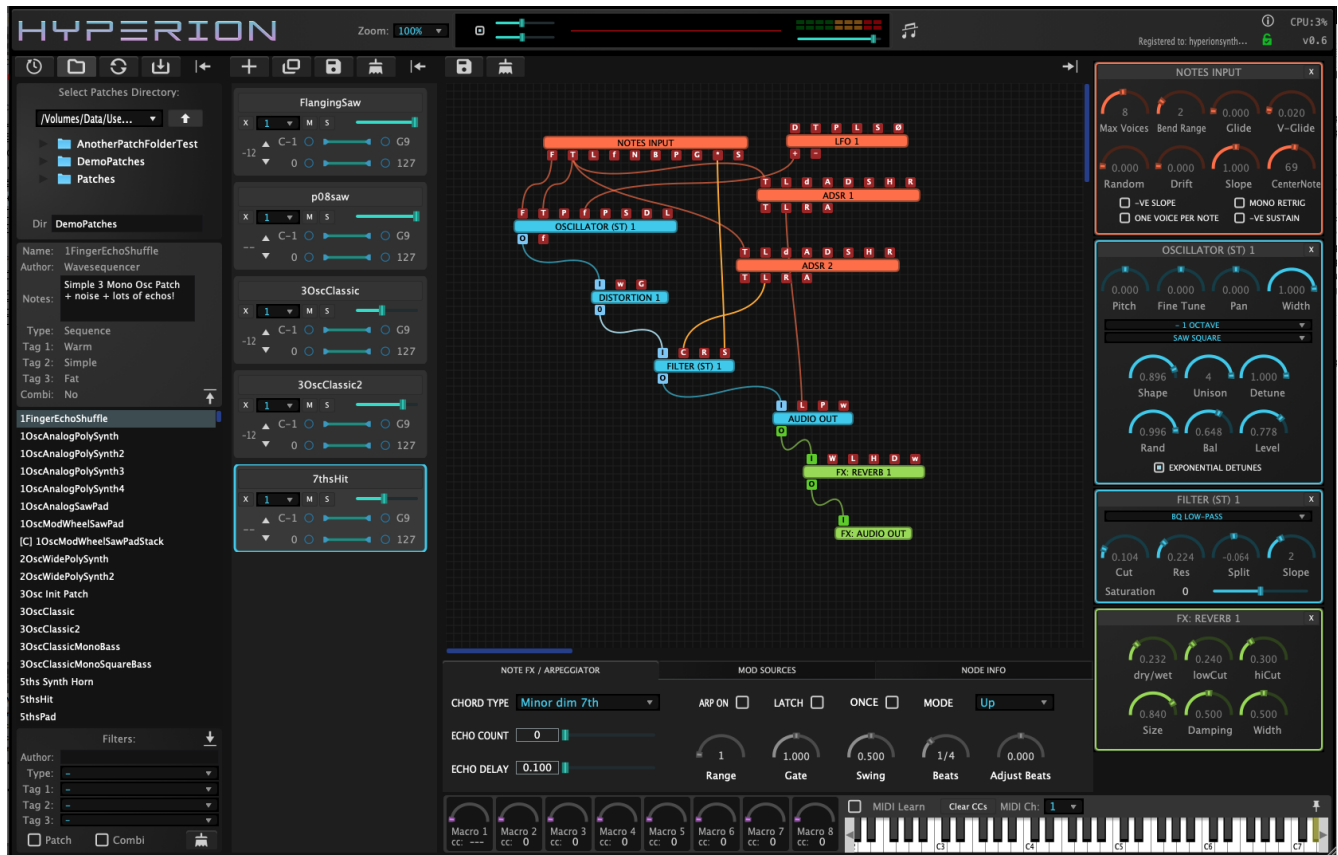
To drop a new node into the patch 'graph' area, right click on the mouse in the editing area (when not over a node or node-connector pin):



You can dismiss the list by clicking anywhere else in the editing area.

## Editing node parameters

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



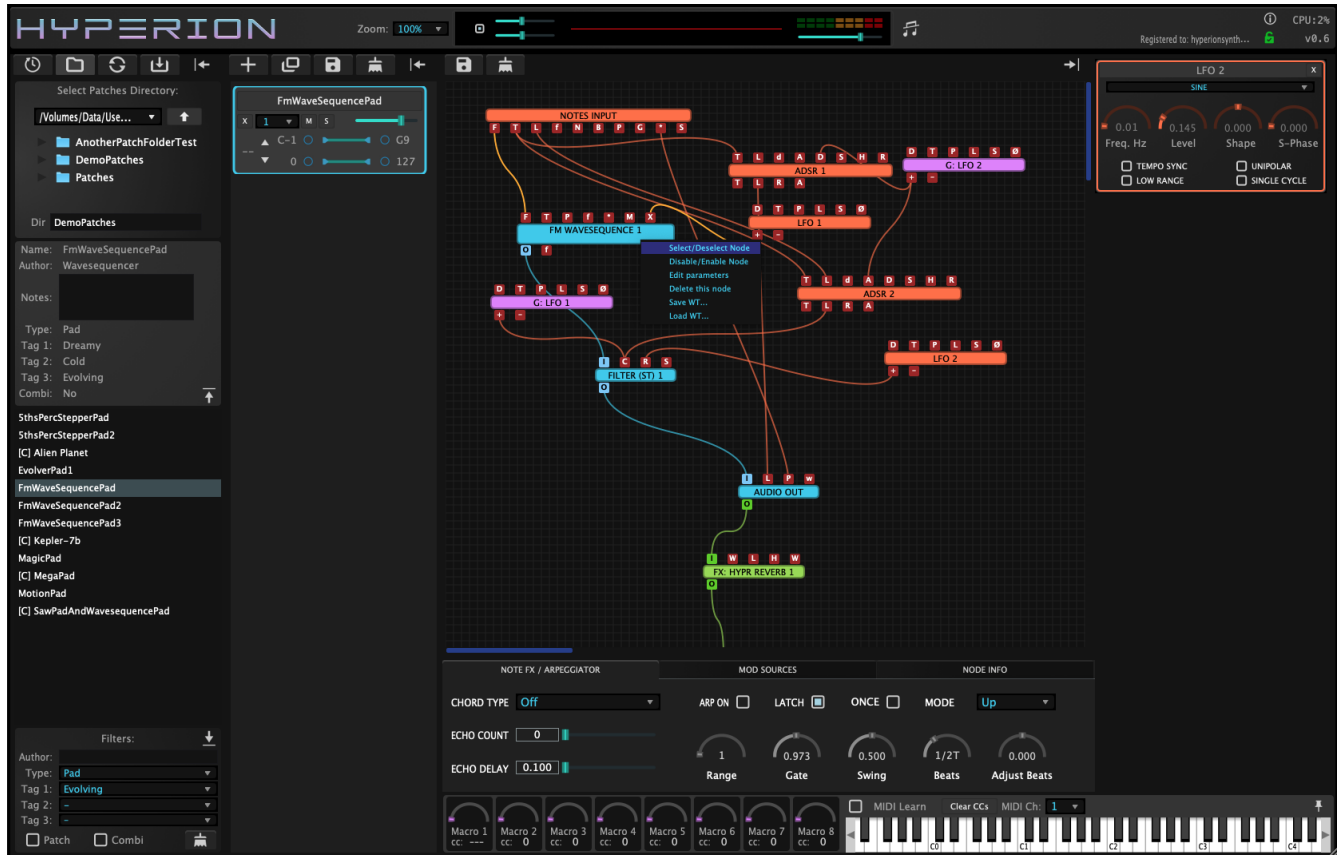
Clicking multiple nodes one after the other adds more node edit panels to the node edit pane – when there are more than fit on the screen you can scroll to see them all. The most recently clicked node will be placed at the top of the editing pane automatically.

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

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).

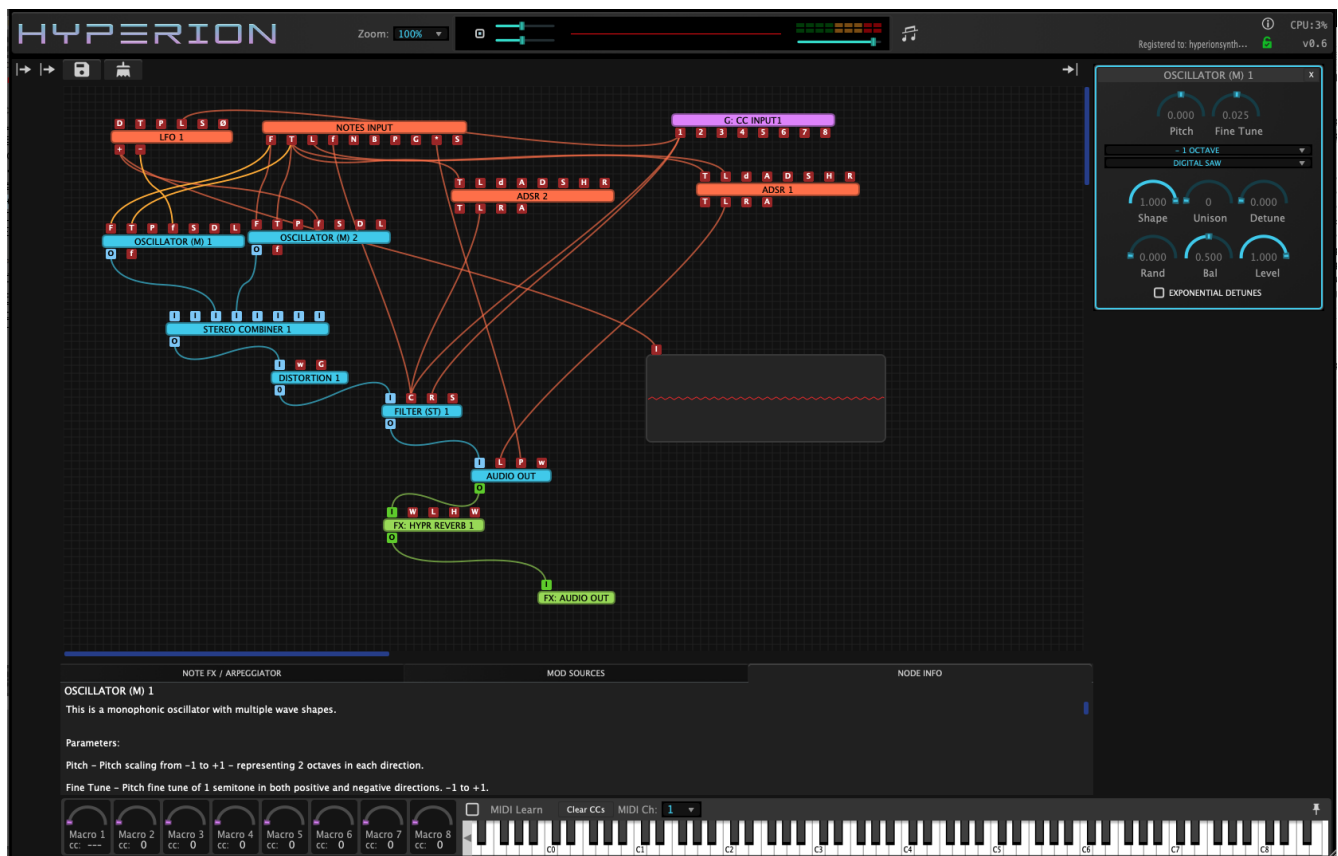


This list allows to select and deselect the node, temporarily bypass the processing of that node ('Disable/Enable' option) or delete it from the patch.

## Node information tab

There are many available node types, to get more information about each node, you can click on the node in the editing area and the contextual tab area at the bottom of the patch editing pane will show information about the current node clicked on.

You can 'long click' a node to bring up the node information without opening up the node's edit pane on the right hand side edit pane area.



## 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.

(Note that the sampler node will only import up to 1 minute of audio data – audio sample data is saved as data embedded into patch files, and this limitation keeps patch sizes manageable.)

## 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.

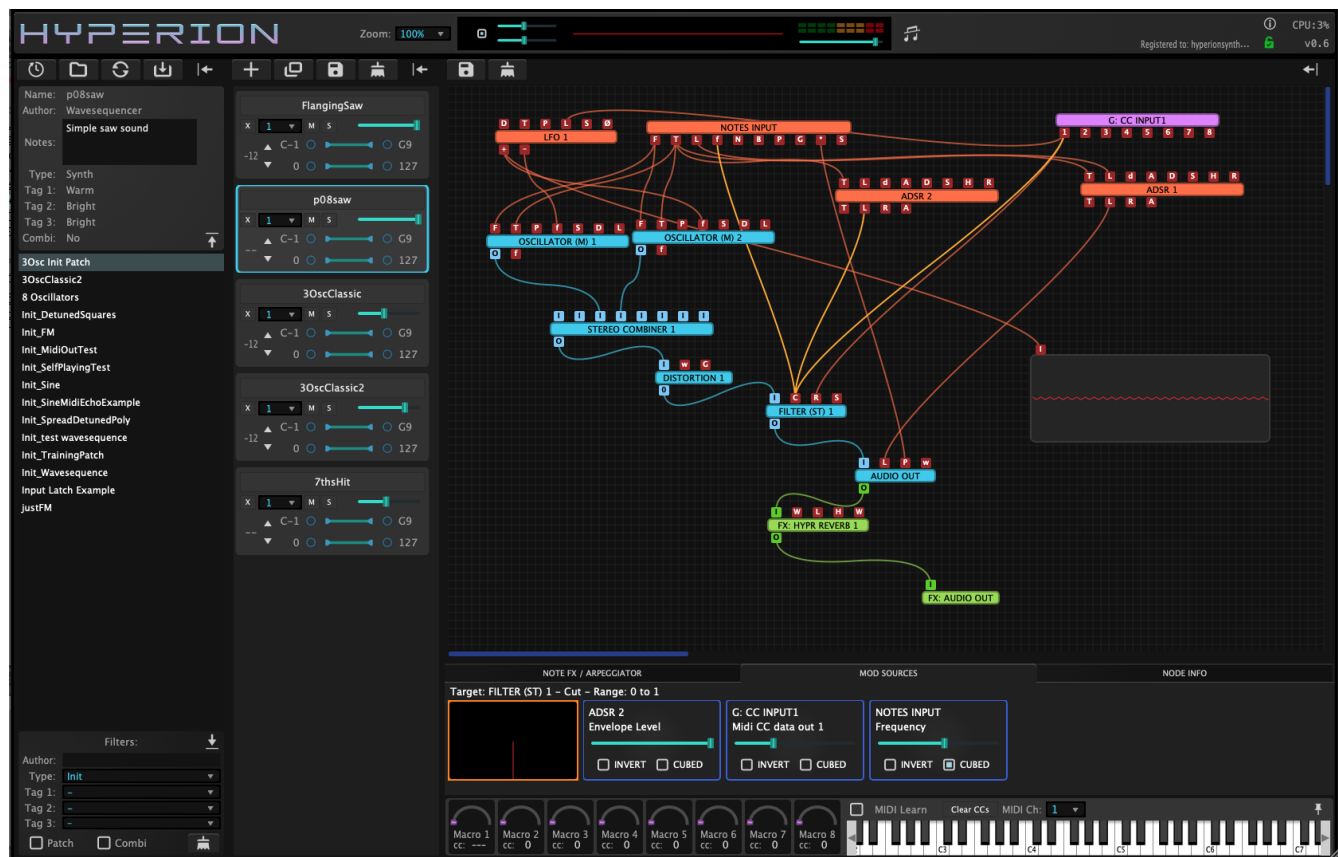
To select the target pin to connect to, move the mouse pointer until the cable is touching the targeted pin – on doing so it will become highlighted by a white square surrounding the pin.

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.

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.

Selected nodes are surround by a white border.

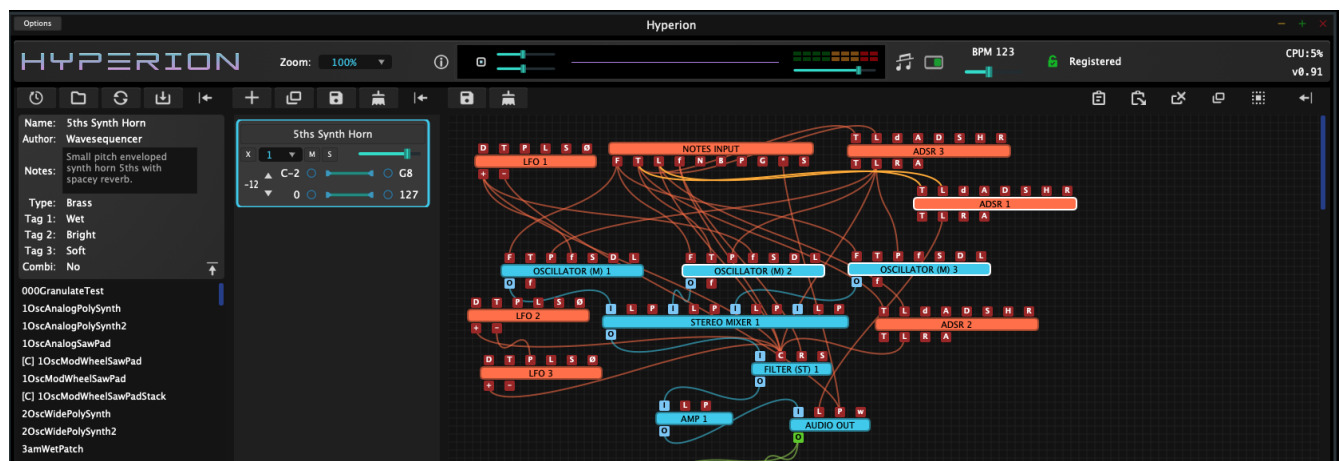
Clicking anywhere else in the graph area will clear node selections.

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

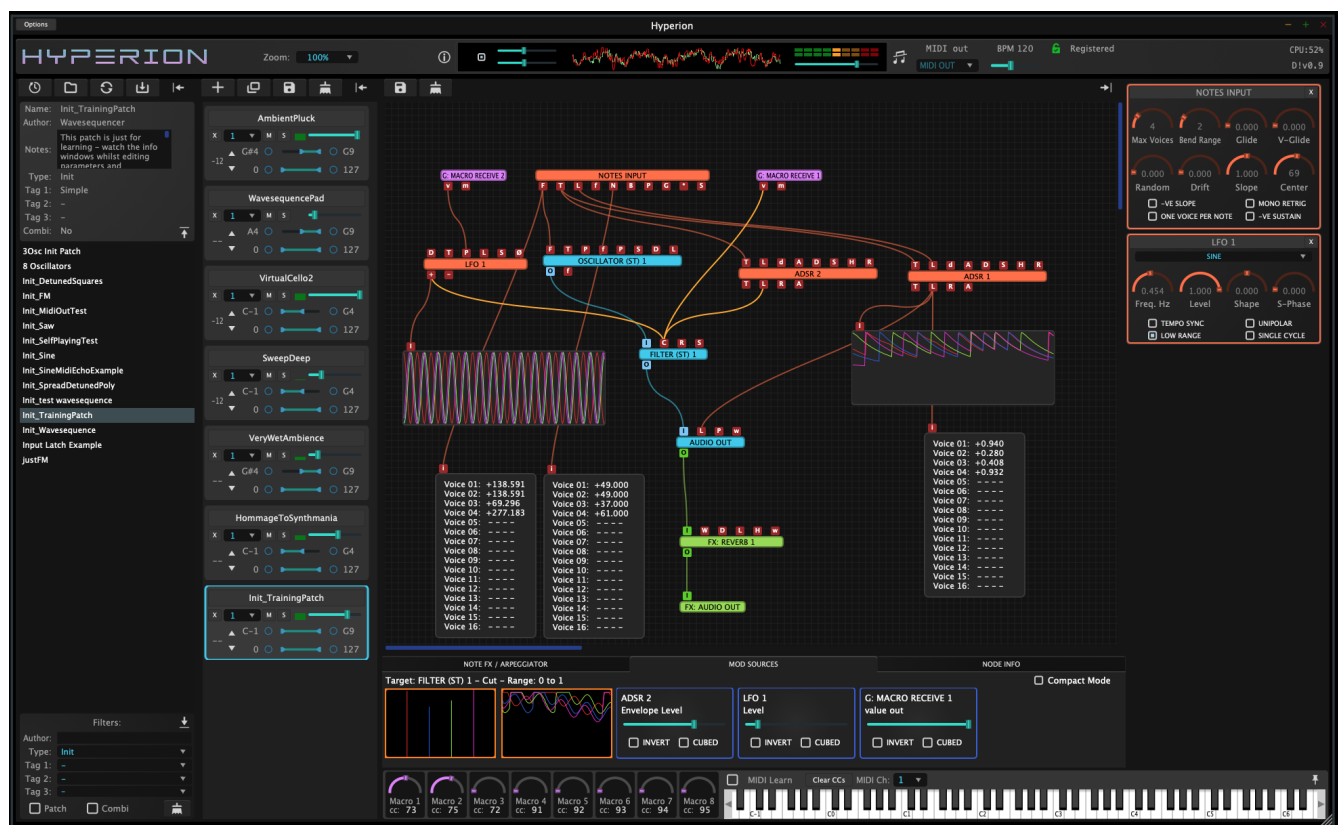
When you click on a control data input pin, it will also switch the contextual panel at the bottom of the patch editing area to the 'MODSOURCES' tab, where you can visualize the animated lines showing the value for each active voice as well as the scope view for each voice value.

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).

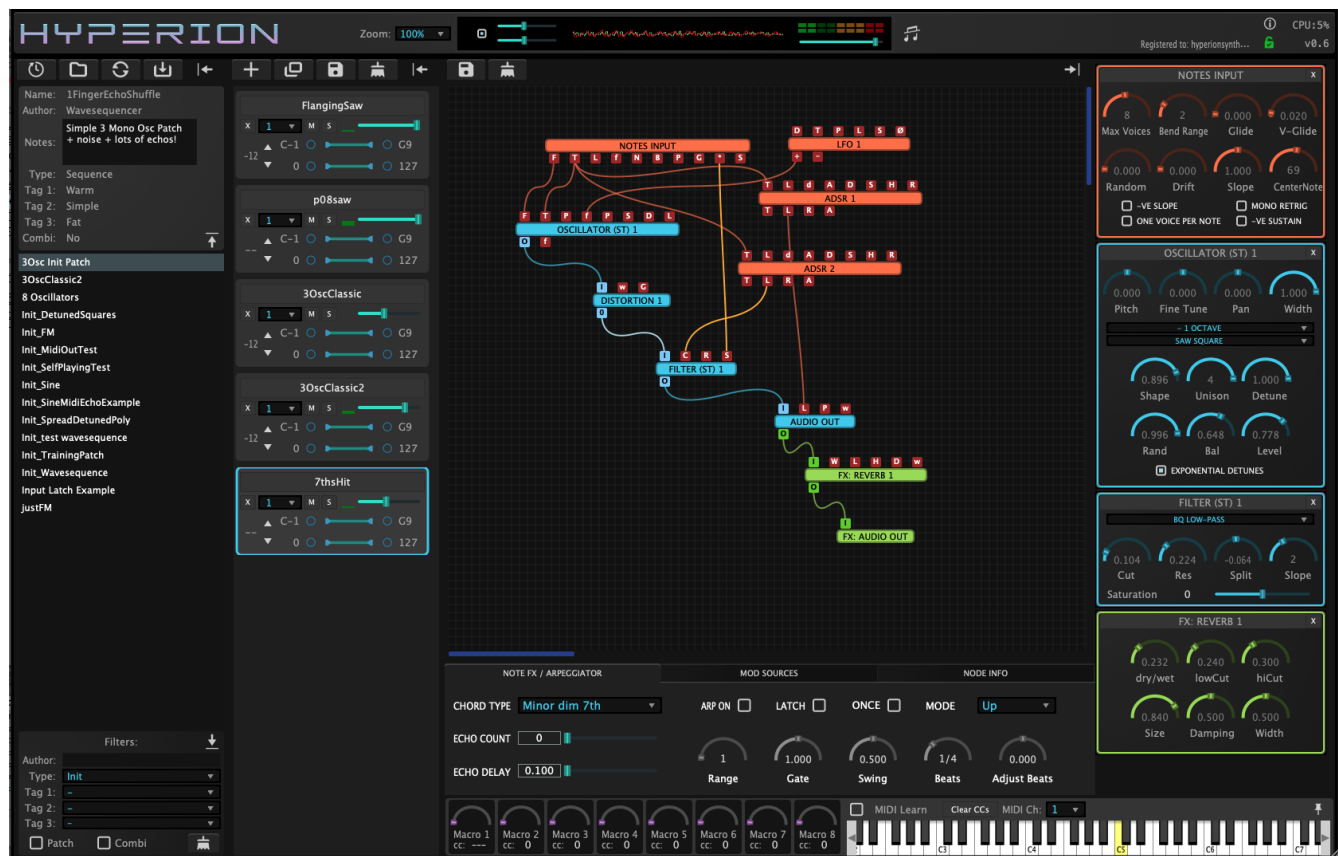
Whilst it's possible to set the level of a modulation source by directly setting the output level within the node (for example the LFO), in many cases it's handy to send the same control data source to multiple different input control pins (and multiple target nodes) – and so this allows to tailor the 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 pretty standard, other than there is also a 'once' option which 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.

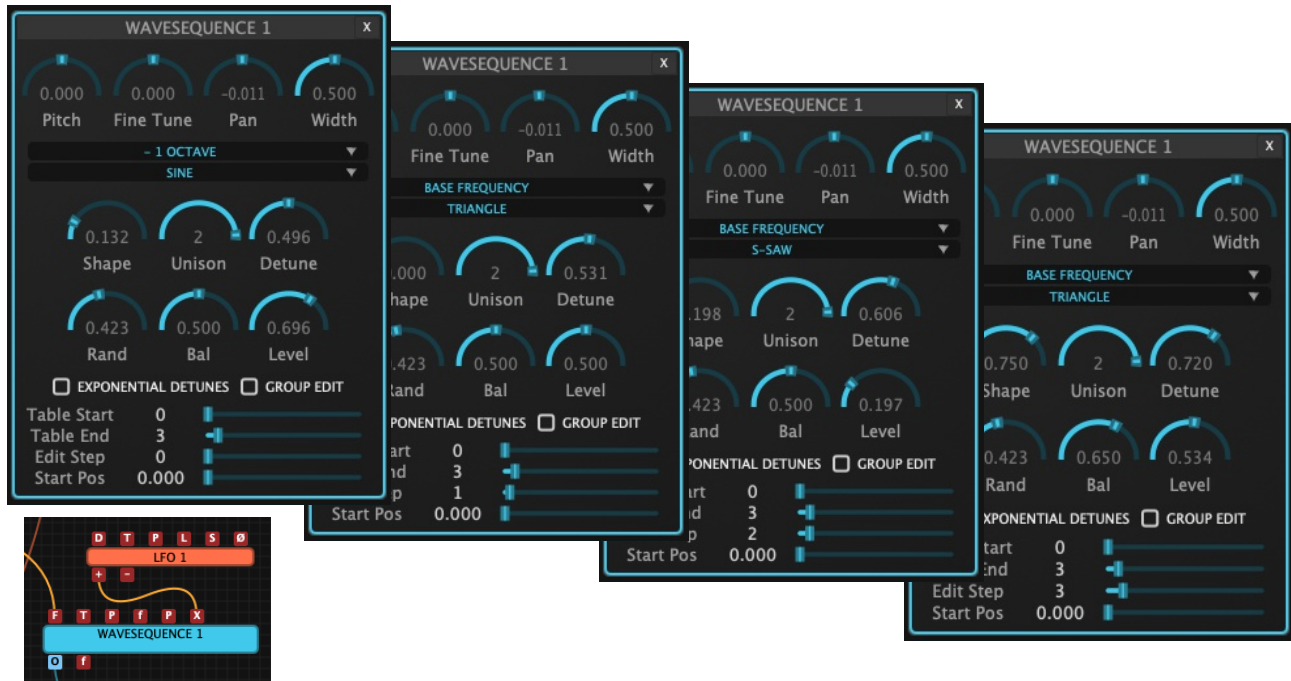
Every layer has it's own note processor for chord, echo and arpeggiator – so some pretty complex combinations of patterns can be created.

One interesting usage of the arpeggiator is to have a slightly different beat time on each layer – settable via the 'Adjust Beats' control.

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

## Advanced considerations

### 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.

## 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..

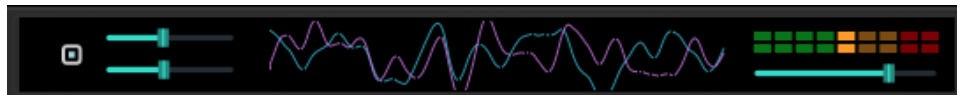
Try to lower the output levels of those nodes or use an amp stage to trim the level.

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.



As a general rule – it's good practice to keep the audio level meter peaking at or below the second yellow segment 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

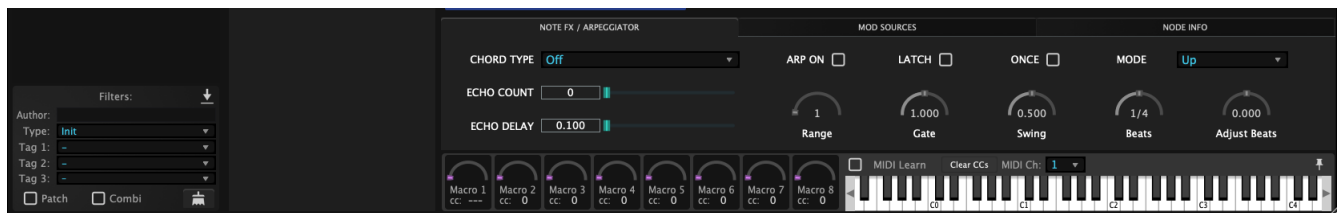
Whilst each individual layer can be assigned its own MIDI receive channel, the Macro receive node will receive the same Macro control values regardless of which layer-patch you put it in – so it allows macro control over all the layers from a single GUI/MIDI control.

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.



## 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 a output MIDI channel (channel which the DAW will receive data on) and/or a 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:

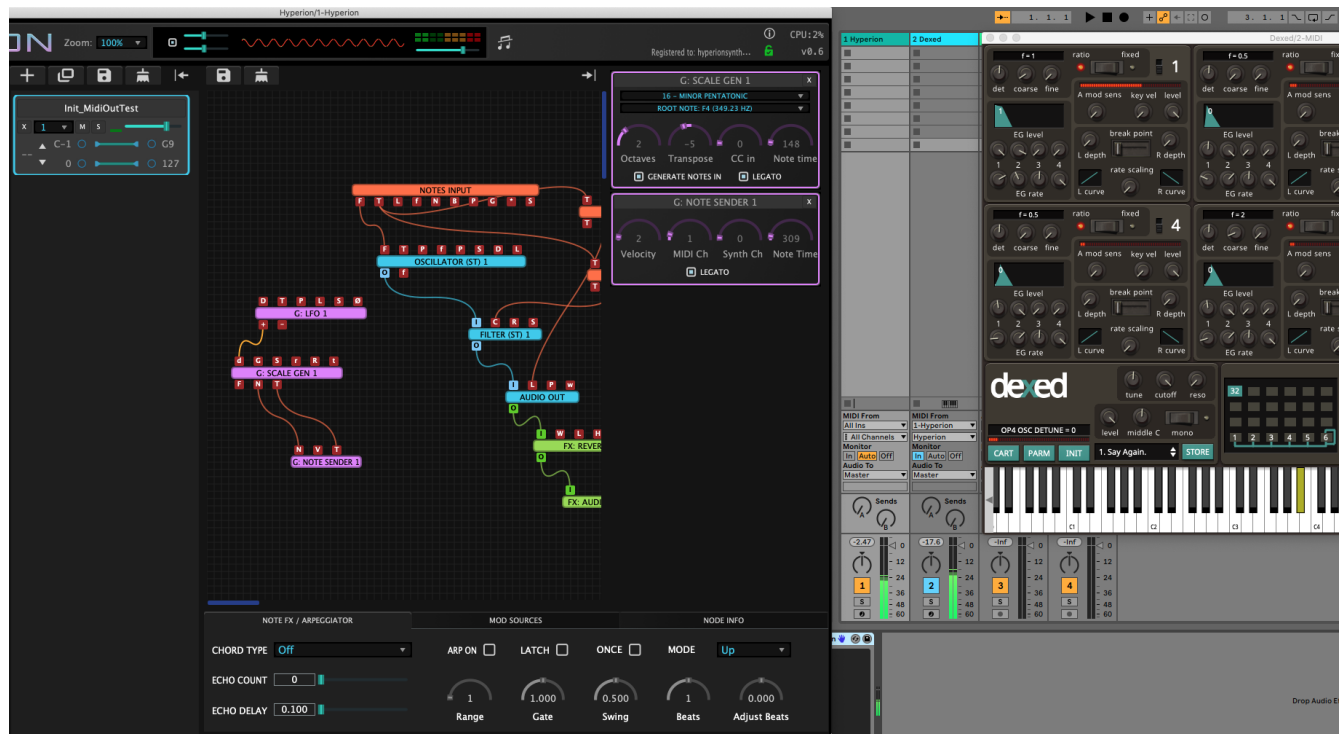
You can send MIDI cc and notes data to your DAW (or selected external MIDI device in stand-alone mode) from nodes which generate that data.

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.

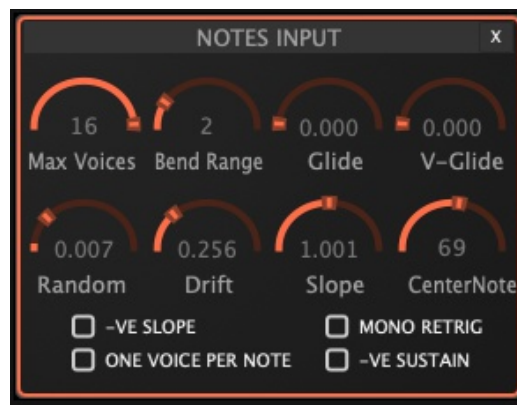
## Analog synth / natural instruments feel

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 with the 'Mono Retrig' checkbox.

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.

## Hyperion Synth Plugin – User Guide – v1.3:

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.

## 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..

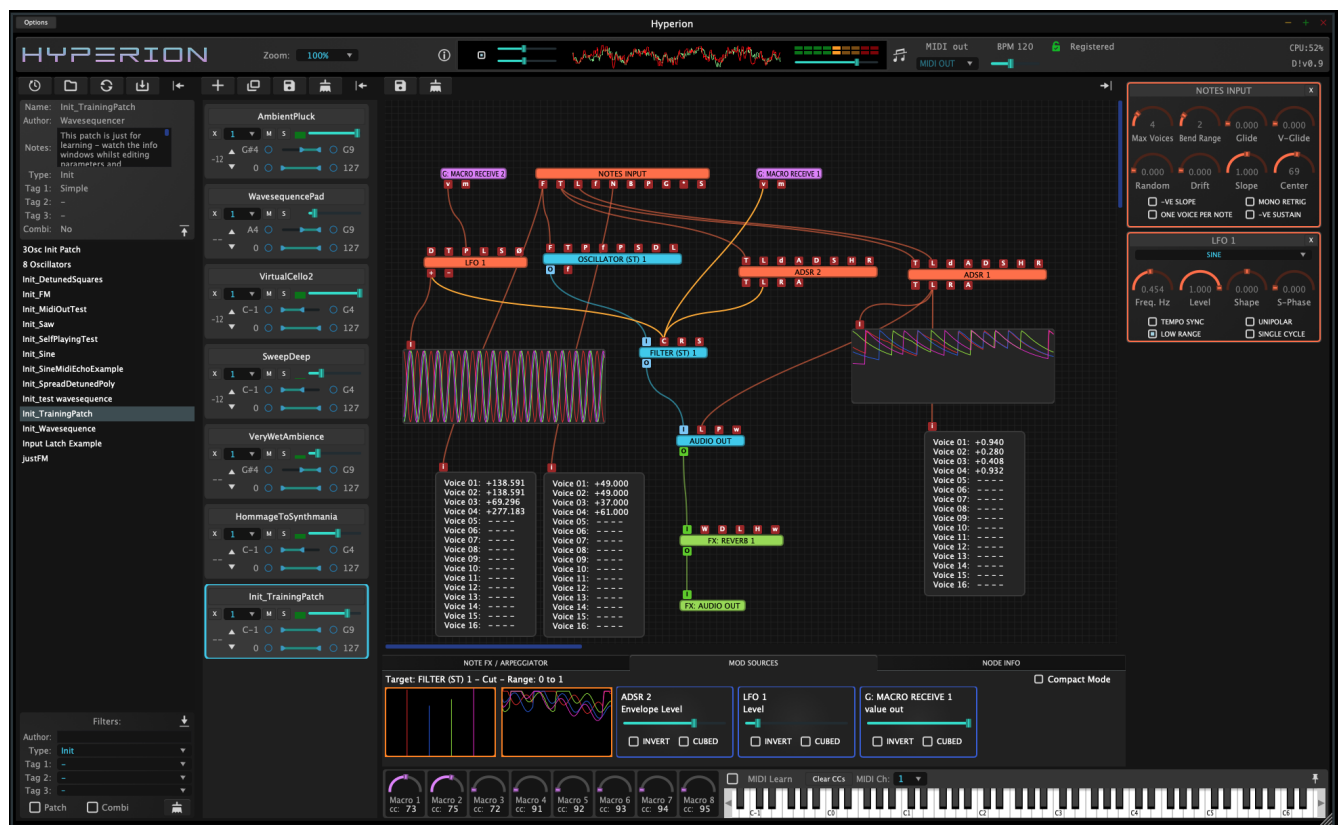
These data viewer nodes will show values/or graphs of each individual active voice.

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.



## **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 already 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 – and so there is no single oversample rate to set from the UI at this stage.