ROLI

EQUATOR 2

User Manual

Contents

Equator2 introduction

Welcome to the Equator2 User Manual. This comprehensive guide details every element and feature of Equator2 in order to help you get the most out of this amazing synth.

For further information and technical support, please visit our support page and user forum.

Overview

Equator2 is a hybrid synthesizer with six **Source Modules** at its core, each of which can operate in any of four signal generating modes:

- Oscillator (Wavetable and Virtual Analog)
- Sampler
- Granular
- Noise

The Source Modules feed into an extremely flexible routing matrix, where each one can be independently routed to the multi-input main Filter Block and the Effects Block.

The Filter Block enables selection of a wide range of filter types and four filter routing schemes; while the Effects Block is a semi-modular 12-slot rack housing a vast library of powerful processing modules and switchable between four signal routing setups.

Alongside that, an advanced modulation matrix allows for automated movement of any number of parameters by various mod sources, creating a highly expressive engine for sound design.
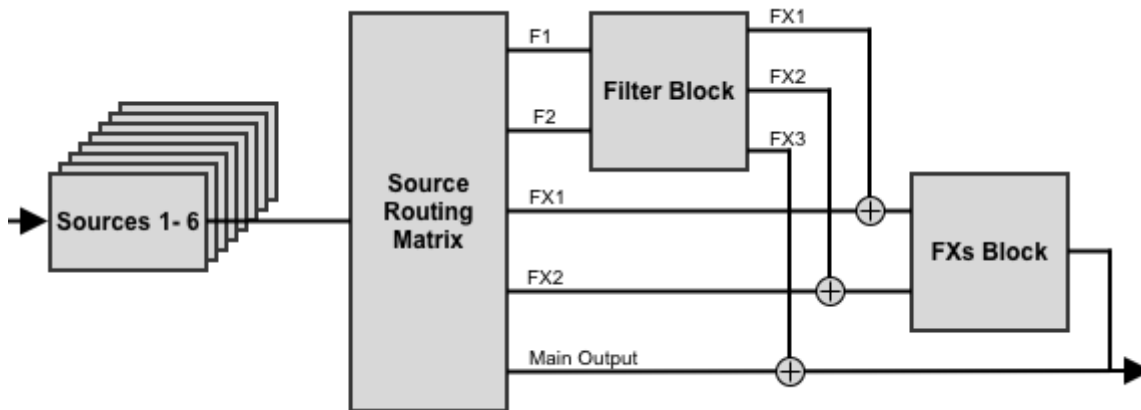
Equator2 Engine Structure

Authorization, installation and updates

Equator2 is authorised, downloaded and installed via the **ROLI Connect** download application. To download and install ROLI Connect, please go to **roli.com/start**.

When you first run ROLI Connect, you will need to log in to or create a ROLI Account to authorise and download Equator2.

If you bought Equator2 directly from the ROLI online store and selected 'Auto Register' at checkout, Equator2 will automatically appear in the **Apps** tab when you log into ROLI Connect. Alternatively, if you have a registration code for Equator2, click the 'register' icon in the top right hand corner of ROLI Connect to enter it.

Once authorised, click **Install** and ROLI Connect will automatically download and install Equator2. Click the Equator2 name in ROLI Connect to reveal the Equator2 and Equator1 Legacy content libraries; clicking **Install** will download and install the content to the default file location listed below.

File and folder locations

Here is a list of the default locations to which the standalone and plug-in versions of Equator2 are installed, as well as the Factory and User content:

Mac file and folder locations

- **Standalone**: Macintosh HD/Applications
- **AU**: Macintosh HD/Library/Audio/Plug-ins/Components
- **VST3**: Macintosh HD/Library/Audio/Plug-ins/VST3
- **Content:**
    - **Factory content:** Macintosh HD/Users/Shared/ROLI/Equator2/…
        - …/Presets
        - …/Samples
        - …/Wavetables
        - …/Multi-Mod
        - …/Modulation Curves
        - …/Effect Chains
        - …/Effects/..
            - …/Distortion
            - …Etc
    - **User content:** ~/Documents/ROLI/Equator2/…
        - …/Presets
        - …/Samples
        - …/Wavetables
        - …/Multi-Mod
        - …/Modulation Curves
        - …/Effect Chains
        - …/Effects/...
            - …/Distortion
            - …/Etc

Windows file and folder locations

- **Standalone**: C:\Program Files\ROLI\Equator2\Equator2.exe
- **VST3**: C:\Program Files\Common Files\VST3
- **Folders:**
    - **Factory Folders:** C:\Users\Public\Documents\ROLI\Equator2\…
        - …\Presets
        - …\Samples
        - …\Wavetables
        - …\Multi-Mod
        - …\Modulation Curves
        - …\Effect Chains
        - …\Effects\…
            - …\Distortion
            - …\Etc
    - **User Folders:** C:\Users\[User]\Documents\ROLI\Equator2\…
        - …\Presets
        - …\Samples
        - …\Wavetables
        - …\Multi-Mod
        - …\Modulation Curves
        - …\Effect Chains
        - …\Effects\…
            - …\Distortion
            - …\Etc

Navigating and Interacting with Equator2

Navigating the interface

The Equator2 interface comprises two main panels, divided horizontally. Synth Source Modules, routing, settings, visualizers and effects are controlled in the top panel, while Modulation Sources and routings are handled in the bottom panel. This separation makes it very quick and easy to assign Modulation Sources to synth and effects parameters directly from the UI. For a more traditional approach to applying modulation, though, the bottom panel can also be flipped to the Modulation Matrix View.

Equator2 Main View

Top bar

The top-most bar is used to navigate the synth and its settings.

- **About:** Clicking the ROLI logo, top left, opens the About panel, where you can view and copy the version number of your Equator2 installation, which will be useful information for ROLI Support if you run into any issues.
- **Synth, Routing and Effects View tabs:** Click the tabs to navigate between the three main top panel Views.
- **Global**: Displays the Per-preset Settings in the central window.
- **Preset selection**: Quickly step through presets, open the full browser and save User presets.
- **Undo/Redo:** Turn the clock back on any mistakes you have made (and wind it forwards again if that mistake turns out to have been a happy accident!).
- **Volume**: Raise or lower the output volume level, from -inf to +12dB, independent of the preset volume.
- **Panic**: If anything unexpected happens, click the **!** button to immediately kill all MIDI input to Equator2.
- **Synth Settings:** The top right-hand corner icon opens the Synth Settings panel.

Top panel – Synth View

The Synth View shows the **Mini Views** for all six Source Modules**,** offering control over the **Source Type** (Waveform/ Wavetable/Sample Instrument) and top level parameters for each. These parameters are explained in detail in the **Equator2 Source Modules** section.

At the bottom of the Synth View are the parameters for Equator2's two Global Filters, which are routed in series by

default. These parameters are explained in detail in the **Filters** section.

By default, the central window in the Synth View is set to its **Main View**, displaying a visualisation of the main output. Clicking the **Global** tab below the central window switches it to displaying the Per-preset Settings.

Top panel – Routing View

In the Routing View, the Source Module Mini Views and Global Filters are replaced by banks of controls for adjusting send levels to the Routing Matrix. For details, see the **Equator 2 Routing Matrix** section.

The central window in the Routing View shows the Filter Configuration, Main Output controls and Ring Mod output controls.
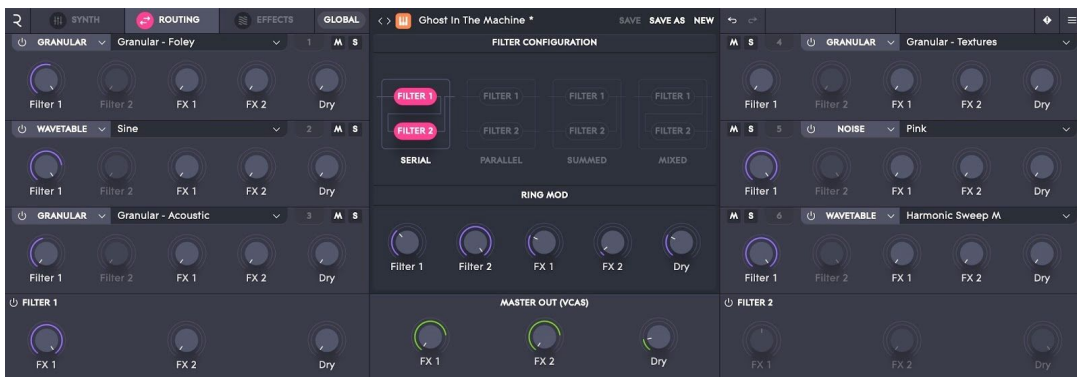
Top panel – Effect Racks View

This View displays and enables configuring of the signal flow through the Effects Rack, the effect modules loaded into each of the Rack's 12 slots, and the controls of the currently selected module. For details, see the **Equator2 Filter and Effects** section.
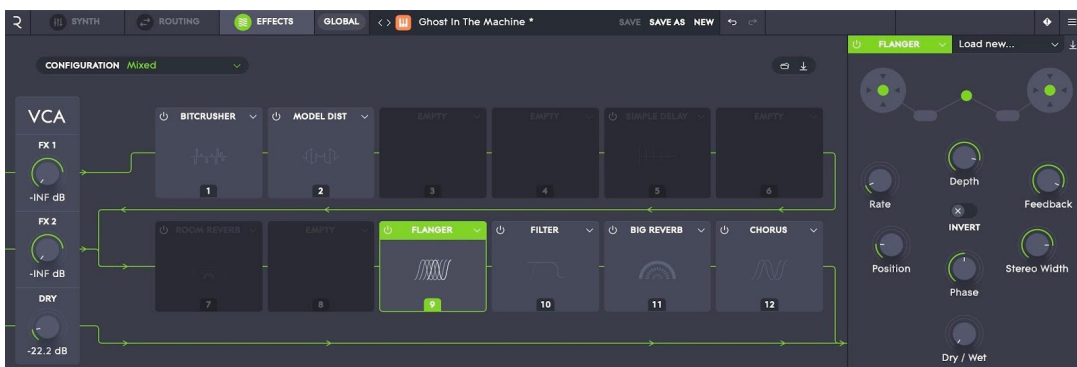
Top panel – Browser View

In the Browser View, the whole GUI displays a full view of the Equator2 preset browser. For details, see the **Browsing Equator2 Sounds** section**.**
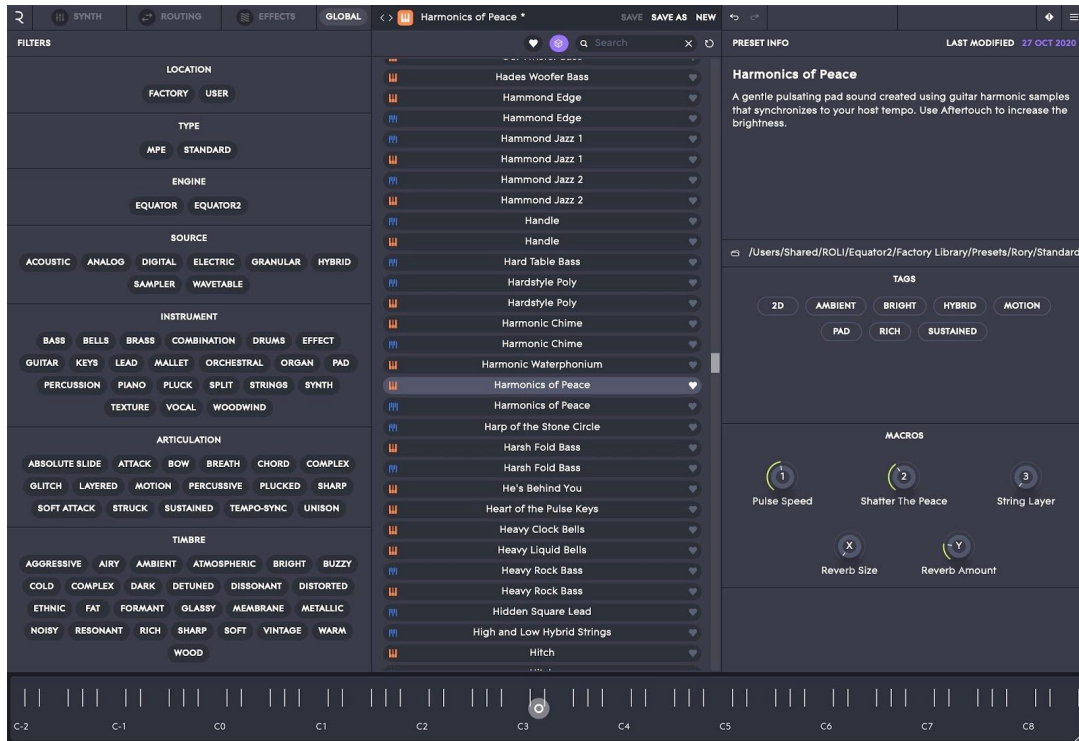
Bottom panel – Modulate View

The Modulate View displays Equator2's many Modulation Sources, enables direct control of their parameters, and lets you quickly assign them to any number of synth and effects parameters, as well as those of other Modulation Sources.

Bottom panel – Modulation Matrix

Clicking the **Mod Matrix** tab flips the bottom panel to a traditional 'list' view of all current modulation assignments. Any number of new assignments can be made here, and existing assignments tweaked or deleted. You can even locate a particular assignment using the Search field next to the **Mod Matrix** tab.

To make a new assignment in the Mod Matrix (bearing in mind that it's usually quicker to do it using the method detailed in 'Applying modulation to a parameter', below), click the **New Connection** button, top right. Select a Modulation Source

(Envelope, LFO, etc) in the Source column and a target parameter in the Destination column, and set the modulation depth with the Amount slider. By default, all new assignments are mapped to a linear transfer curve, but clicking the **Edit** button in the Transfer Function column opens a graph in which the curve can be edited, and preset curves saved and loaded. To delete an assignment, click the **Remove** button on its row.

For details of the available Modulation Sources, see the **Equator2 Modulation Sources** section.
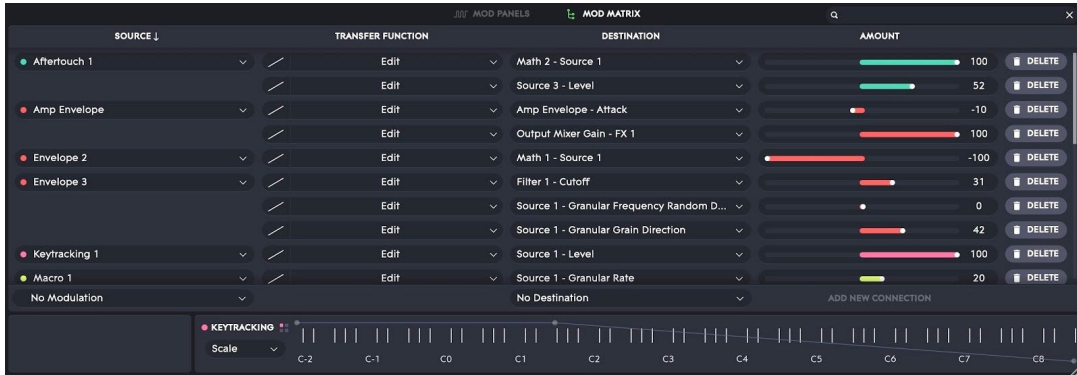
Interacting with Equator2

Adjusting parameters

All Equator2 parameters are adjusted by manually operating their on-screen dials or directly entering numerical values. A dial will display its name until you mouse over it, whereupon it will display the current parameter value.

Click and drag a dial to adjust its base (coarse) value. Hold down the **Command** (Mac) or **Control** (Windows) key while dragging for fine adjustment.

Double-click a dial to reset the parameter to its default value.

Applying modulation to a parameter

To quickly modulate any Equator2 parameter from the **Modulate View**, follow these steps:

1. Select a Modulation Source (Envelope, LFO, etc) by clicking its title bar (ENV2, LFO1, etc). The Modulation Source will be outlined with an orange border.
2. Mouse over the dial of the parameter you want to modulate. If it's an eligible destination, an outline will appear around it.
3. Click and drag the dial's outer 'collar' to set the depth of modulation of that parameter by the Modulation Source. The highlighted arc within the collar shows the range of values produced by the modulation.

You can also right-click a source or destination parameter to open a dedicated modulation matrix for that parameter, in which assignments can be made just as they are in the main Modulation Matrix, described above.
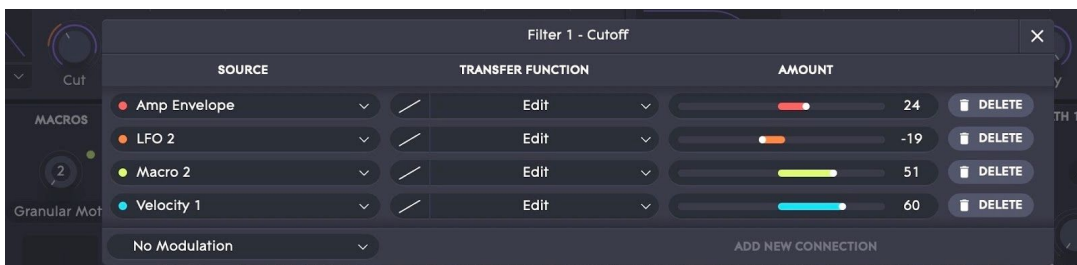
The modulation matrix that appears when the 'Filter 1 - Cutoff' control is right-clicked

Modulation can be positive or negative, and both unipolar and bipolar sources are supported, where applicable.

Double-clicking the collar resets the modulation depth to 0%.

Working with curves

The transfer function curves of Equator2's **Envelope**, **Expression Curve** and **Multi-Mod** Modulation Sources can be adjusted by adding and moving nodes, and adjusting the curvature between them. Here are the operations involved:

- **Add a node**: Double-click anywhere in the graph.
- **Delete a node:** Double-click an existing node.
- **Move a node:** Click and drag an existing node.
- **Apply curvature between two nodes:** Click and drag the curve point that appears when the mouse is placed near the line between two nodes.
- **Reset curve:** Double-click the curve point.

The Multi-Mod 1 transfer function curve editor

Browsing Equator2 Sounds

To open Equator2's Preset Browser, click the preset name in the centre of the top bar.

To step through the currently filtered presets at any point, click the left and right arrows next to the preset name, or use the left and right arrow keys on your QWERTY keyboard when in the Preset Browser section.

Click the left and right arrows to step through presets

Finding presets

The Preset Browser makes it easy to find the sound you're looking for using filters and the search function.
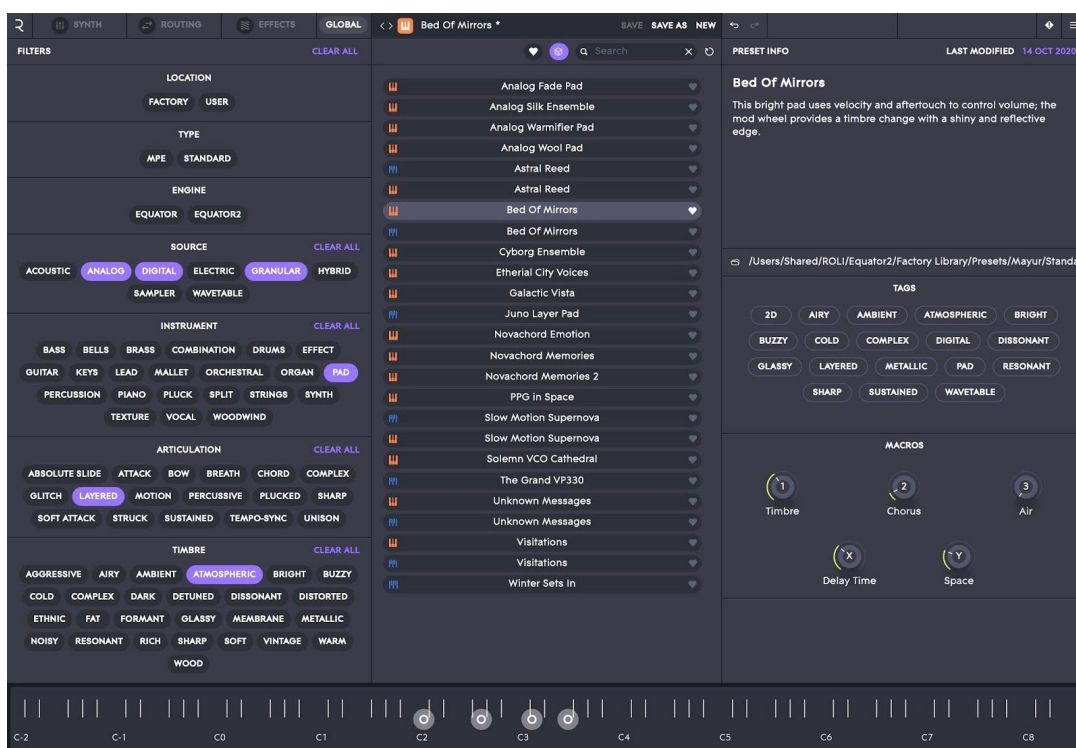
Filtering

Refine your search by selecting one or more filter tags in the left hand panel. These include:

- **Location:** Filters presets by their location in the **Factory**, **User** and/or **Soundpack** directories. See File and folder locations for the locations of these directories. (ROLI Soundpacks are separately available add-on preset banks – see the ROLI Sound Store for details.)

- **Type:** Filters the visible presets down to those designed specifically for **MPE** devices such as the ROLI Seaboard, or those designed for **Standard** MIDI keyboards.

- **Engine:** Filters down to **Equator1** or **Equator2** presets.

- **Source:** Fiters the selection according to various broad synthesis and sampling types – **Analog** or **Digital**, for example.

- **Category:** Filters by specific instrument types – **Bass** or **Lead**, for example.

- **Articulation:** Filters by sonic movement – **Plucked**, **Sustained** or **Complex**, for example.

- **Timbre:** Filters by the overall character of the preset – **Bright** or **Warm**, for example.

- **Creators**: Filters by sound designer.

Results

The preset Results list always reflects the currently selected filters, and the icon to the left of every preset tells you what Type it is:

- **Seaboard icon**: MPE presets
- **Keyboard icon**: Standard presets

When you come across a preset you particularly like, click the heart icon to the right of its name to add it to your **Favorites** list. To view only those presets in the Favorites list, click the heart icon at the top of the results.

You can also search for a specific preset using the **Search** text field. And for instant inspiration, clicking the die icon selects a random preset based on your active filters.

Preset Info

Every Factory and Soundpack Preset includes a brief description to help you understand the sound and how best to approach using it. This is especially useful for MPE presets, which can be played in many different ways. As well as that, the following information is provided:

- **Location:** Shows the location of the preset file on your hard drive.
- **Tags:** Shows all Tags assigned to the preset.
- **Macros:** The names of the Macro controls assigned within the preset.

Auditioning Seaboard

Use the virtual Seaboard at the bottom right to audition the selected preset.

Making and saving presets

Making a new preset

To revert to the Init (default) preset, click the **New** button in the top bar of the plug-in window.

Save As / Save

Click **Save As** to save a new preset. In the dialog that appears, name your preset and edit any of the following properties:

- Browser Filter Tags
- Macro Names
- Preset Description

As soon as any edit is made to a saved preset, the **Save as** button becomes active. Click this to overwrite the preset with the current parameter state.
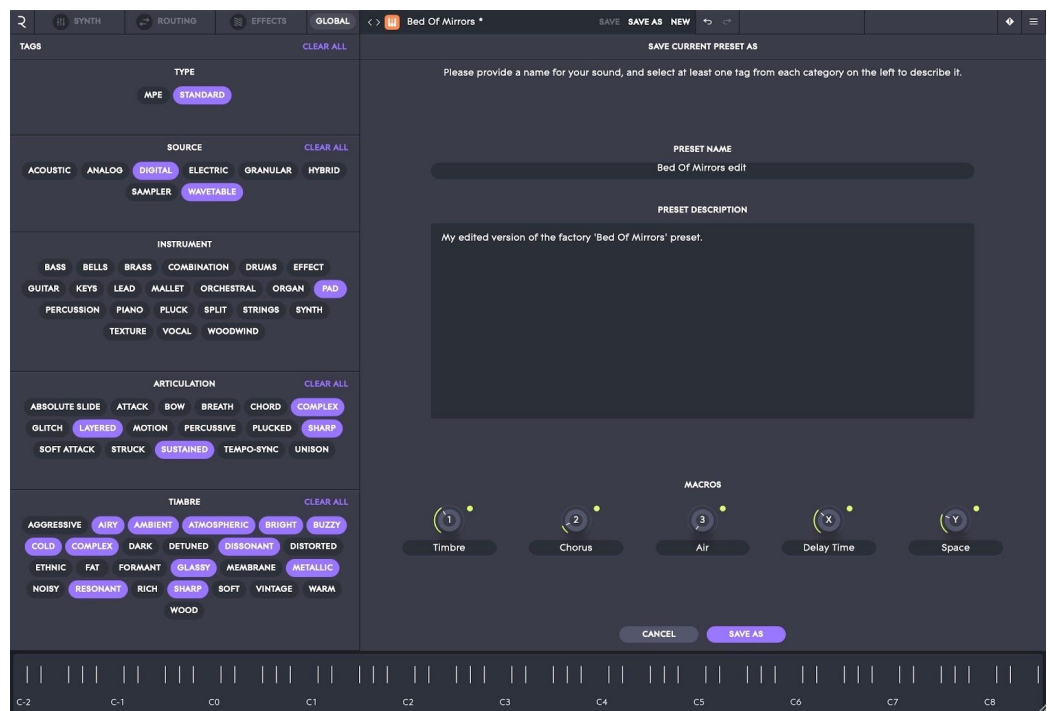
Equator2 Settings

Per-preset Settings

Click the **Global** tab in the central window of the **Synth View** to access the following preset-specific Settings.

Clock

The Clock governs the time-based parameters of **Envelopes**, **LFOs**, **Multi-Mods**, **Source Modules** and effects when their **Sync** switches are engaged.

- **Clock**: Toggles between the two settings below.

  - **Internal:** Equator2's clock is used as the internal clock. Set the tempo with the **Tap Tempo** or **BPM** controls.

  - **External:** Synchronises the plug-in version of Equator2 to the host DAW's clock. Not available in the standalone version.

- **Tempo**: In **Internal** mode, click the arrow buttons to adjust the tempo in 1 BPM increments.

- **Tap**: In **Internal** mode, click repeatedly to set the **Tempo** to the average BPM of your clicks.
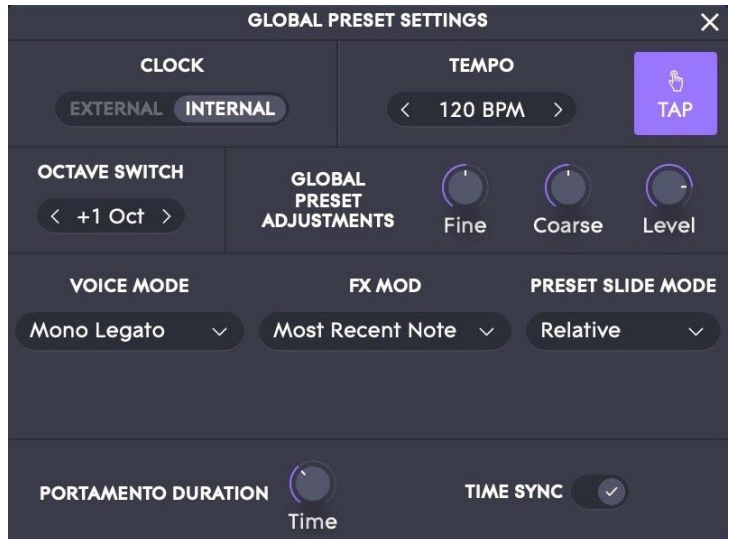
Pitch and Level

Adjust the volume and tuning of the preset with these settings:

- **Octave Switch**: Shifts the pitch in octave steps up to +/-3 octaves.

- **Coarse Pitch**: Adjusts the overall pitch of the preset by up to +/-11 semitones.

- **Fine Pitch**: Adjusts the overall pitch of the preset by up to +/-99 cents.

- **Level**: Adjusts the volume level of the preset from -inf to +6dB.

Voicing and modulation

Equator2 can be played polyphonically or monophonically, with or without portamento. This section of the **Global** tab is where those and other, related modulation settings are made.

- **Voice Mode**: Select one of the following settings.

  - **Polyphonic:** Each incoming active note triggers a new voice, up to a maximum of 16 voices.

  - **Mono Retrigger:** One voice plays at a time, with each incoming note re-triggering all envelopes.

  - **Mono Legato:** One voice pays at a time, with all envelopes only re-triggering after all active notes are released.

- **Number of Voices:** In **Polyphonic Voice Mode**, sets the number of voices from 2 to 16. Note that the number of voices set here is unaffected by the use of **Unison** in each Source Module, as Unison is generated within Sources, rather than drawing on the global voice limit.

- **Portamento**: In **Mono Retrigger** or **Mono Legato** mode, sets the time it takes for the pitch to glide up or down when one note is played while a previously played note is held.

  - **Portamento Duration**: Sets the time it takes for the pitch to shift up and down between overlapping

notes.

- ○ **Portamento Sync**: Switches the **Portamento Duration** between tempo-synced note value timings, and hundredths of a second up to 10s.

- ● **FX Mod**: Determines how effects – which are global to all voices – react when modulated by Equator2's polyphonic MPE Modulation Sources: **Strike**, **Press**, **Glide**, **Slide** and **Lift**.

    - ○ **Most Recent Note:** The last voice activated modulates the effect.

    - ○ **Lowest Note:** The lowest pitched note activated modulates the effect.

    - ○ **Highest Note:** The highest pitched note activated modulates the effect.

    - ○ **Average:** The average of all active voices modulates the effect.

- ● **Preset Slide Mode**: MPE controllers such as the Seaboard RISE and Block can be made to interact with Equator2's **Slide** Modulation Source in either of two ways:

    - ○ **Relative Mode:** The interaction with **Slide** is bi-polar, with the initial strike setting it at 64 (mid-way), and subsequent movement up and down the Y-axis of the keywave raising and lowering it from there. Adjusting the Slide sensitivity for your ROLI device in **ROLI Dashboard** will reduce the distance you have to slide your finger to reach the maximum and minimum Slide values.

    - ○ **Absolute Mode:** The values generated by **Slide** are determined by the points at which you strike the keywave then Slide your finger to, with the initial contact being absolute and additional movement relative. For example, striking the keywave a third of the way down from the top ribbon, then sliding down to the bottom ribbon, will generate a Slide value change from around 96 to minimum.

Synth Settings

Click the keyboard icon at the top right of the Equator2 interface to access the following options, and the **Audio & MIDI Settings** panel.

- ● **Audio & MIDI Settings**: See below.
- ● **Visit Support**: Open the Equator2 support website in your browser.
- ● **Animations**: Turn the animated modulation 'collars' around modulated parameter dials on and off, and enable/disable the main and keyboard visualizers, to greatly reduce CPU usage.
- ● **Ignore Warnings**: Disable or enable confirmation dialogs when changing presets. Disabling warnings may result in unsaved changes being lost.
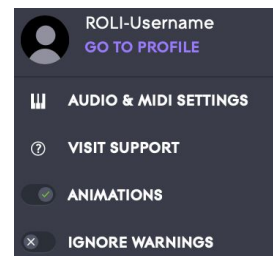
Audio & MIDI Settings

*Please note that the **Audio & MIDI Settings** panel is only available in the standalone Equator2 application, as these settings are managed by your DAW when using the plug-in version.*

- ● **Output:** Lists your available audio interfaces – select the one you want to use for output.
- ● **Test:** Sends a test tone to the output device briefly, for diagnostic purposes.
- ● **Active output channels:** If your audio output device has multiple outputs, select which stereo output to use here.
- ● **Sample Rate:** Lists all available sample rates supported by the audio output device.
- ● **Audio buffer size:** Adjusts the buffer size. If you experience performance/CPU issues, increasing the buffer size will help to resolve them. The larger the buffer size, however, the higher the latency.
- ● **MIDI:** Lists all available MIDI input devices – activate the ones you want to use by clicking them.
- ● **Auto Connect to ROLI Hardware:** Any connected ROLI MIDI Devices are automatically selected.
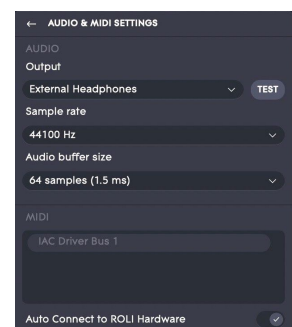
Equator2 Source Modules

The beating heart of Equator2 is its bank of six **Source Modules**, enabling limitless combinations of Synth Engines to be constructed, for the creation of complex layered sounds.

Source Mini View

In the main Synth View, you always have access to the Mini Views for all Source Modules, comprising the following controls for all but the **Noise Engine**:
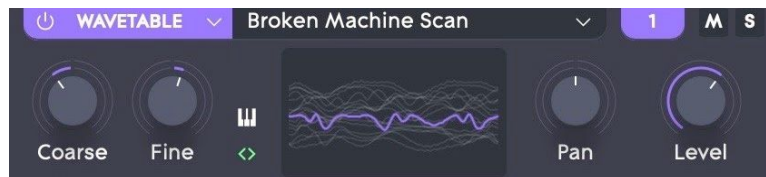
- **Source Module Bypass**: Enables/disables the Source Module.

- **Synth Engine Selection:** Sets the Synth Engine (**Oscillator**, **Granular**, **Sampler** or **Noise**) for the Source Module.

- **Waveform/Wavetable/Sample Browser**: The contents of the Browser depend on which Synth Engine is selected.

- **Expanded View:** Clicking the Source Module number reveals the advanced controls for each Synth Engine in the main window, with the exception of the **Noise Engine**, which is controlled entirely from its Mini View.

- **Mute/Solo**: Isolates or mutes the Source Module. *(Note: this doesn't deactivate the Source Module but rather disables any routing from it to the Filters, FX and Main Output. This means that any source being used for cross modulation – FM or ring mod – will still work as expected.)*

- **Coarse Pitch:** Adjusts the pitch of the Source Module in semitones, up to +/-48 Semitones.

- **Fine Pitch:** Adjusts the pitch in cents, up to +/-99 cents.

- **Keytracking Toggl**e: Determines whether or not pitch is modulated by incoming MIDI note data. When disabled, the pitch must be set manually using the **Coarse** and **Fine** controls.

- **Glide tracking Toggle:** Determines whether or not pitch is modulated by MIDI Pitchbend data. The Pitchbend range is set in the **Note Configuration** panel.

- **Pan:** Sets the stereo positioning of the Source Module when routed to the Filters, FX or Main Output.

- **Level:** Sets the output level of the Source Module before it's routed anywhere, from -inf to 0dB. When set to -inf dB, **Level** can be modulated by an Envelope for per-Source VCA-style control.

See page 20 for a description of the **Noise Engine** parameters.

Oscillator Synth Engine

Overview

The Oscillator Engine can generate analog-style waveforms (sine, square, saw, etc), 'designed' single-cycle waveforms, and much more complex Wavetables that can be 'scanned' through to create evolving, constantly shifting tones and textures.

Browser and User Wavetables

The Oscillator Module's Waveform/Wavetable Browser gives access to its three source signal types:

- **VA Waveforms (Equator1):** Classic analogue-style waves – Pulse, Sine, Square, Triangle and Sawtooth.

- **Single Cycles (Equator1):** A collection of 40+ single-cycle waveforms taken from the original Equator1 library

- **Wavetables:** A large library of finely crafted wavetables covering many different styles and techniques. This collection is broken down into subcategories to help with browsing – Additive, FM, Digital, Vocal and many more.

As well as loading any Factory Waveform/Wavetable, Equator2 also allows importing of your own wavetables. Simply drag any .wav or .flac audio file into the **Drop Wavetables here** panel in the browser to have Equator2 process it, convert it and add it to the User Wavetable folder. It can then be saved with presets and recalled easily.
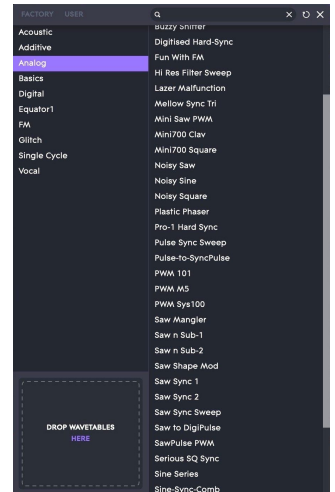
When you drag your sample in, the panel will offer four **Window Size** options – 256, 512, 1024 and 2048 samples. Each window constitutes a waveform, so if your wavetable contains four individual waveforms (sine, triangle, square, saw, for example) and the length of the file is 4096 samples, the window length is 1024:

Window Size = total sample length / number of individual waveforms

Advanced parameters

In **Expanded View**, the following advanced Oscillator Module controls are made available in the central window.

- **WT Position:** Sets the playback position within the wavetable. *Note: WT Position is only available when a Wavetable is loaded, not when a VA waveform or Single Cycle is loaded.*

- **Morph:** When this is disabled, the **WT Position** discretely moves through the individual single cycles; when activated, it interpolates smoothly between them.

- **Detune:** Dials in pitch variation between the stacked waveforms, with 100% being almost a semitone of variation.

- **Unison:** Sets the number of additional, stacked waveforms produced by the Source Module, from 1 to 5.

- **Symmetry:** Adds phase distortion to the current waveform by 'bending' it to the left or the right. When the **Pulse VA** waveform is loaded, this parameter becomes **Width**, controlling the pulse width of the waveform.

- **Spread:** Sets the stereo spread of the stacked waveforms, from mono (0%) to across the full stereo field (100%).

- **FM Source 1/2:** Selects up to two other Oscillator Synth Engines for use as Frequency modulation sources.

- **FM Source 1/2 Amount:** Sets the modulation depth(s) for the chosen FM Source(s).

- **Ring Mod Source:** Selects any other Oscillator Synth Engine as a Ring modulation source.

- **Ring Mod Amount:** Sets the modulation depth for the chosen Ring Mod Source. (*Note: the Ring Mod circuit has its own output for routing separately to any Filter, FX or the Main Output.*)
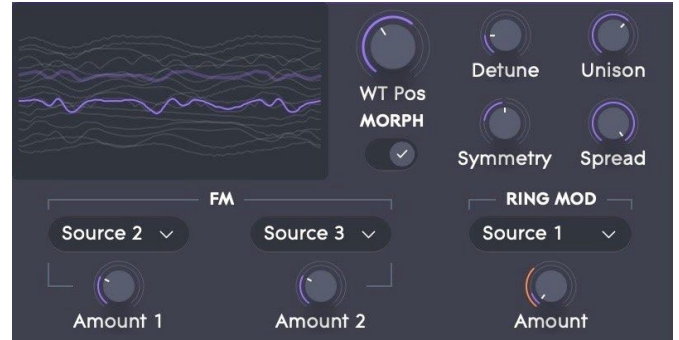
Sampler Engine

Overview

The Sampler Engine facilitates playback of Equator2's Factory library of deeply multisampled instruments, as well as single samples imported from your own collection.

Browser

The Sampler Module browser gives access to Equator2's library of Multi- and Single-layer samples. The latter are primarily intended for use with the Granular Synth Engine, but feel free to load them into the Sampler nonetheless.

- **Multi-layer samples**: A vast array of intricate, finely crafted multisampled instruments, with round-robin playback for incredible realism, covering everything from pianos and world instruments to analog synths.

- **Single-layer samples:** These are primarily sources for the Granular Synth Engine, but they can be used in the Sampler Engine, too, if desired. Imported User samples also fall into this category.

To import your own samples into Equator2, just drag one or more .wav audio files directly into the bottom half of the sample browser. You'll need to specify the **Root Note** of the sample to ensure that it's pitched correctly across the keyboard.

Advanced parameters

When the Sampler Module is switched to Expanded View, the following advanced controls are made available in the central window.

- **Start Offset:** Delays the actual start of playback relative to the original start point of the sample, from 0% to 100%.

- **+12dB Boost:** Applies a +12dB gain boost to the output of the Source Module.
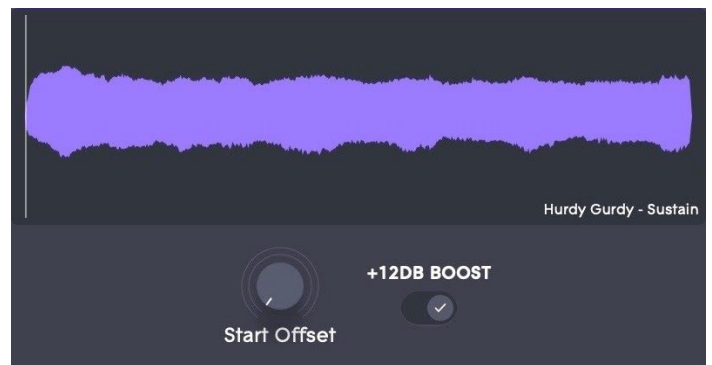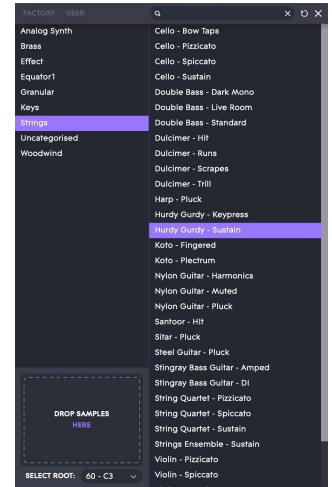
Granular Synth Engine

Overview

The Granular Synth Engine divides a single sample or the individual samples within a multisampled instrument into a series of tiny 'grains' and plays them back in a variety of ways, with adjustable parameters including the size, playback speed and amplitude envelope of the grains, and the movement of the 'grain start' point within the sample.

Browser and User Samples

The Granular Module browser gives access to Equator2's library of Multi- and Single-layer samples.

- **Multi-layer samples:** Although Equator2's library multisampled instruments is primarily intended for use with the **Sampler Engine**, very interesting things can happen when they're used as sources for the Granular Synth Engine. Be aware, however, that unlike the Sampler Engine, the Granular Synth Engine only plays back (grains generated from) one sample at a time. Granular instruments begin at note 48 (C2) and occupy a certain keyrange, depending on the number of samples
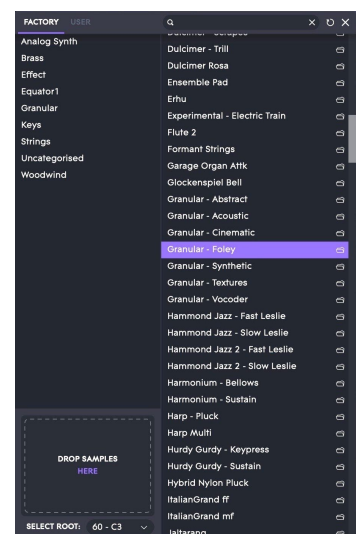
in the instrument. The number of available samples is displayed below the **Index** parameter when moused over.

● **Single-layer samples:** Single sounds designed specifically for use with the Granular Synth Engine. Imported User samples also fall into this category.

To import your own samples into Equator2, just drag one or more .wav audio files directly into the bottom half of the sample browser. You'll need to specify the **Root Note** of the sample to ensure that it's pitched correctly across the keyboard.

Advanced parameters

When the Granular Module is switched to **Expanded View**, the following advanced controls are made available in the central window.

● **Sample Selection Mode (Index/Note):** Sets the method by which the **Sample Selection** dial chooses the sample to generate grains from within a multi-zone sample.

  ○ **Note:** The incoming MIDI note value determines the specific sample to be played. For example, if 60 (C3) is selected and a sample covers the range G2-C4, that's the sample that will be used to generate grains.

  ○ **Index:** Instead of reading note ranges from the multisampled instrument, the Engine simply counts the number of samples within it and indexes them in linear fashion. The **Index** knob sweeps through the samples, and the selected sample is mapped across the whole keyboard range.

● **Index:** Selects which sample to use when playing back a multi-zone sample. Its functionality depends on the current **Sample Selection Mode**.

● **Direction:** Sets the direction of playback for each grain. The range is 100:0 to 0:100:

  ○ **100:0**: All grains are played in reverse.

  ○ **50:50**: Grains are played forwards and in reverse in equal numbers.

  ○ **0:100**: All grains are played forwards.

● **Scan Rate:** Sets the direction and speed at which the grain start **Position** shifts through the sample. The range is -2.0 to +2.0:

  ○ **-2.0**: The **Position** moves backwards at double speed.

  ○ **0.0**: There is no motion and each grain is generated at the same **Position** within the sample.

  ○ **+2.0**: The **Position** moves forwards at double speed.

● **Position:** Determines the point within the sample from which grains are generated.

● **Randomise Position:** Sets the amount of randomisation applied to the starting point for each grain.

● **Rate:** Determines how often new grains are generated. The range is 1-100Hz: at 1Hz, a grain is generated every second; at 100Hz, a grain is generated every 10ms.

● **Sync:** Toggles the **Rate** parameter between Hertz and tempo-synced note values.

● **Size:** Determines the length of the grain as a multiple of the time between each grain, from x0.10 to x16.0. With **Rate** at 10Hz and **Size** at x8.0, the grain length would be 800ms, for example.

● **Shape:** Adjusts the curvature of the grain envelope's Attack/Decay Ramp, from 0-100% (default 50%):

- **0%**: A rounded peak
- **50%**: A linear peak.
- **100%**: A very sharp peak.

- **Tilt:** Shifts the Attack and Decay time of the grain amplitude envelope. The overall envelope time is equal to the **Size**, and the range is 0-100% (default 50%):

  - **0%**: Attack is 0ms and Decay is equal to the **Size** (a falling sawtooth envelope when **Shape** is at 50%).
  - **50%**: Attack and Decay are equal (a triangle envelope when **Shape** is at 50%).
  - **100%**: Attack is equal to **Size** and Decay is 0ms (a rising sawtooth envelope when **Shape** is at 50%).

- **Stereo Width:** Sets the position in the stereo field at which new grains appear. At 0%, all grains are mono and centered; at 100%, they cover the full stereo field.

- **Update Pitch:** Sets the way Pitchbend is tracked across grains.

  - **Enabled:** Pitchbend is tracked through playback of the grain, for a smooth response.
  - **Disabled:** The Pitchbend value is only updated when a new grain is triggered, for a 'stepped' response.

- **Randomise Pitch:** Randomises the pitch of each grain to either side of the played pitch, with a range of up to +/-24 semitones.

Noise Engine

Noise Profile

The Noise Engine offers three different Noise Profiles:

- **White**: Energy is equal on a linear scale, so all frequencies in the entire spectrum are output at equal volume.
- **Pink**: Energy is equal on a logarithmic scale, so the level drops as frequencies get higher.
- **Crackle**: A completely different style of noise, creating a crackle/static effect.

Parameters

The Noise Synth Engine's controls are all housed in its Mini View, with no advanced controls available in the central window.


- **Width:** Sets the stereo width of the Noise output, from mono (0%) to full stereo (100%).

- **Density:** Sets the threshold level that noise samples have to exceed to be heard at the output. The lower the threshold, the more 'dense' the sound.

- **Pan**: Pan the signal between the left and right stereo channels.

- **Level:** Sets the output level of the Noise Engine, from -inf to 0dB.

Filters

Equator2 features an individual filter on the output of every Source Module, and two freely assignable to multiple simultaneous destinations via the Mixer panel. These are all per voice, so they can be modulated by any of Equator2's mod sources. As well as that, up to 12 more Filters are also available as modules in the Effect Section for processing of the final output.
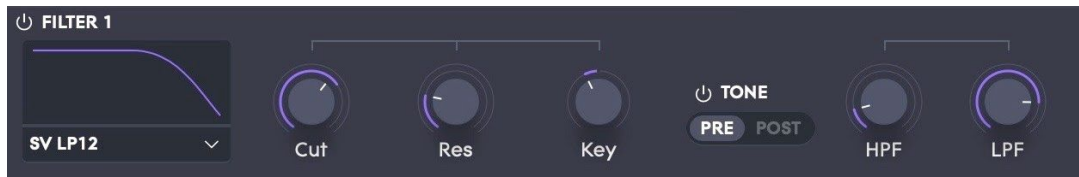
Filter On/Off

Every filter has a 'power' button next to its name that switches it on and off.

Modes

Each Filter module can be switched between multiple modes, with and without analog-style saturation:

Classic analog filter models

- Low-pass 12dB/octave with saturation
- Low-pass 24dB/octave with saturation
- Band-pass
- Notch
- Hi-pass 12dB/octave with saturation
- Hi-pass 24dB/octave with saturation
- Comb Filter

State-variable filter models

- State-variable low-pass 12dB/octave
- State-variable band-pass 12dB/octave
- State-variable high-pass 12dB/octave
- State-variable low-pass 24dB/octave
- State-variable band-pass 24dB/octave
- State-variable high-pass 24dB/octave

Waveshapers

- Saturation
- Wavefolder

Parameters

The Low-pass, Band-pass, High-pass and Notch filters feature the following controls:
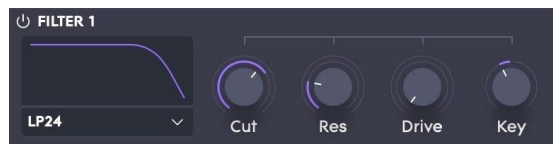
- **Cutoff**: The cutoff or centre frequency of the filter, from 20Hz to 15kHz.

- **Resonance**: Adds emphasis to the frequencies immediately around the cutoff frequency.

- **Drive**: Boosts the level gain of the signal going into the filter.

- **Keytracking:** Determines how much the cutoff is modulated by the incoming note pitch.

The Comb Filter has a different set of parameters:

- **Delay**: The length of the delay line in milliseconds.

- **Mix**:The amount of delayed (wet) signal added to the input (dry) signal. The range is -100 to +100%, with a 50/50 mix at 0%.

- **Feedback**: The amount of delayed signal fed back positively or negatively to the input of the delay line.
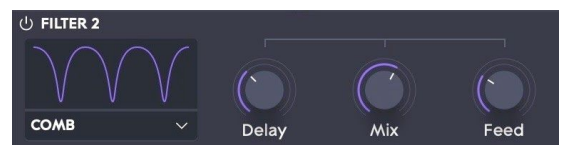
The Waveshapers also have their own parameters:

- **Level**: Sets the output level of the Waveshaper.

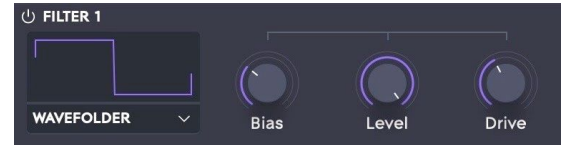- **Bias**: Adds additional even harmonics.

- **Drive**: Sets the input level going into the Waveshaper.

Tone stage

An extra high- and low-pass filter pair, with adjustable cutoff frequency controls for each, can be placed before or after the main filter/waveshaper. This is particularly useful for shaping the output of the Comb Filter or Waveshaper.

- **Pre/Post**: Positions the additional filters before or after the main Filter/Waveshaper in the signal path.

- **HPF**: Sets the cutoff frequency of the high-pass filter.

- **LPF**: Sets the cutoff frequency of the low-pass filter.
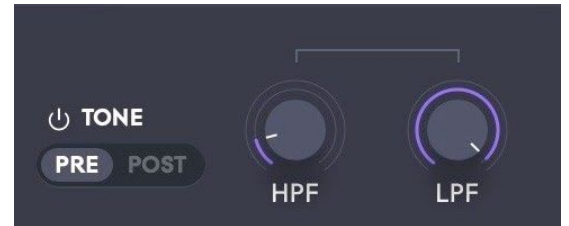
Equator2 Routing Matrix

The six Source Modules feed into Equator2's flexible Routing Matrix, where each one can be independently routed to the two Global Filters, two individual FX block inputs and Dry output.

You can also route the Ring Mod output to the same five inputs, and the Global Filters to the FX 1/2 and Dry inputs.

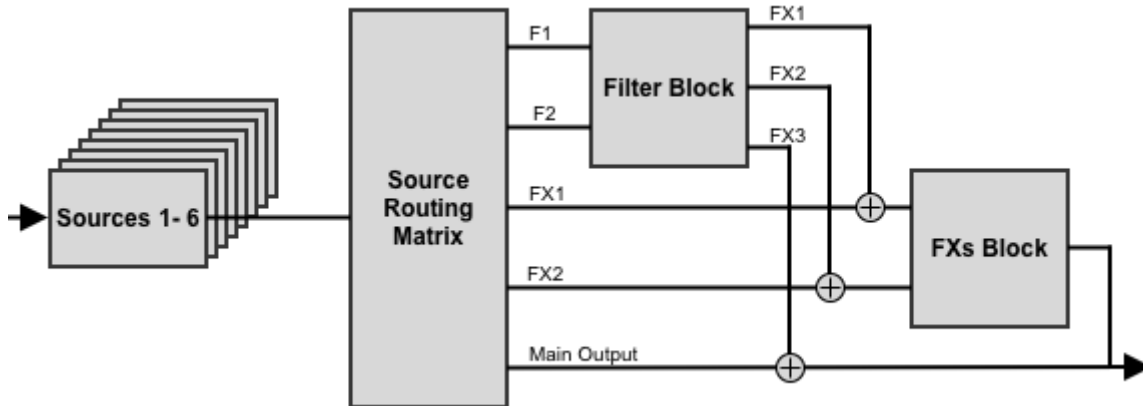The send amount controls for all six Source Modules, the Ring Mod and the Global Filters are accessed in the **Routing View**, which is selected at the top left hand corner of the **Main View**.

Each **Source Module** has controls for sending its output to these five inputs:

- Global Filter 1 (Filter 1)
- Global Filter 2 (Filter 2)
- FX input 1 (FX 1)
- FX Input 2 (FX 2)
- Main Output (Dry)

The two **Global Filters** can each be routed to any combination of these inputs:

- FX input 1 (FX 1)
- FX Input 2 (FX 2)
- Main Output (Dry)

The **Filter Configuration** panel enables routing of the two **Global Filters** in any of four schemes:

- **Serial:** Filter 1 feeds into Filter 2. All sends to Filter 2 are disabled.
- **Parallel:** Filter 1 and Filter 2 both operate independently, and output their signals in parallel.
- **Summed**: Filter 1 and Filter 2 are routed in parallel but their outputs are summed.
- **Mixed:** Filter 1 has its own output but also feeds into Filter 2.

Outputs (VCAs)

The VCA outputs of the Source Modules, Ring Mod and Global Filters are summed going into the FX 1, FX 2 and Dry inputs, each of which has its own final level control. After these level controls, all voices are summed into a stereo signal to be fed into the FX chain or Main Output.

These are useful controls, as they can be modulated per voice and used as VCA-style level controls for the signal prior to the FX chain. In the Init (default) preset, the Amp Envelope is assigned to fully modulate the levels going into all three inputs (see below).

Please note: Due to the default routing behavior of the Amp Envelope in the Init preset, removing this routing can result in an ungated signal that may sound like a "stuck note". To avoid this, ensure that all three VCA controls are set to 0%, and then apply modulation from the Amp Envelope (or any of the other four envelopes) to determine the amount of signal affected by the envelope.

Equator2 Modulation Sources

Envelopes

Equator2 features five modulation envelopes, each of which can be controlled via an interactive graph-style interface or, for more precise control, a set of dials. Clicking the **Expand** button at the top right of the **Envelopes** panel toggles it between a tabbed single-Envelope view and an overview of all five Envelopes.

The Envelope overview, showing all five envelopes at once

The first envelope is labelled **Amp Envelope**, but this is really just for reference purposes, and due to the Init (default) preset using the first envelope for control of the Main Out (VCA) levels. Be aware that manually increasing the level of the VCA outputs with this default routing will result in a constant 'stuck note', as the envelope can no longer fully gate the signal. Of course, any envelope can be used as an Amp Envelope, and the Amp Envelope can be used to modulate any parameter(s).

Envelope modes

There are four operational modes available to each envelope, enabling various different uses.

- ○ **ASD-R:** Attack, Decay Sustain, Release. The envelope sustains until the triggering note is released.

- ○ **ADR:** No Sustain stage. The envelope immediately releases after the Decay stage.

- ○ **ADADR:** The Attack and Decay stages loop until the triggering note is released.

- ○ **ADS-PR:** An extra Pluck stage is added in between the Sustain and Release stages.

Envelope parameters

The envelopes all share the same set of adjustable parameters:

- ● **Envelope Level:** Sets the overall output level of the envelope as a modulation source.

- ● **Sync:** Switches time-based parameters between milliseconds and tempo-synced musical note values.

- ● **Attack Time:** Sets the duration of the Attack stage.

- ● **Attack Curve:** Adjusts the shape of the Attack ramp. Accessible by mousing over the Attack stage in the graph interface and dragging the point that appears.

- ● **Decay Time:** Sets the duration of the Decay ramp.

- **Decay Curve:** Adjusts the shape of Decay ramp. Accessible by mousing over the Decay stage in the graph interface and dragging the point that appears.

- **Sustain:** Sets the Sustain level.

- **Width:** Sets the time it takes for the ADS-PR mode's Pluck stage to rise and fall.

- **Pluck Off Level (PO):** Sets the level of the ADS-PR's Pluck stage.

- **Release Time:** Sets the duration of the Release stage.

- **Release Curve:** Adjusts the shape of the Release ramp. Accessible by mousing over the Release stage in the graph interface and dragging the point that appears.

LFOs

Equator2's five versatile LFOs provide plenty of scope for a wide range of modulation uses. Clicking the **Expand** button at the top right of the LFO/Multi-Mod panel with an LFO selected switches from the regular tabbed LFO view to an overview of all five LFOs without their graphs (and with tabs above for switching to either Multi-Mod).

The LFO overview, showing all five LFOs at once

Parameters

Each LFO has the following parameters:

- **Waveform:** Sets the shape of the LFO's cyclical signal.

  - Square

  - Rising Sawtooth

  - Falling Sawtooth

  - Sine

  - Triangle

  - Random

  - RandomSH (Sample & Hold)

- **Sync:** Switches the **Frequency** parameter between Hertz and tempo-synced note values.

- **Trigger:** When enabled, the LFO restarts with every incoming note. When disabled, the LFO is free running.

- **Polarity:** Switches the LFO between unipolar and bipolar output.

- **Fade:** Sets the duration of a gradual fade-in when the LFO is triggered.

- **Freq:** Sets the LFO frequency in Hertz or note values, depending on the **Sync** setting.

- **Level:** The overall modulation output level of the LFO.

Multi-Mod

Each of Equator2's two Multi-Mod sources combines the functionality of an LFO and a multi-stage Envelope in a single versatile and highly creative Modulation Source. Clicking the **View** button at the top right of the LFO/Multi-Mod panel with a Multi-Mod selected switches to an expanded view of that Multi-Mod that makes detailed editing of nodes in the graph easier (with tabs above for selecting the other Multi-Mod, or switching to the LFO overview).

The expanded Multi-Mod view enables gives more space for editing

Loading and saving Factory and User Multi-Mod curves

A library of preset Multi-Mod curves lets you quickly call up a range of modulation shapes – rhythmic, natural, random, LFO-like, envelope-like, etc – and can be added to with your own edits and entirely new curves. Click the **Load** menu button to open a browser containing the Factory and User curve libraries. To save a User curve, click the **Save** button next to the Load menu, enter a name for your curve in the dialog that appears, and click **Save** or **Save as** to add it to the User library. It's not possible to overwrite factory presets, but edited versions of them can be saved using the **Save as** option.

Parameters

Each Multi-Mod Modulation Source has the following editable parameters:

- **Mode:** Determines the fundamental behavior of the Multi-Mod:

    - **Sustain:** After triggering, the 'playback head' passes through all nodes until it reaches the Sustain node, where it remains until the triggering note is released, after which it passes through any remaining nodes. The signal then stays at the level of the final node until the voice is retriggered. **Trigger** is always **on** in Sustain Mode.

    - **Loop:** After triggering, the 'playback head' passes through nodes until it reaches the Loop section, through which it loops continuously for as long as the note is held. When the note is released, playback immediately jumps to the end of the Loop section and continues through any remaining nodes. When playback reaches the end of the graph, the signal stays at the level of the final node until the voice is retriggered. If the Loop section stretches to the last node of the graph, the loop will continue until the voice is retriggered.

    - **One-Shot:** Playback progresses through all nodes from first to last, and the signal stays at the level of the final node until that voice is retriggered.

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- **Polarity:** Switches the Multi-Mod output between unipolar and bipolar.

- **Trigger:** If Loop is enabled, determines whether incoming notes retrigger the Multi-Mod from the start or the loop runs free regardless of note input.

- **Release:** If enabled, playback will continue to play through nodes after the Loop section on release of a note. Otherwise, playback continues to cycle through the Loop section.

- **Sync:** Determines whether the **Rate** is set in milliseconds or tempo-synced note values.

- **Frequency:** Sets the playback speed through the curve.

- **Draw Mode:** Nodes can be added to the curve in two ways:

    - **Free:** Double-clicking in the graph adds a single node.

    - **Steps:** Double-clicking in the graph adds two nodes at the same height/level on the two nearest vertical grid lines, creating a 'step', and effectively turning the Multi-Mod into a step sequencer.

- **Grid Size:** Sets the grid resolution anywhere from 2 to 32 'snap' lines.

- **Snap:** When enabled, newly added nodes snap to the nearest grid line.

- **Level**: The overall modulation output level of the Multi-Mod.

See the 'Working with curves' section on page 11 for a list of envelope graph interactions.

Keytracking

Equator2's four Keytracking Modulation Sources are adjusted in the keyboard visualizer at the bottom of the main window. Click anywhere around the **Keytracking** header to select it, and select one of the four sources by clicking the grid button next to the header.

Nodes and curves are added to the graph overlay to shape the mapping curve across the note range, using the same

interactions as every other graph in Equator2 – see the 'Working with curves' section on page 11 for a run-down.

Each Keytracking source can be set to any one of four modes, selected via the menu at the bottom left corner of the Keytracking strip. The mode affects how Keytracking behaves when applied to a modulation destination alongside

another Modulation Source – when both Keytracking and Pressure are applied to filter cutoff, for example.

- **Add:** Keytracking is added to all other connected Modulation Sources.

- **Scale:** Keytracking scales the effective values of all other Modulation Sources.

- **Limit MAX:** Keytracking sets the maximum modulation depth of all other connected Modulation Sources. The modulated parameter cannot exceed this value.

- **Limit MIN:** Keytracking limits the minimum modulation depth of all other connected Modulation Sources. The modulated parameter cannot go below this value.

Math Modifiers

The four Math Modifiers each combine the outputs of two Modulation Sources into a new modulation signal via various mathematical functions.

Modes

The selection made in the Mode menu determines how the two incoming modulation signals are combined:

- **Add:** Adds Sources 1 and 2 together.

- **Multiply:** Multiplies Source 1 by Source 2.

- **Quantize:** Quantizes the Source 1 input to anywhere between 255 and 2 steps, progressively reducing smoothness as the **Resolution** is lowered. Source 2 is inactive.

- **Max Threshold:** Source 2 sets the maximum modulation depth of Source 1.

- **Min Threshold:** Source 2 sets the minimum modulation depth of Source 1.

- **Lag:** Adds a low-pass filter to Source 1, creating a slight delay/lag. Source 2 is inactive.
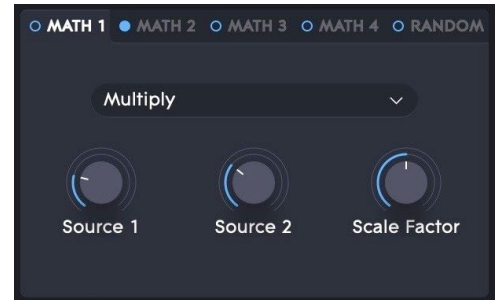
Parameters

Depending on the mode selected, the following parameters are available:

- **Source 1**: Select a Modulation Source (LFO 1, for example) and drag up on the Source 1 dial's collar to set the amount of signal routed from that Modulation Source to the Math Modifier's Source 1 input. The Source 1 dial then shifts the range of values coming from the Modulation Source up and down.

- **Source 2**: Select a Modulation Source (ENV 1, for example) and drag up on the Source 2 dial's collar to set the amount of signal routed from that Modulation Source to the Math Modifier's Source 2 input. The Source 2 dial then shifts the range of values coming from the Modulation Source up and down.

- **Scale Factor**: Scales the output of the Math Modifier. For example, at 50% the output signal is based on half the combined value of the two Sources; and at 200% it's based on double the combined Source value.

- **Resolution (Quantize mode)**: Sets the number of stepped values to which Source 1 is quantized, from 255 to 2.

- **Amount (Lag mode)**: Sets the length of the delay applied to Source 1, from 0-2s.

Random

The Random Modulation Source is applied on per-note/polyphonically – ie, independently with every new voice.

Randomisation

Each of the four Randomisation sources simply jumps to a new random value with every incoming MIDI note.
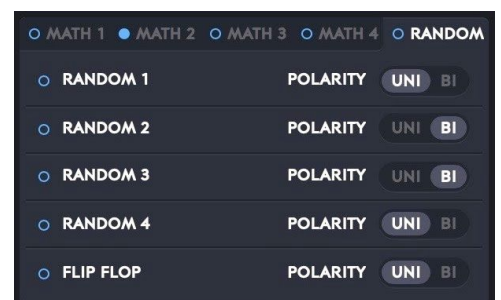
Flip-flop

The Flip-Flop source toggles its output between 0 and 100% with every new note.

All five Random sources can be set to unipolar (0 to 100%; 0 to 1) or bipolar (-100 to 100%) output.

Expression Curve Inputs

Central to Equator2's creative proposition is the ease with which performance/gestures can be used to change the sound over time. The **Standard** and **MPE** modulation curves are key to this, enabling you to quickly add expression via the various note input gestures made possible by MPE and standard keyboards.

MPE Mode

In MPE Mode, the available gesture inputs are:

- **Strike**: Note on Velocity.
- **Glide**: Polyphonic Pitchbend.
- **Slide**: Polyphonic Y axis control (CC74).
- **Press**: Polyphonic Pressure (Channel Pressure).
- **Lift**: Note off Velocity.
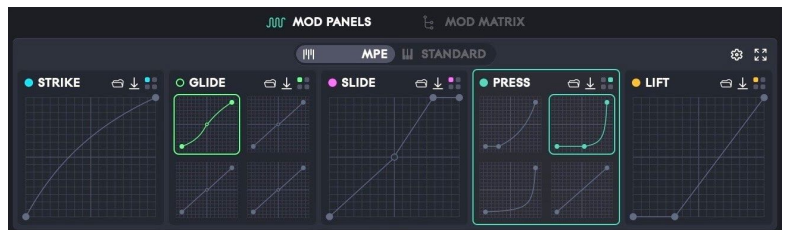
Standard MIDI Mode

When in Standard MIDI Mode, the inputs change slightly to:

- **Note on Velocity**: The Velocity at which keys are struck.
- **Pitchbend**: Global Pitchbend, applied to all voices.
- **Mod Wheel**: MIDI CC1, applied to all voices.
- **Pressure**: Poly Pressure, applied per voice/key.
- **Note off Velocity**: The Velocity at which keys are released.
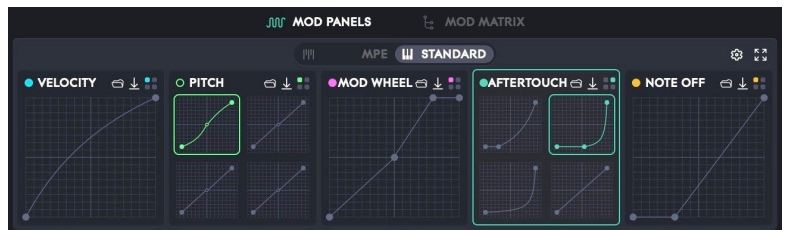
Selecting and editing curves

To switch between editing the MPE and Standard expression Modulation Sources, click the **Standard/MPE** toggle above the graphs. Every Source hosts four discrete Transfer Function curves, so you can tailor the output of a single source independently to multiple destinations – click the 'four squares' button at the top right of a source to switch between its four curves.
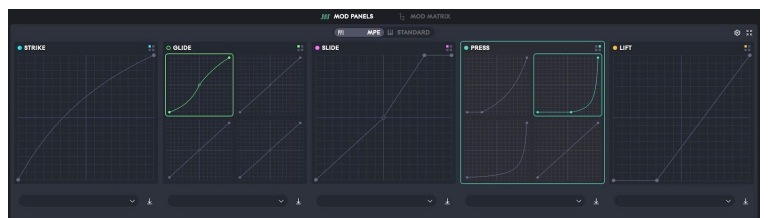
Transport Function curves can be stored and recalled using the **Save** and **Load** buttons above each graph, and a Factory library of preset curves is included for use in their own right or as starting points.

The curves can be adjusted using the graphs – see the 'Working with curves' section on page 11 for a list of editing interactions.

Note Configuration Settings

Click the cogwheel icon to reveal channel selection and other MIDI settings for **MPE mode** or **Standard mode**, as selected using the tabs at the top.

- **Global Channel (MPE Mode)**: Sets the global channel (channel 1 or 16) used in **MPE Mode**.
- **Number of channels (MPE Mode)**: Sets the range of channels used for note input (1-15 or 2-16, dependent on the **Global Channel** setting).
- **Channel (Standard Mode)**: Sets the input channel for all note data (All or 1-16).
- **Per note Pitchbend range (MPE Mode)**: The Pitchbend range for individual notes.
- **Global Pitchbend Range (MPE Mode and Standard Mode)**: Sets the global Pitchbend range for both **MPE** and **Standard Modes**.

Macro controls

Equator2's five Macro controls comprise three faders and an XY pad.
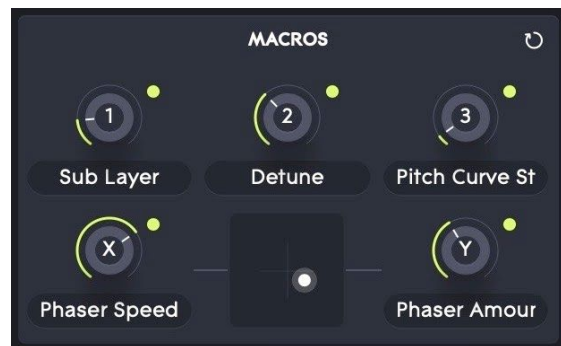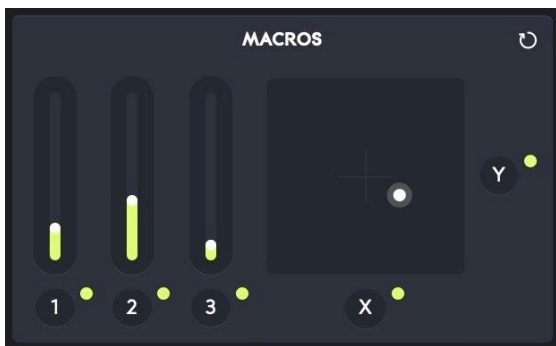
By default the Macros are mapped to the following MIDI CC numbers:

- Fader 1: CC 107
- Fader 2: CC 109
- Fader 3: CC 111
- X Axis: CC 113
- Y Axis: CC 114

The names of the Macros can be customised both in the Main View and when saving presets.

Equator2 Filters and Effects

Routing

Clicking the **Effect Racks** tab in the top bar opens the **Effects View**. This consists of two lanes of six effects slots each, with four routing configurations. Any effect can be loaded into any slot, with no limit on how many instances of the same effect can be instantiated at once (up to 12, of course – ie, the same effect in all 12 slots), and effects can be repositioned by dragging and dropping.
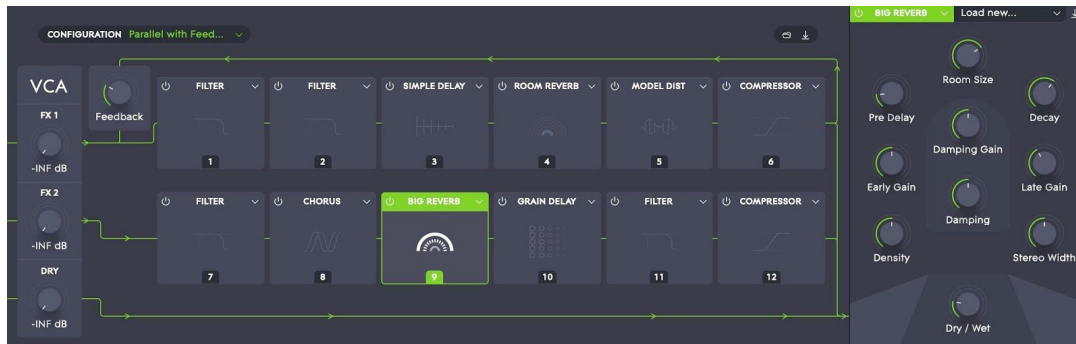

Effects routing configuration

The menu at the top of the **Effect Racks View** offers a choice of four signal routing schemes through the two lanes.

- **Mixed**: Lane 1 feeds into Lane 2.
- **Parallel**: Lane 1 and Lane 2 run independently of each other and their outputs are mixed.
- **Mixed Feedback**: Lane 1 feeds into Lane 2, and a feedback loop also runs from the output of lane 1 back to its input.
- **Parallel Feedback:** Lane 1 and Lane 2 run separately and their outputs are mixed, and a feedback loop also runs from the output of lane 1 back to its input.

Effect Feedback: When either of the two **Feedback** configurations is selected, this dial sets the feedback gain amount.
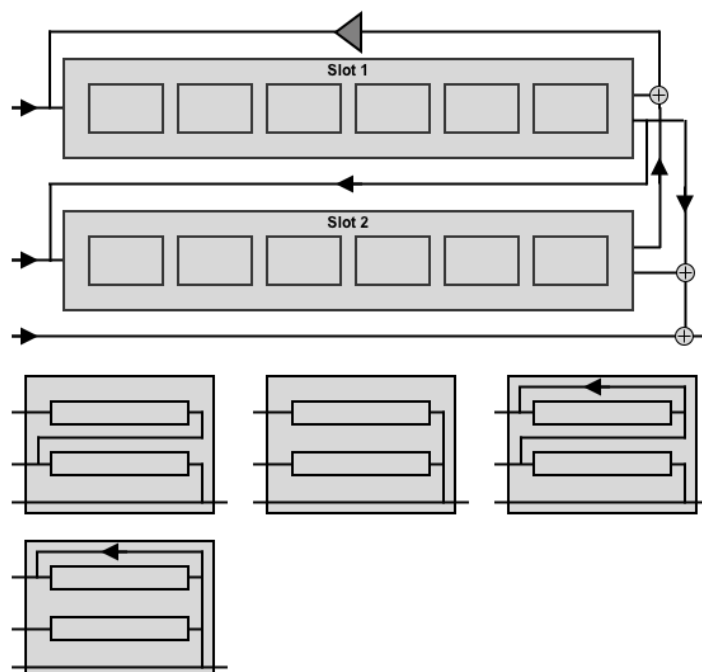
Effects modules

Equator2's 15 effects provide everything from dynamics shaping and EQ to distortion, reverb, modulation-based processing and more.

To load an effect, open the **Select Effect Type** dialog by clicking anywhere in an empty slot, then click the effect you want. The parameter controls for the currently selected effect appear in the panel to the right.

To swap the effect module loaded in a slot for a different one, click the downward arrow next to the effect name at the top of the slot or the control panel. Alternatively, use the previous/next arrow buttons to step through all 15 modules.

Every effect has its own library of Factory presets, and a User library to which you can add your own presets. Access both libraries by clicking the **Load new…** menu button at the top of the effect control panel, and save your own presets by clicking the **Save/Save As** button to the right of that.

To bypass an effect, click the 'power' button at the top left of its slot or control panel. And to move an effect within the lanes, drag and drop the handle that appears when the right-hand edge of its slot is moused over.
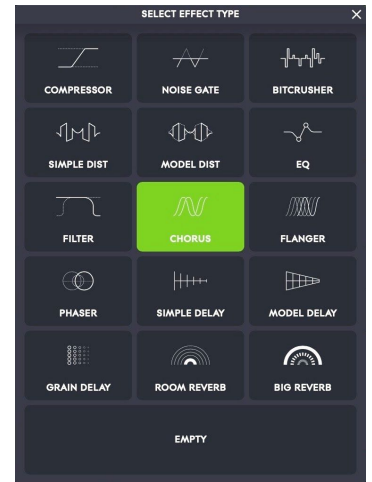
Compressor

The Compressor effect lowers the volume whenever the input signal crosses a defined threshold in order to even out excessive changes in level, and for use as a creative effect.

- **In Gain**: Controls the level of the signal going into the Compressor.

- **Attack**: Determines the time it takes for compression to kick in when the input signal passes the **Threshold**.

- **Out Gain**: Controls the level of the signal coming out of the Compressor. Use this to make up any gain lost through compression.

- **Threshold**: Sets the level at which the input signal starts to be compressed.

- **Release**: Determines the time it takes for compression to fully withdraw when the input signal drops back below the **Threshold**.

- **Ratio**: Sets the ratio of input to output signal – ie, the amount of compression applied.

- **Dry / Wet**: Balances the relative amount of unprocessed and processed signal present at the output.

Noise Gate

Use the Noise Gate to get rid of unwanted low-level noise in any signal, and for transient emphasis.

- **Attack**: Determines the speed at which the gate opens when the amplitude **Threshold** is exceeded by the input signal.

- **Release**: Determines the speed at which the gate closes after the **Hold** stage.

- **Hysteresis**: Smooths out the response of the gate. This is useful if the gate is opening and closing very quickly due to the input signal hovering around the **Threshold** for long periods, but be aware that it will make the gate less sensitive to quick changes in amplitude.

- **Threshold**: When the input signal exceeds the level specified by the **Threshold**
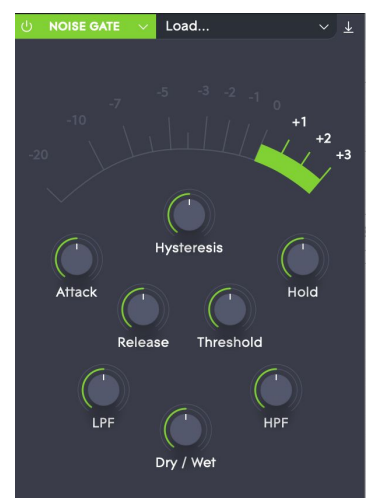
control, the gate begins to open, allowing the audio signal to pass through.

● **Hold**: Sets the amount of time the gate remains open after the input signal drops below the **Threshold** level.

● **Low-Pass and High-Pass Filters (LPF/HPF)**: These filters process the input signal used to trigger the gate while leaving the audible processed signal unaffected. By isolating particular frequency ranges, the gating response can be improved – preventing excessive low frequencies in the input signal opening the gate more often than required, for example.

● **Dry / Wet**: Balances the relative amount of unprocessed and processed signal present at the output.

Simple Distortion

The distortion algorithm from Equator1.

● **Drive**: Controls the amount of distortion.

● **Bass**: Applies low-frequency boost.

● **Fuzz:** Boosts even harmonics for a dirtier sound at high settings.

● **Bite**: Boosts the mid-range frequencies.

● **Tone**: Adjusts the overall color of the wet signal. Higher settings will result in a harsher sound.

● **Level**: Controls the overall level of the effect.

● **Dry / Wet**: Balances the relative amount of unprocessed and processed signal present at the output.
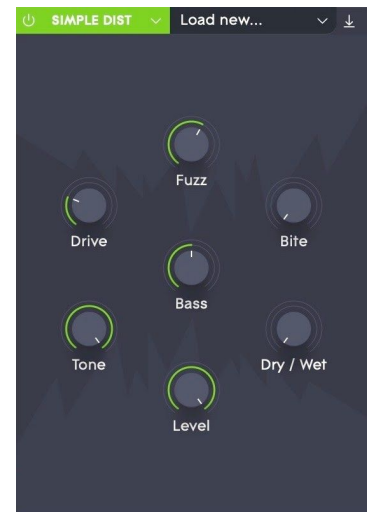
Model Distortion

Choose from a range of distortion model algorithms, adapted from FXpansion distortion engine.

● **Distortion Model**: This menu gives access to a wide range of distortion algorithms.

● **Input Gain**: Sets the level of the signal going into the distortion.

● **Drive:** Controls the amount of distortion.

● **Output Gain**: Controls the output level of the effect.

● **High-Pass Filter (HPF)**: Sweeps the cutoff frequency of a post-distortion high-pass filter.

● **Low-Pass Filter (LPF)**: Sweeps the cutoff frequency of a post-distortion low-pass filter.

● **Dry / Wet**: Balances the relative amount of unprocessed and processed signal present at the output.
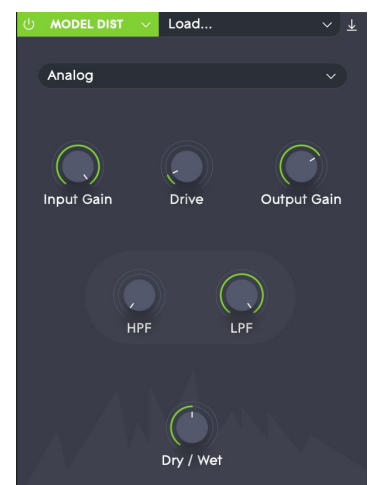
Bitcrusher

Bitcrushing involves reducing the bit depth of a digital signal (from 24- to 16-, 8- or even fewer bits, for example), often to produce an intentionally 'lo-fi' sound reminiscent of vintage digital synths, drum machines and videogames. Equator2's Bit

Crusher also performs sample rate reduction, giving even more control over the lo-fi character.

- **Drive**: Determines the amount of waveshaping applied. Lower settings can be used to add warmth; higher settings will result in an overdriven or distorted sound.

- **Crush**: Sets the effective bit depth of the signal. Raising **Crush** lowers the resolution, quantising the signal.

- **Reduce**: Determines the amount of sample rate reduction applied. Higher settings result in less high frequencies and more aliasing distortion.

- **Tone**: Adjusts the overall color of the wet signal.

- **Level**: Sets the overall level of the effect.

- **Dry / Wet**: Balances the relative amount of unprocessed and processed signal present at the output.
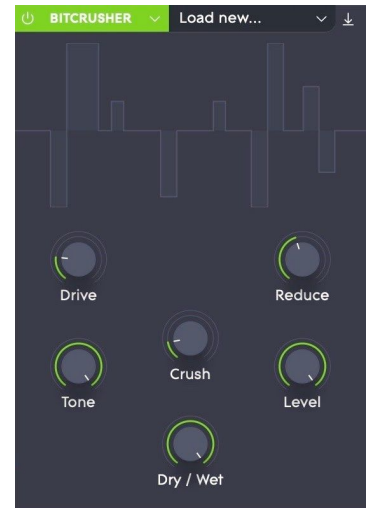
5-band EQ

A five-band parametric equalizer. Select a band for editing using the numbered tabs at the top.

- **Frequency**: Sweeps the centre frequency of the band, adjustable from 20Hz to 15kHz.

- **Gain**: Sets the amount of cut or boost applied to the band, from -24dB to +24dB.

- **Q factor**: Adjusts the bandwidth of the bell-shaped EQ filter. Raise the **Q** to lower the bandwidth.
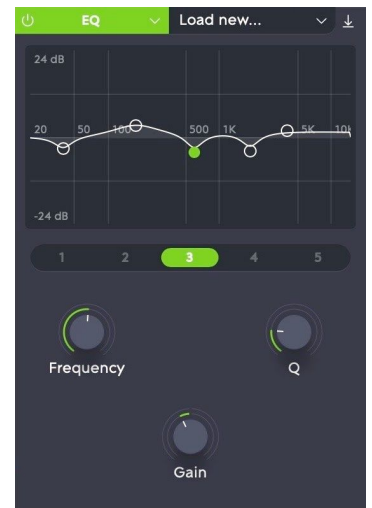
Filter

The Filter effect is identical to the main filters – see the Filters section above for details.

Chorus

A short modulated triple delay line for creating thickening ensemble effects. The modulation signal is generated by an onboard sine wave LFO.

- **Depth**: Sets the amount of pitch modulation applied.

- **Speed**: Sets the rate of pitch modulation, from 0.2-50Hz.

- **Stereo Width**: Narrows or widens the stereo field, from mono (0%) to stereo (100%).

- **Dry / Wet**: Balances the relative amount of unprocessed and processed signal present at the output.
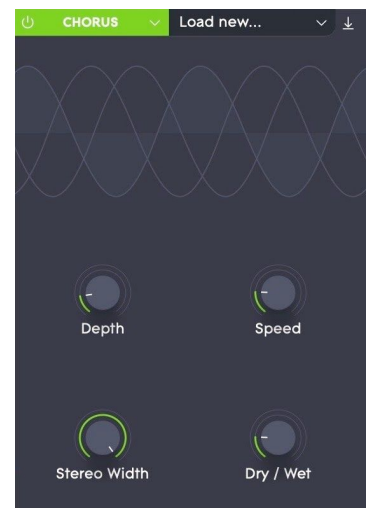
Flanger

A short modulated delay line with feedback to the input, the Flanger is used to create a sense of movement, and for psychedelic effects, from subtle to extreme. The modulation signal is generated by an onboard sine wave LFO.

- **Rate**: Controls the speed of the sine wave LFO modulating the delay time.

- **Depth**: Controls the amount of modulation of the delay time.

- **Feedback**: Determines the amount of flanged signal fed back into the input.

- **Invert**: Sets the phase of the input signal to positive or negative polarity. Positive tends to provide a more obvious flanging effect.

- **Position**: Offsets the delayed signal relative to the input signal to vary the delay time.

- **Phase**: Controls the phase offset of the LFOs between the left and right channels.

- **Stereo Width**: Narrows or widens the stereo field, from mono (0%) to stereo (100%).

- **Dry / Wet**: Balances the relative amount of unprocessed and processed signal present at the output.
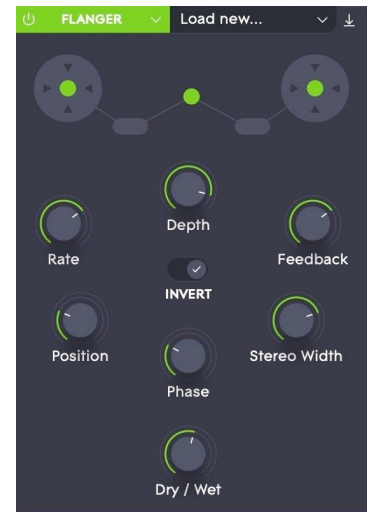
Phaser

The Phaser uses phase cancelling techniques (through the use of all-pass filtering) to create a series of peaks across the frequency spectrum. When these peaks are modulated, a psychedelic sweeping effect is created.

- **Sync:** Determines whether the **Rate** is set in Hertz or tempo-synced note values.

- **Rate:** Sets the speed of the internal LFO cycle, from 1/128 to 4 bars in **Sync** mode, including dotted and triplet variations; or 0.03-64Hz unsynced.

- **Stages:** Determines the number of all-pass filters (stages) – 4, 6, 8 or 12.

- **Depth:** Adjusts the amount of pitch modulation from the internal LFO.

- **Pitch:** Controls the centre frequency of the all-pass filters.

- **Invert:** Toggles the all-pass filters between positive and negative feedback.

- **Resonance:** Controls the amount of feedback in the all-pass filters.

- **Phase Offset:** Offsets the phase between the dry signal and the all-pass filtered signal.

- **Dry / Wet:** Balances the relative amount of unprocessed and processed signal present at the output.
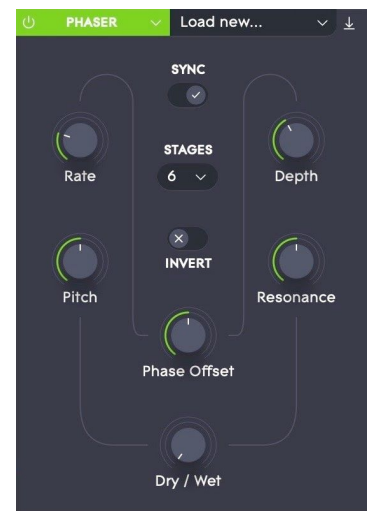
Simple Delay

A stereo delay with independent Left and Right delay lines. The following parameters are available separately for each delay line:

- **Delay Time**: Controls the length of the delay. With **Sync** disabled, the Delay Time can be set from 0-2000 milliseconds. With **Sync** enabled, the Delay Time is set in tempo-synced musical note values from 1/128 to 4 bars.

- **Feedback**: Controls the amount of processed signal fed back to the input of the delay line. The lowest setting results in a single repeat of the input signal, while higher settings introduce more repeats.

- **Wet**: Determines the amount of processed signal added to the dry signal.
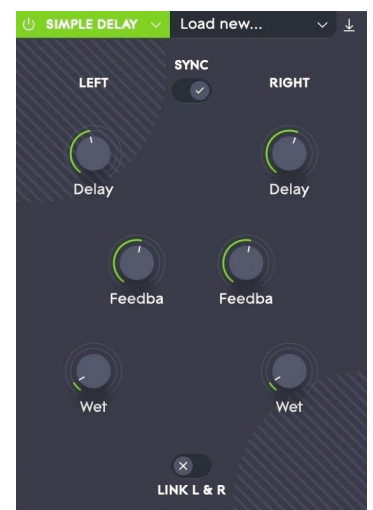
These parameters affect both delay lines collectively:

- **Link L & R**: When enabled, parameter changes made on one side are applied equally to the other.

- **Sync**: When enabled, the **Delay Time** value range will be based on Equator2's **Clock** settings, rather than set in Hertz. This is useful if you want the delay to follow the tempo of your DAW project, or to keep the delay in sync with Envelopes and/or LFOs.

Model Delay

A powerful creative delay effect based on FXpansion delay technology.

- **Delay Model**: Enables selection of one of three distinct delay technology models.

  - **Digital**: Produces a variety of digital delay timbres, from early lo-fi devices to modern effects with higher sample rates and better AD/DA converters. The **Digital Era** control lets you transition between vintage and modern sounds.

  - **BBD (Bucket Brigade Device)**: A classic analogue delay in which the audio signal is passed through an array of capacitors, which are charged and discharged at a rate determined by the delay time clock. The name refers to water (the audio signal) being transferred between a series of buckets (the capacitors). BBD delays are known for their dark sound and dulled high-frequency response.

  - **Tape**: Tape delays operate by guiding a tape loop past record and playback heads, with the delay time changed by adjusting the tape speed and/or the distance between the heads. Tape delays are known for their warm, psychedelic character, and the wobbly texture imparted by their inherent wow and flutter.

- **Ping Pong**: When enabled, the input signal is summed to mono before being sequentially routed hard left/right. With the right settings, this achieves an alternating panned stereo effect.

- **Input Gain**: Controls the signal level going into the delay.

- **Model Tone**: Controls specific aspects of the selected **Delay Model**:

  - **Digital Era (Digital)**: Adjusts the 'age' of the Digital Delay Model, sweeping from Vintage at 0% to Modern at 100%. The Vintage setting introduces the low-fidelity characteristics of early digital delays, such as low sample rates and bit depths.

  - **BBD Stages (BBD):** Sets the number of stages – ie, capacitors – in the BBD model between 256 at 0% and 4096 at 100%. Lower numbers of stages give a lo-fi sound with more aliasing artifacts. Despite being 'analog', BBD delays involve a form of sampling; and even though the method of sample 'storage' is analog, any process that involves sampling audio signals at finite intervals is susceptible to aliasing.

  - **Tape Age (Tape)**: Simulates the degrading effects of tape aging. At lower settings, hiss and wow/flutter artifacts are introduced, and the high-frequency response is increasingly rolled off.

- **Slew**: Governs the amount of smoothing applied when changing the **Delay L/R** times (either manually or via modulation). Turn it up for slower but smoother, transitions between **Delay** values.

- **Delay L**: Sets the Left channel delay time in milliseconds or tempo-synced note values, depending on the status of the **Sync** toggle.

- **Delay R**: Sets the Right channel delay time in milliseconds or tempo-synced note values, depending on the status of the **Sync** toggle.

- **Sync**: When enabled, the **Delay** values are set in tempo-synced note values, rather than Hertz. This is useful if

you want the delay to follow the tempo of your DAW project, or to keep the delay in sync with Envelopes and/or LFOs.

- **Link L & R**: When enabled, parameter changes made on one side are applied equally to the other.

- **Crossover**: Determines the amount of cross-feedback between the Left and Right channels – ie, the Left delay output feeding into the Right delay input, and vice versa. At 100%, the feedback effectively becomes monophonic.

- **Drive**: Controls the amount of distortion applied before the feedback loop.

- **Feedback**: Adjusts the level of the delayed signal fed back into the input.

- **HPF**: Controls the cutoff frequency of a 12dB/octave high-pass filter applied before the delay feedback loop

- **LPF**: Controls the cutoff frequency of a 12dB/octave low-pass filter applied before the delay feedback loop

- **Width**: Adjusts the stereo width of the two channels in the stereo delay line, from mono (0%) to stereo (100%).

- **Dry / Wet**: Balances the relative amount of unprocessed and processed signal present at the output.

Grain Delay

The Grain Delay applies the same style of granular synthesis as used by the Granular Synthesis Engine to a delay line.

- **Sync**: When enabled, the **Delay** value is set in tempo-synced note values, rather than Hertz. This is useful if you want the delay to follow the tempo of your DAW project, or to keep the delay in sync with Envelopes and/or LFOs.

- **Detune**: Controls the amount of pitch randomisation applied to each grain.

- **Spread**: Controls the amount of delay time and stereo width randomisation applied to each grain. At 0%, the delay time and width are entirely determined by the **Delay** and **Stereo Width** parameters; as **Spread** is increased, the delay time and width of each grain will be reduced by a random amount, with the **Spread** value determining the range of possible random values.

- **Delay**: Sets the delay time in milliseconds or tempo-synced note values, depending on the **Sync** toggle status.

- **Pitch**: Controls the pitch of the generated grains, and raises/lowers the pitch of the signal in the feedback circuit – for example, at 12.00, the signal is pitched up an octave with each pass through the feedback loop.

- **Rate**: Controls how often a new grain is generated. When set to 10Hz, for example, a new grain will be generated every 100ms.

- **Tilt**: Adjusts the shape of the grain amplitude envelope:
  - **0%**: Falling ramp (short attack, long decay).
  - **50%**: Triangular (attack and decay are symmetrical).
  - **100%**: Rising ramp (long attack, short decay).

- **Feedback**: Adjusts the amount of delayed signal fed back into the input.

- **Width**: Controls the stereo width of the two channels in the delay line, from mono (0%) to stereo (100%).

- **Density**: Controls the length of the grains and how much they overlap.
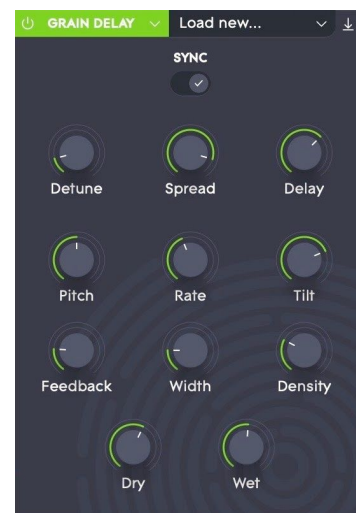
- **Dry**: Sets the level of the dry (unprocessed) signal at the output.

- **Wet**: Sets the level of the wet (processed) signal at the output.

Room Reverb

A simple, quick-to-use reverb.

- **Delay**: Sets the delay between the direct signal and the reverberant signal, from 0-100ms.

- **Size**: Controls the reverb time of the reverberant signal.

- **Damping**: Controls the amount of low-pass filtering (absorption) applied.

- **Dry / Wet**: Balances the relative amount of unprocessed and processed signal present at the output.
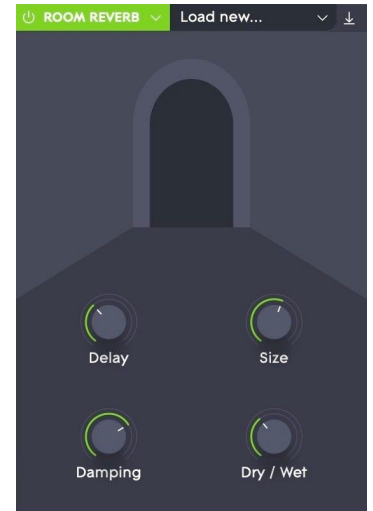
Big Reverb

A more complex, realistic (and, consequently, CPU-intensive) reverb simulation.

- **Room Size**: Specifies the size of the virtual reverberation chamber. Higher settings result in a more pronounced and longer reverberation effect.

- **Pre Delay**: Controls the amount of delay between the dry signal and the reverberated output, creating a sense of space and distance.

- **Damping Gain**: Adjusts the amount of damping EQ applied.

- **Decay**: Adjusts the length of the reverberation tail (which is also affected by the **Room Size** control).

- **Early Gain**: Sets the volume level of the early reflections within the reverb.

- **Damping**: Controls the centre frequency of the damping EQ.

- **Late Gain**: Controls the level of the late reflections within the reverb.

- **Density**: Controls the density of the late reflections.

- **Stereo Width**: Controls the spread of the output signal across the stereo field.

- **Dry / Wet**: Balances the relative amount of unprocessed and processed signal present at the output.
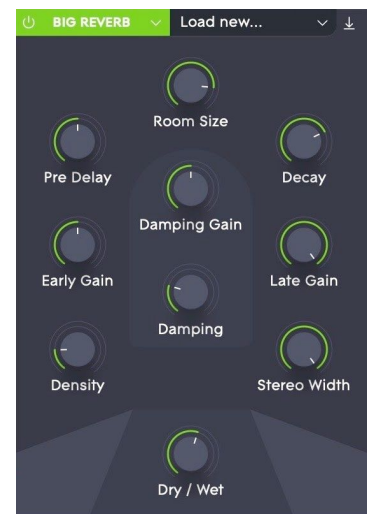
Glossary

Dimensions of Touch: The real-time control and modulation of sound made possible by MPE controllers, through the basic finger gestures of Strike, Press, Glide, Slide, and Lift.

> **STRIKE**: The velocity and force with which a finger makes contact with a keywave.

> **PRESS**: The pressure and continuous touch applied to the keywave after the initial strike. Known as "aftertouch" in traditional synth terminology.

> **GLIDE**: Horizontal movements from side to side on a keywave or along the ribbons located above and below the keywaves. This typically controls pitch, enabling smooth movements from one pitch to another. It also lets you bend notes and add vibrato by moving your finger.

> **SLIDE**: Vertical movements up and down the Y-axis of a keywave.

> **LIFT**: The release velocity or speed with which your finger lifts off from a keywave.

Expression Curves: The graphical curves in Equator2 that represent the behavior and sensitivity of the Five Dimensions of Touch

Expression Mode: The mode of operation in which the three Touch Faders of the Seaboard RISE control the dynamics of the Glide, Slide, and Press dimensions of touch. Expression Mode is designed to let you modify the expressiveness of the Seaboard RISE to suit specific sounds and your individual playing style.

Keywave: A wavelike element of the keywave surface that corresponds to a single key on a standard keyboard. Each of the available dimensions of touch can be accessed on a single keywave.

Keywave surface: The entire playing surface of the Seaboard, including all keywaves and the ribbons above and below them. The keywave surface corresponds to a keyboard.

MIDI Mode: A mode of operation in which the Touch Faders can be assigned to any MIDI CCs for additional customisation of sound.

MPE: MIDI Polyphonic Expression (MPE) is a protocol for using standard MIDI messages to communicate with and enable the operation of multidimensional instruments such as the Seaboard BLOCK, RISE and GRAND. MPE enables these instruments to control multiple parameters – such as pitch, brightness (usually via filter cutoff frequency), vibrato, and much more – on a per-note (polyphonic) basis. You do this with playing gestures such as velocity, aftertouch, and sliding up and down the keywaves – what we've called the Dimensions of Touch – and, importantly, a gesture performed on one note affects only that note, not all of the others along with it, as happens with most conventional MIDI controllers and synthesizers. MPE accomplishes this by spreading MIDI data pertaining to each note across a range of MIDI channels, while reserving one channel (usually the lowest) for global MIDI messages such as program change, pedal and fader positions. These global messages affect all notes equally.

ROLI Dashboard: An application for modifying and customising the internal settings of any ROLI Hardware and for loading Apps onto the Lightpad (See "ROLI Dashboard Creator Manual" for more information.)