Glaid User Manual

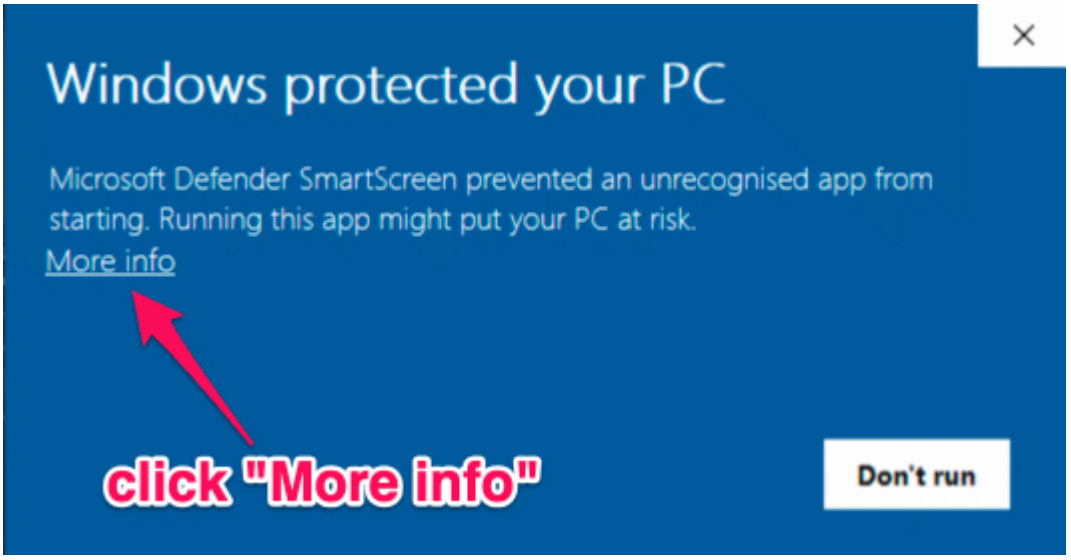
Version 0.5

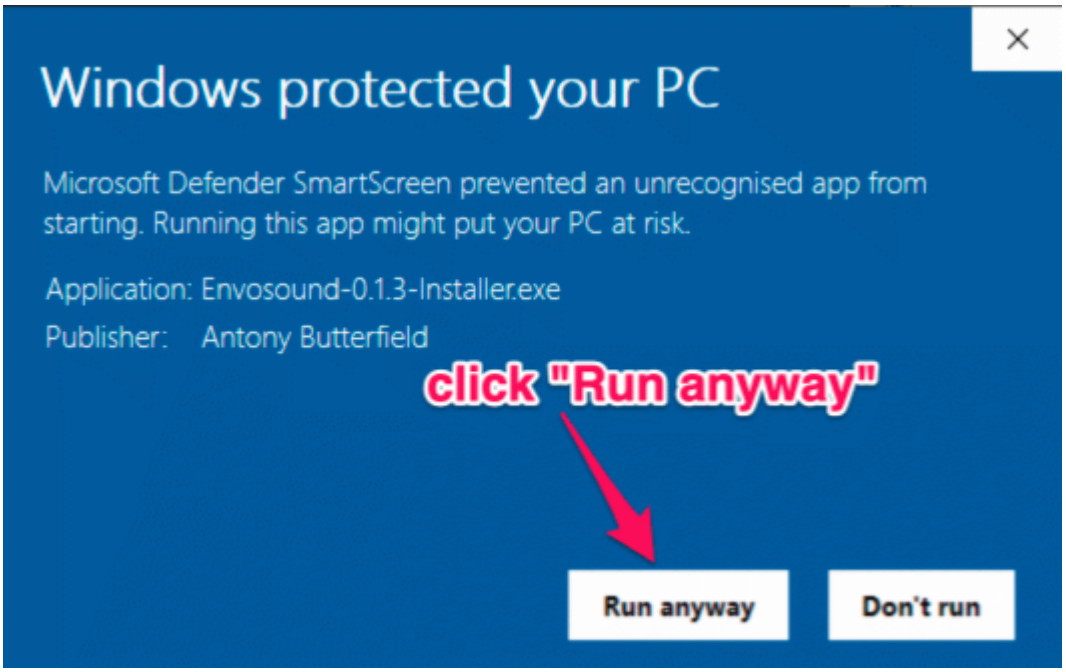
Inspired by digitally controlled analog synthesis from 80's era gaming hardware, Glaid is a fusion of synthesis, sequencing, and arpeggiation. Morph notes into complex harmonic patterns and never heard before sounds.

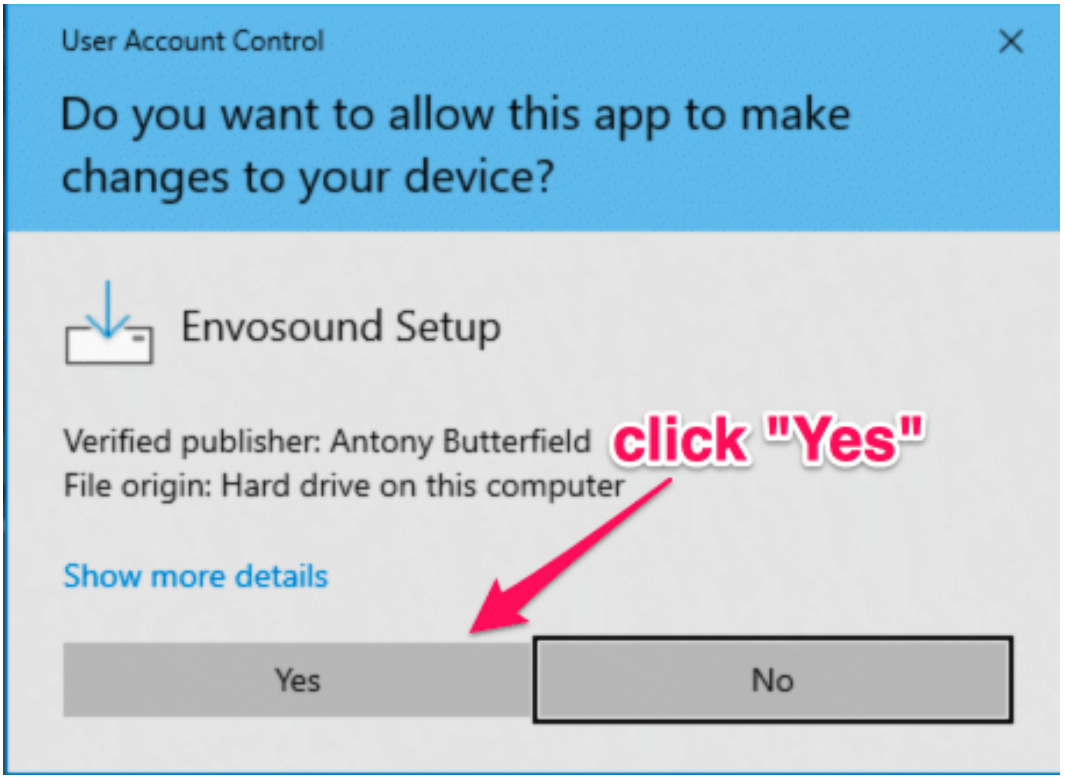
Activation and first start

Installation on Windows

- Download the latest installer executable from https://accounts.tsuga.io/downloads.
- Locate the downloaded installer and execute it.
- The installer and plugin have been code signed with an IV certificate, yet despite this, it may still cause a Windows SmartScreen popup due to this software being new. (It takes a while for Microsoft to recognise and trust new vendors.) This does not mean it is not safe. Please install with confidence if Antony Butterfield is the organisation field within the certificate.
- The following screenshots show what you should expect.







- Follow through the installer screens and accept the license agreement.
- The VST3 plugins are installed at `C:\Program Files\Common Files\VST3\`
- Presets are installed in *`C:\Program Files\Common Files\Tsuga\Glaid\`* and any additional presets you create will be stored in *`C:\Users\[username]\AppData\Roaming\Tsuga\Glaid\`*

Installation on macOS

- Download the latest installer executable from https://accounts.tsuga.io/downloads.
- Locate the downloaded installer and execute it.
- The installer and executable have been code signed and notarised by Apple and should install without problem.
- Follow through the installer screens and accept the license agreement.
- The AU format plugins are installed in */Library/Audio/Plug-Ins/Components/*, and the VST3 plugins are installed in */Library/Audio/Plug-Ins/VST3/*
- Glide installs presets in */Library/Application Support/Tsuga/Glaid/*, and user presets are saved in */Users/[username]/Library/Application Support/Tsuga/Glaid/*.

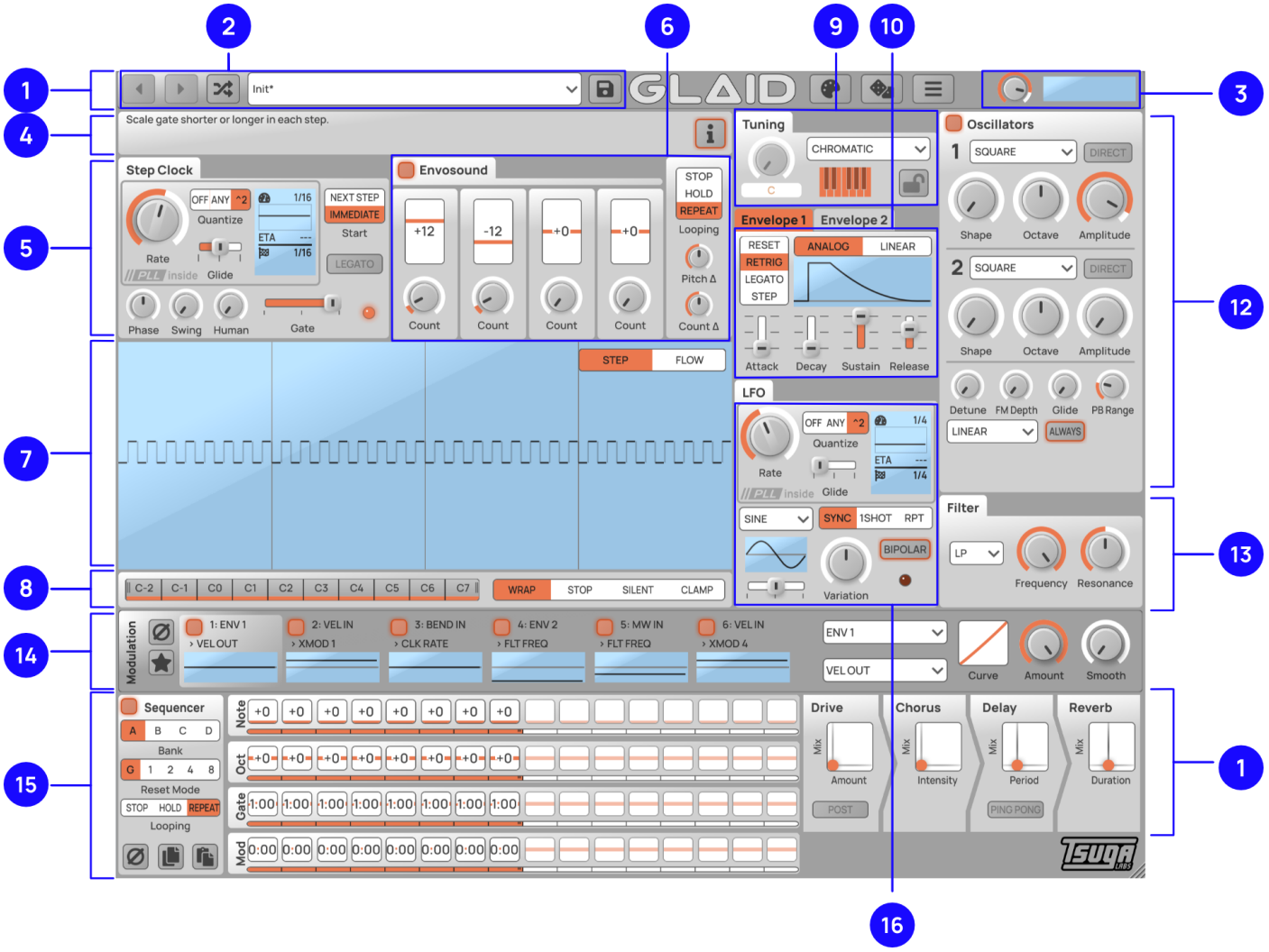
Activation

Upon first use, when you open the user interface, the plugin will prompt you to activate it. If you haven't already, create an account at https://accounts.tsuga.io, then use these login details to sign in. You will be automatically granted an evaluation license if you haven't purchased. This evaluation is fully functional but time limited.

Overview of Features

Glaid is a monophonic synthesiser controlled by MIDI-In that takes each key press as a gesture to initiate a sequence of notes and modulations using inbuild sequencers. These output notes and modulations can drive an internal oscillator or generate MIDI-Out.

User interface overview



1. **Toolbar** The toolbar contains the preset manager, output stage controls, and other buttons.
2. **Preset Manager** The preset manager has controls to allow you to step through presets, select a specific or random preset, and save the current settings as a new preset.
3. **Output Stage** The output stage contains a VU meter to show peak output levels and a gain knob.
4. **Help / Preset Description** This section shows the current preset description text. If help mode is enabled using the button on the right, it will also show popup tooltips on the control under the mouse pointer.
5. **Step Clock** The step clock is synchronised to a multiple of the host clock and controls the timing of note transitions for both the Envosound and Sequencer modules.

6. **Envosound** The envosound module contains four discrete note interval steps, each configured to play multiple times.
7. **Step Display / Flow Visualizer** You can switch this panel between step display and flow visualizer modes. The step display shows the note sequence that Glaid will play or is playing, with time on the x-axis and note pitch on the y-axis. The 3D flow visualiser shows historical notes played as a waterfall display fading into the distance.
8. **Note Range** The note range section determines the highest and lowest notes that Glaid will play and its behaviour when it detects out-of-range notes.
9. **Tuning** The tuning section controls what scales and modes the notes generated by the sequencers are constrained to
10. **Envelope** You can utilise the two independent envelopes to modulate other parameters.
11. **LFO** The low-frequency oscillator can also modulate other parameters.
12. **Oscillator** Within the oscillator section, you'll find two multi-mode oscillators capable of independent operation or cross-modulated.
13. **Filter** The filter section controls the multi-mode audio filter applied to the oscillator section output.
14. **Modulation** This section enables modulation of parameters and output MIDI using input MIDI and internal state such as envelopes and LFO.
15. **Sequencer** The sequencer contains a richly configurable traditional-style step sequencer with up to 16 steps.
16. **Effects** The effects section applies drive, chorus, delay, and gain audio effects to the output of the oscillator section.

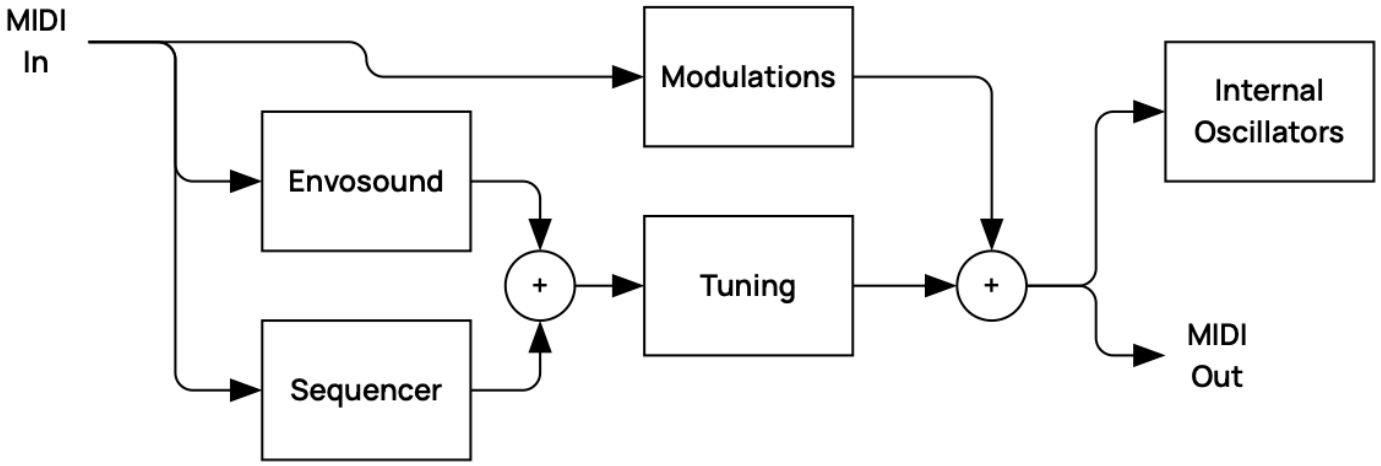
Signal Flow

MIDI Signal Flow

Both the Envosound and regular sequencer received MIDI In when enabled. The note offsets generated by the sequencers are summed and passed to the tuning module.
The tuning module combines the played note from MIDI In with offset constrained with the selected key and range.

In addition, the modulation engine receives Midi In, takes the resultant modulations (where they modulate MIDI parameters) and combines them with the sequencer output.

The combined midi is sent to the internal oscillators and MIDI out if enabled.



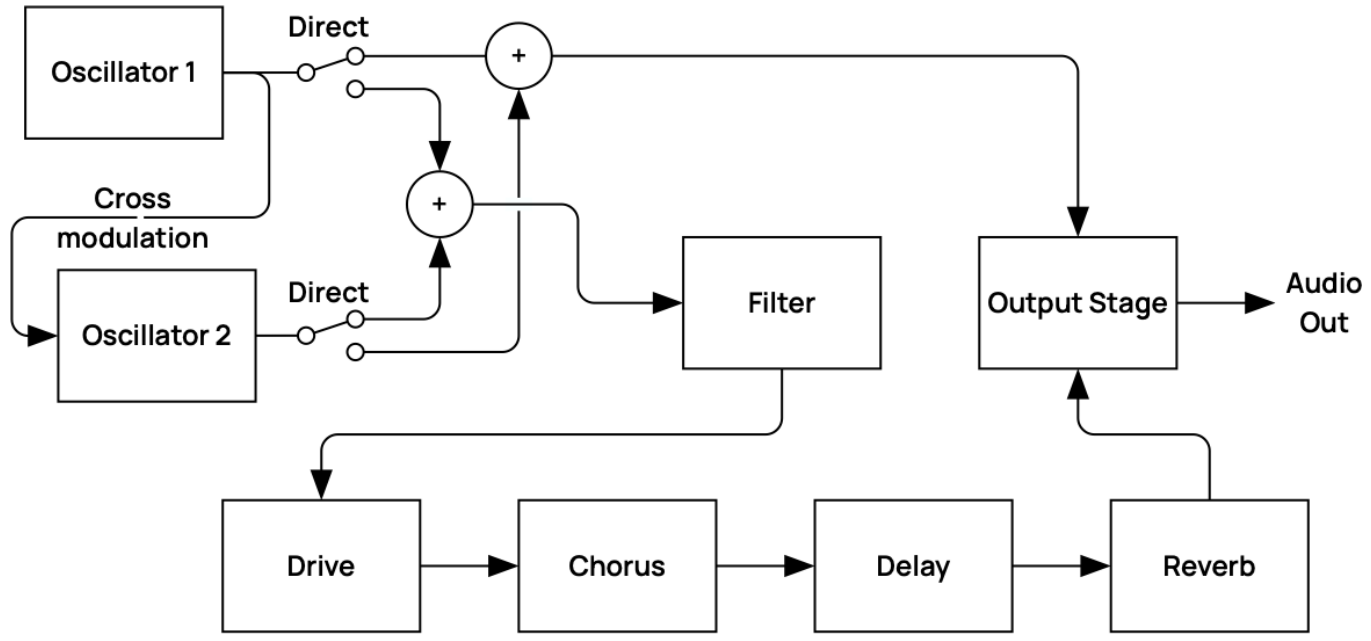
Audio Signal Flow

If the oscillators module is disabled, Glaid performs no audio processing, only MIDI processing. We recommend using it as a MIDI effect if you wish to send MIDI to an external synthesizer.

Glaid uses a single precision stereo signal path throughout.

Oscillator 1 can optionally cross-modulate oscillator 2. The filter module receives the sum of both oscillators and then passes the signal through the drive, chorus, delay and reverb effects in series.

Finally, the output stage gets the signal for monitoring and final gain control.



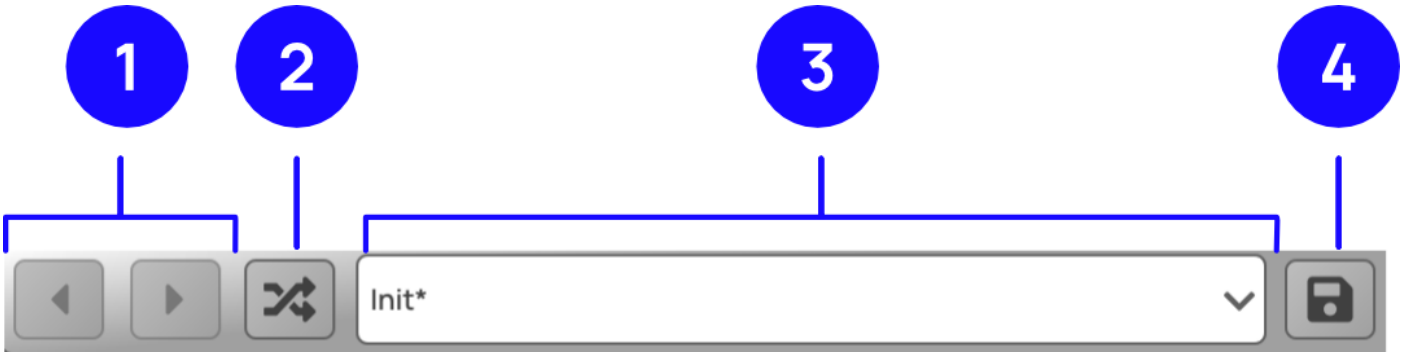
Principles of the User Interface

- Help text when hovering over a value
- Hover over the control to show the current value
- Drag up and down to change knob values

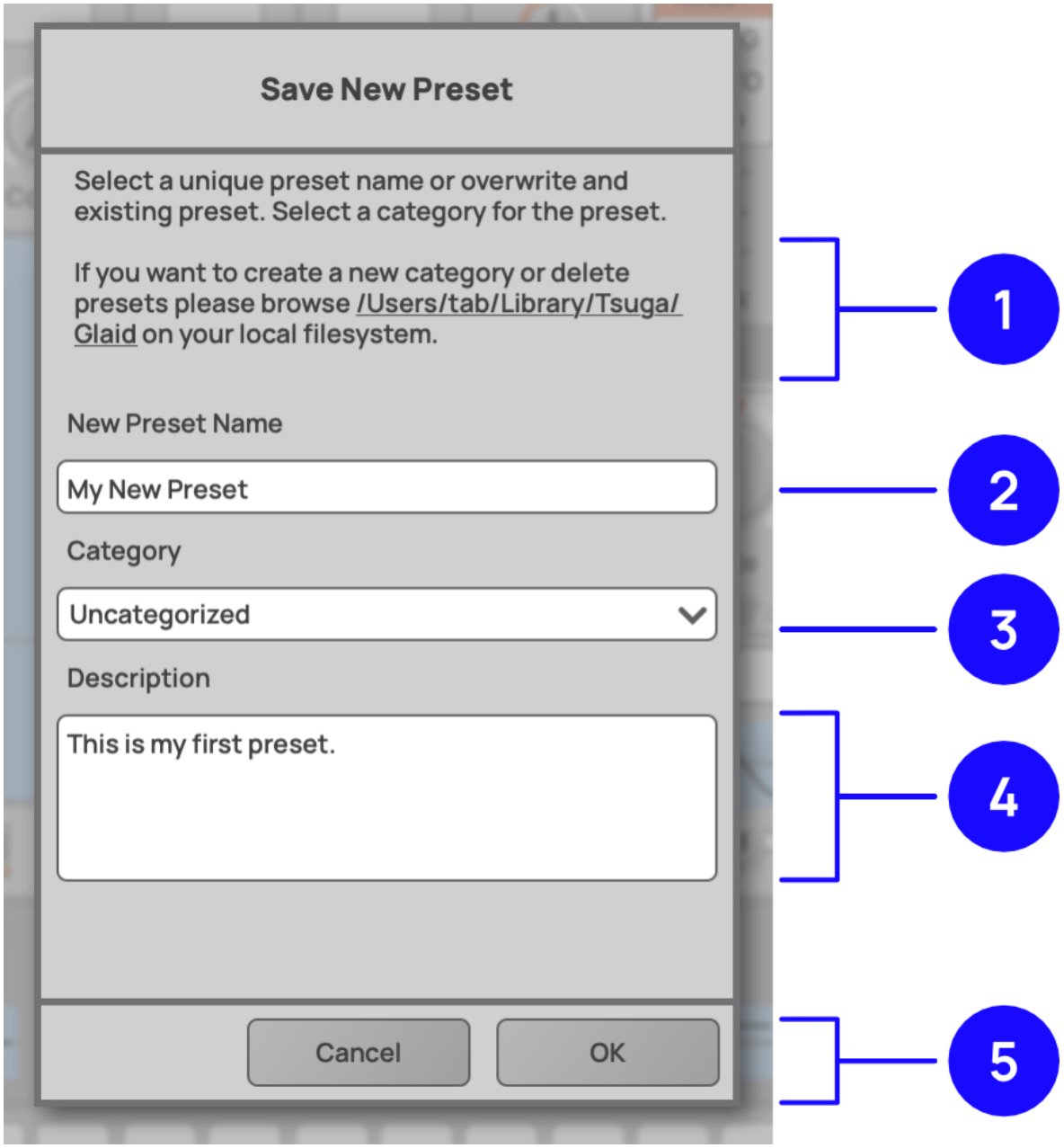
Preset Browser

The preset browser manages store settings presets. It has controls to allow you to step through presets, browse the preset library, pick a random preset and save new presets.

Glaid loads the initial preset on each new instance of the plugin. It is named *`Init`*. Other presets are stored on the filesystem in a platform-specific location, as defined above in the installation section.

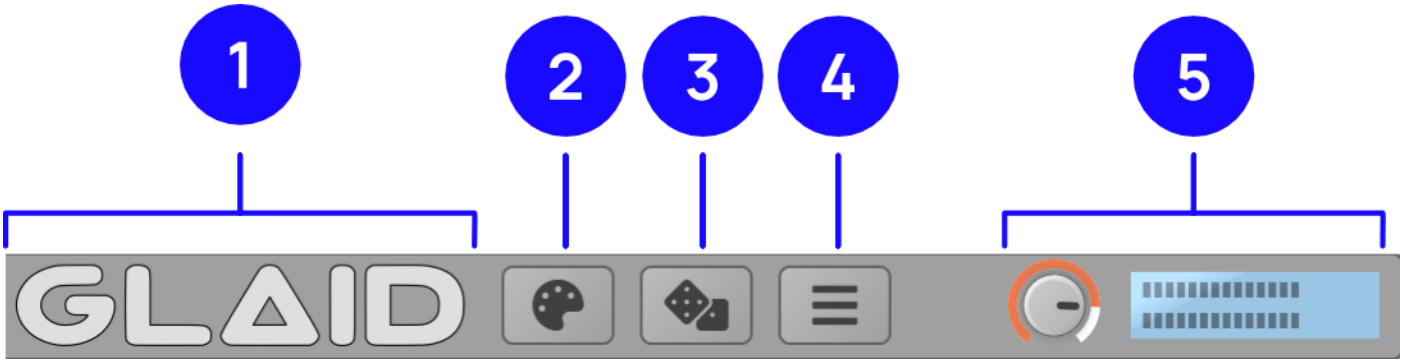


1. The previous and next buttons step backwards and forward through the presets.
2. The shuffle button loads a random preset.
3. The preset dropdown allows you to browse and load presets. Glaid organises presets into sub-folders based on category.
4. Save the current settings as a new preset or replace an existing one. This opens a new dialog window.



1. Glaid cannot directly create new preset categories or delete presets. Instead, you should use the operating system file browser. Click the directory link to open the user preset folder.
2. Type the name of the preset. The dialog will warn you if you are overwriting an existing preset.
3. Select a category for the preset. The category affects where the preset appears in the preset dropdown.
4. You can type an optional description field. This is useful to describe how the preset operates and give hints to future users.
5. Cancel and save buttons.

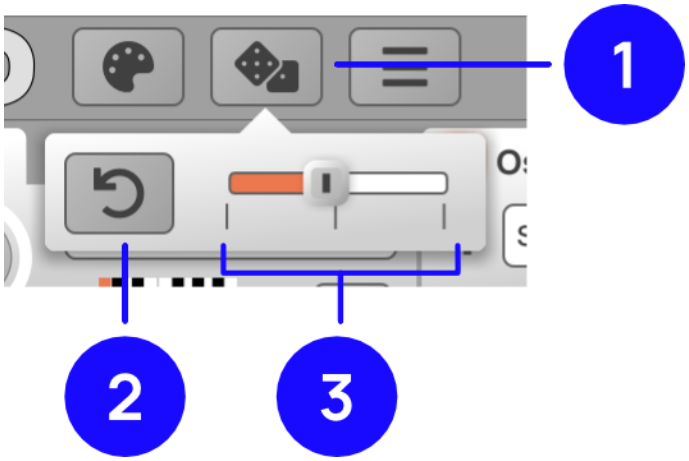
Toolbar



1. Click the logo to toggle bypass mode.
2. Switch between multiple available colour schemes.
3. A long click will toggle the Randomizer popup. The Randomizer performs random mutations of configurable size to the current preset. A short click will randomise the current preset.
4. The Drop down menu provides access to the About box, which shows licensing information. In addition, several developer/diagnostic tools are available.
5. The output stage appears on the right-hand side of the toolbar. The output VU meter shows peak levels. Dark bars will appear when the level rises above -3db, and then the bar will turn solid dark if clipping occurs. Use the gain control to achieve a suitable level.

Randomizer

The randomizer mutates the current preset to create new random variations. Only a random selection of parameters will be changed in each mutate. The amount slider controls the number of parameters changed and the extent of that change. You can use the undo button if you don't like a mutation.

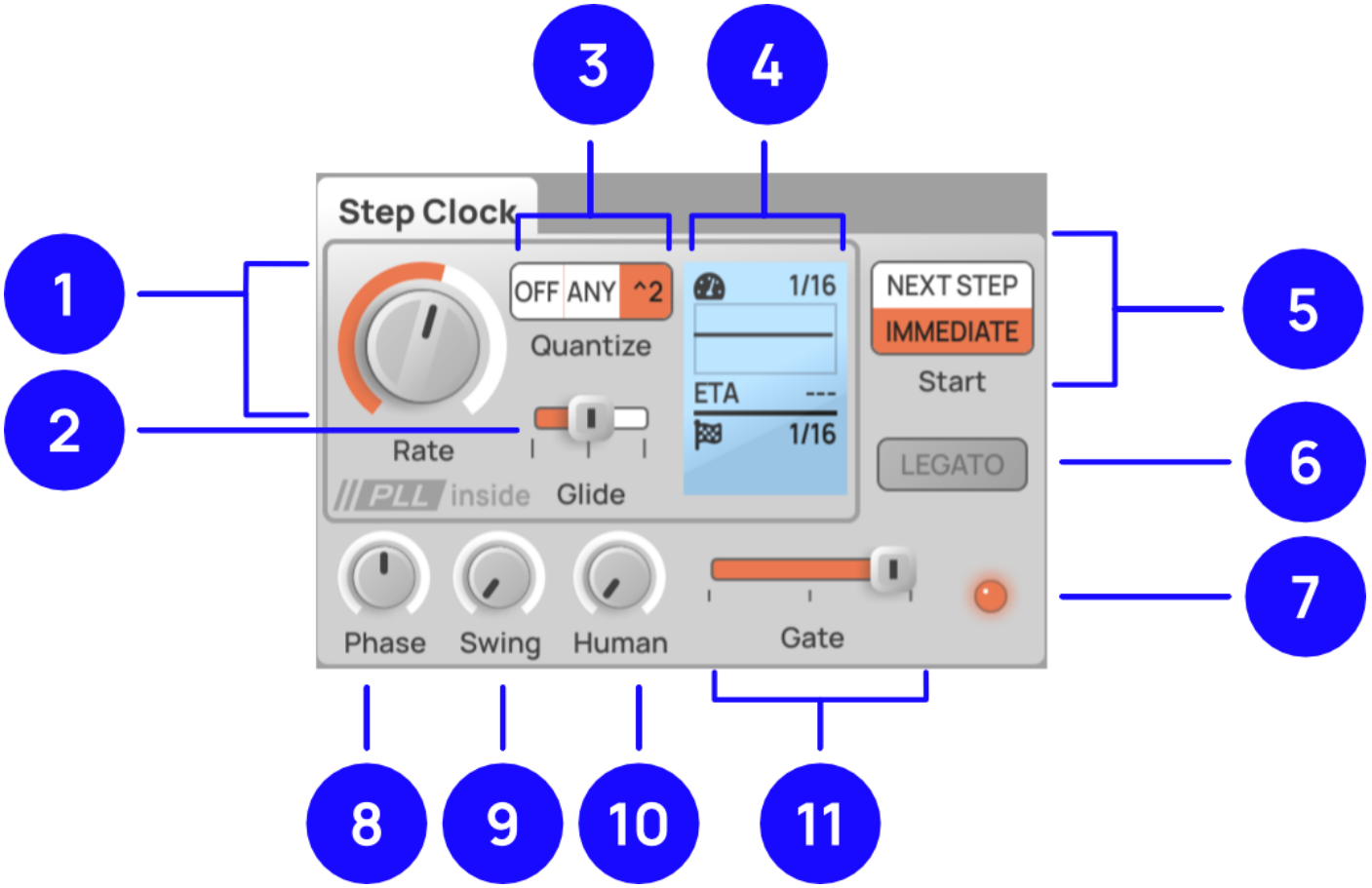


1. With a long click, the Randomizer button on the toolbar toggles the Randomizer popup. With a short click, it randomises the current preset.
2. The undo button allows you to reverse the last five randomizations.
3. The amount slider controls how many and deep the current preset mutations are.

Step Clock

The step clock controls how fast the Envosound and regular sequencer progress. It is tempo synced to the host DAW. The clock also controls the gate or length of the note played on each step. The step

clock possesses a unique characteristic: you can modulate its rate whilst still remaining locked to the beat. This is achieved through carefully executed transitions instantaneously or gradually over several beats. The phase of the clock remains synchronised to the host clock at the end of any rate modulation transition. This approach is called a PLL (Phase-Locked Loop).

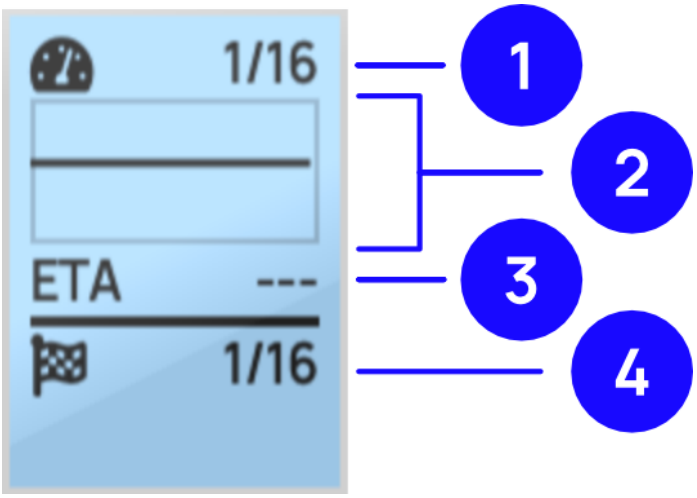


1. The rate knob determines the base (unmodulated) step rate. This is always tempo synchronised to the host DAW.
2. The glide slider sets the number of beats over which any clock modulation will take place. Setting it to zero will cause instantaneous changes.
3. The quantise selector determines how any modulation will be quantised.
    - **OFF** disables any quantisation allowing any multiple of the base step rate.
    - **ANY** setting will quantise the clock to any available rates, including triplets and dotted multiples.
    - **^2** is short for powers of two; in this setting, only progressive doubling of the clock rate is allowed.
4. The clock status display shows the current clock rate and the progress of any transition. See the clock status display section below for more details.
5. The start selector determines if the first step starts as soon as a MIDI note is detected or if it waits for when the next step should begin to remain synchronised to the host clock.
6. The legato button forces the note generated by each step to be the entire length of the step rather than controlled by the gate slider. The envelopes (in **STEP** mode) will still use the configured gate value to determine release. The gate slider controls the step and envelope release if Legato is not enabled.
7. The pulse light flashes on each step to give visual feedback on the rate.

8. Using the phase knob, you can offset the clock to before the beat (pulling) or after the beat (dragging). The step clock changes smoothly using a length transition configured by the glide slider.
9. The swing knob controls the amount of lengthening of alternate steps. All notes are equal in length at a minimum value of 50%. 66% is equivalent to a triplet, where the first note takes two-thirds of the time and the second takes the remaining one-third.
10. The human knob humanises or randomises the start and gate of each step.
11. The gate slider controls each note's length relative to the step's length from 0% to 100%.

Clock Status Display

Both the step clock and LFO use the clock status display to display essential information about the current rate and any modulated transition in progress.



1. The instantaneous current clock rate. This value will be dimmed if not exactly locked onto the reported rate.
2. A historical chart of the clock rate.
3. The ETA (expected time of arrival) is the number of beats until the current transition completes. It will display - - - if no transition is in progress.
4. The target rate for the current or last transition.

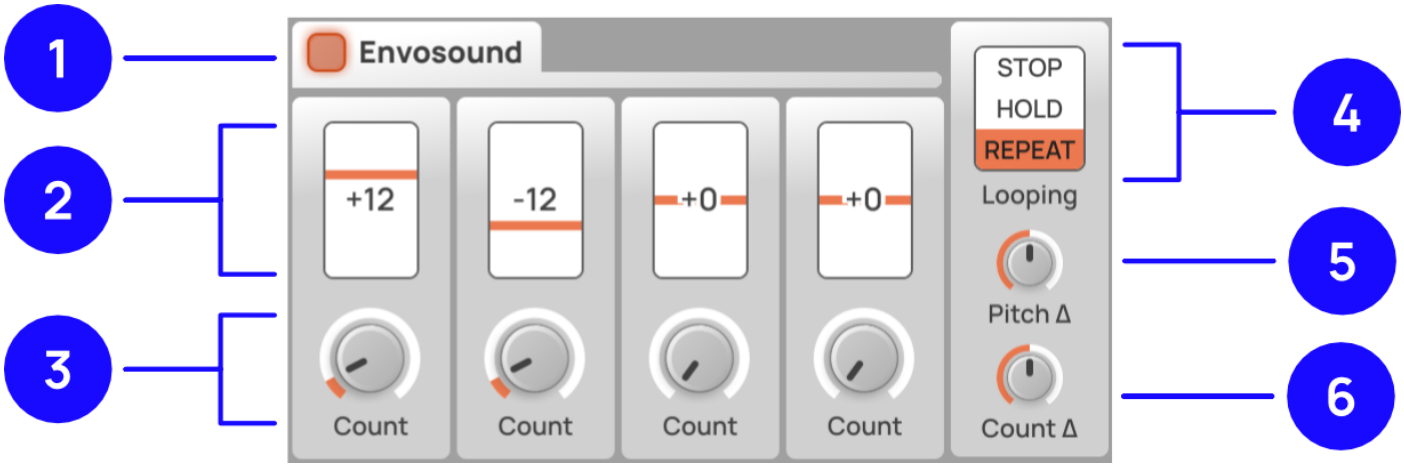
Envosound

The Envosound sequencer is based upon a 1980s approach to generating sound effects in early 8-bit computers such as the BBC Micro and Memotech MTX. In conjunction with an amplitude envelope, this approach enables the creation of complex sound effects from simple digitally controlled analog oscillators.

This novel sequencing approach is interval based and allows for unique, continuously changing sequences of tones not available with modern absolute note sequencers. For example, it can create glissandos by continuously stepping to a lower note.

It can play constantly evolving harmonic patterns by constraining notes to a scale. Alternatively, selecting a microtonal scale can create sound effects such as sweeps and quantised vibrato.

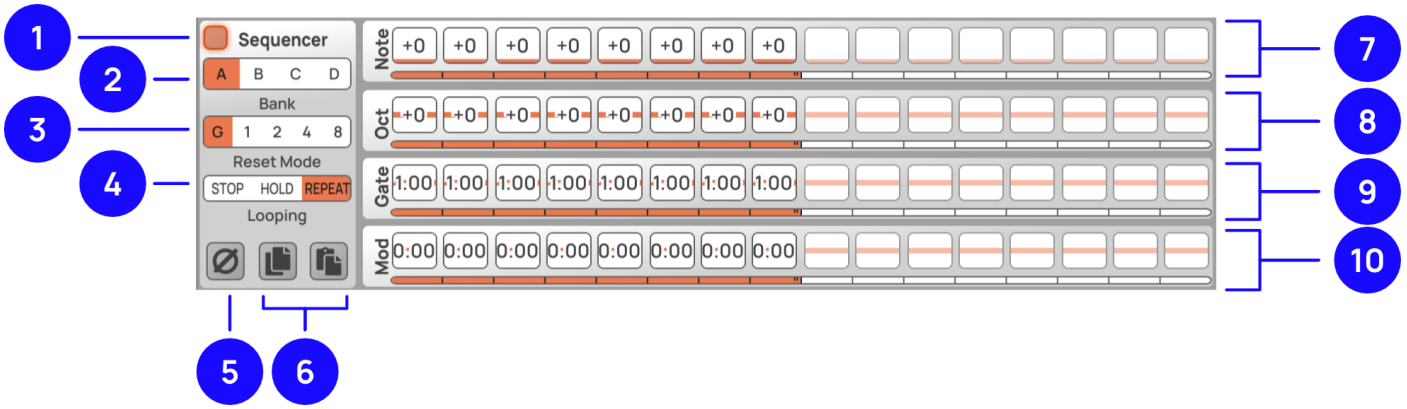
The sequencer consists of four steps, each following after the previous one. If you set the looping mode to repeat, it then loops back to the first position. Each step repeats multiple times as set by the count settings. Envosound will skip a step with a count of zero. Pitch and count delta settings allow for modifying the intervals and counts of each step over time for even more complex patterns.



1. Enable/disable the Envosound sequencer.
2. Select the note pitch interval applied at each of the four steps of the sequencer. Envosound highlights the outer border of the interval when that step is active during playback.
3. Set the number of times the step is repeated before moving to the next step. If set to zero, Envosound will skip the step.
4. When the sequencer has completed step four, its behaviour is determined by the looping mode.
    - **STOP** causes the sequencer to terminate; it will play no more steps.
    - **HOLD** causes the last note step to repeat indefinitely.
    - **REPEAT** will move Envosound back to step one.
5. Pitch Δ (delta) controls how pitch intervals of all steps will change over time. A positive value will cause intervals to grow in magnitude over time, and a negative value will cause intervals to shrink to zero over time. The further you set the knob from zero, the faster changes will occur.
6. Count Δ (delta) controls how the counts of all steps will change over time. A positive value will cause counts to grow in magnitude over time, and a negative value will cause the counts to shrink to zero over time. The further you set the knob from zero, the faster changes will occur.
7.

Sequencer

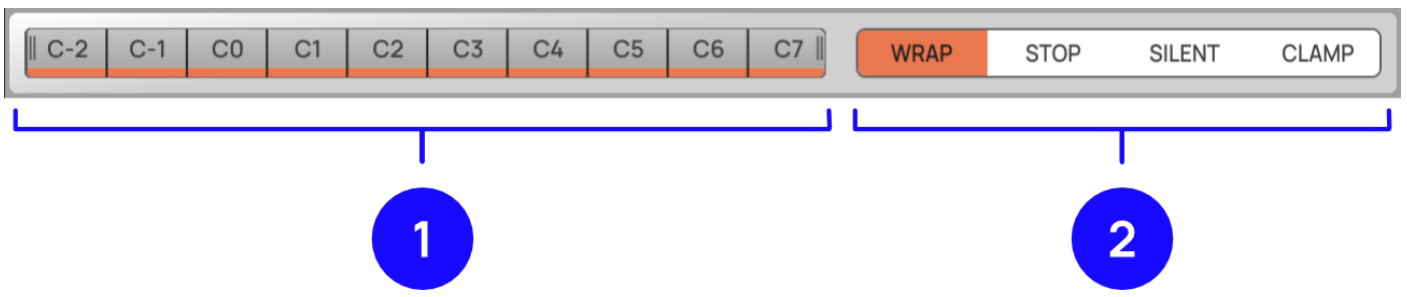
Glaid's sequencer offers a traditional step sequencer to augment Envosound. You can use them individually or together. The sequencer has four banks (A, B, C, and D) which you can select via host automation or modulation. Each bank can have up to sixteen steps for setting a note, octave, and gate offset. In addition, you can set a modulation value for each step, which the modulation system can use to modulate anything you choose. Each offset can have a different number of steps allowing polyrhythmic results.



1. Enable/Disable the sequencer.
2. You can manually select a bank for editing. When a bank is selected, the UI loads its settings. (If you plan to modulate the bank, we recommended to set the bank control back to A after editing, as modulations will be offset from whatever you select here.)
3. The reset mode determines when the sequencer resets so that each lane synchronises back to step one.
    - With option **G,** the sequencer resets every time it receives a new note sequence.
    - Other numeric options cause the sequencer to reset on bar endings every 1, 2, 4, or 8 bars.
4. The looping mode determines the behaviour of the sequencer when the last step in a lane completes:
    - **STOP** causes the sequencer to terminate; it will play no more steps.
    - **HOLD** causes the last value in that lane to repeat indefinitely.
    - **REPEAT** will move the sequencer back to step one in that lane.
5. Reset the current bank back to default settings.
6. Copy and paste settings from one bank to another.
7. The note lane offsets the played note by the set number of intervals in the configured tuning. The slider on the bottom of the lane allows for adjustment of the number of steps in the lane.
8. The octave lane offsets the played note up or down in multiples of whole octaves regardless of the tuning.
9. The gate lane scales the gate set in the step clock to be up to two times longer or down to zero length.
10. The modulation (mod) lane is a modulation source that can modulate other things.

Range

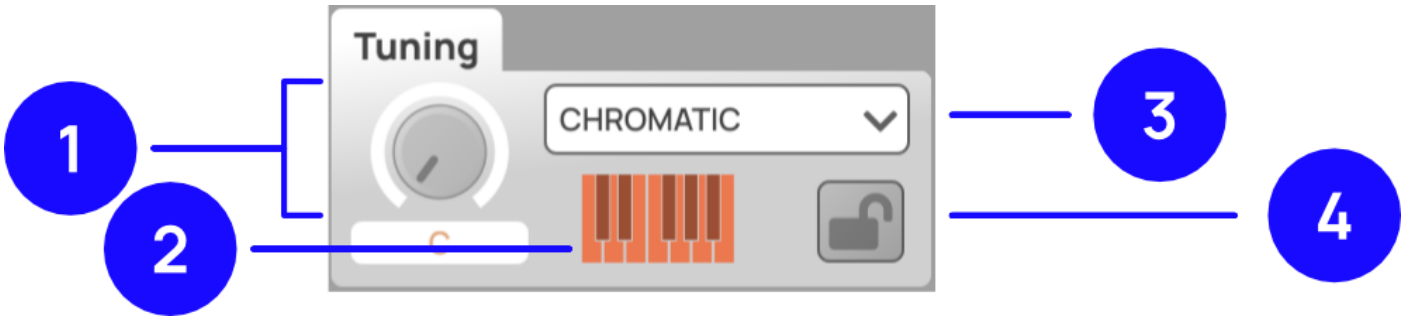
The range panel provides some additional settings to control the range of notes that the sequencers will generate and the behaviour of the sequencers when the notes are either too high or too low.



1. The range selector allows the selection of octaves across the entire midi range. Octaves start and end on C. You must select at least one octave. If you send in a MIDI outside of that range, it will be ignored, and nothing will be played.
2. The out-of-range behaviour selector determines how the sequencers react when generating a note outside the set range.
    - **WRAP** causes the note to wrap around so that a too-high note becomes a low note, and a too-low note becomes a high note. (This was the original behaviour of Envosound in 1980s implementations.)
    - **STOP** causes the sequencers to terminate and not play any more steps.
    - **SILENT** causes the steps not to play any notes until the notes are in range again (if ever.)
    - **CLAMP** causes the notes to stop at the extremities of the range. Though not very musical, CLAMP can be helpful for sound effects.

Tuning

The tuning section is responsible for applying a scale to the note offsets generated by the sequencers. Output notes are not quantised to fit the scale, but instead, the intervals are applied to that scale. So, for example, it takes seven interval increments on a major scale to make an octave, and on a pentatonic scale, it takes five.



1. Select the scale's root note (or tonic) if appropriate.
2. The keyboard visually represents the valid notes in the selected scale.
3. Select the scale type or mode. Many standard scales and modes are available for selection, and a few unusual choices that require a further description below.
4. The lock button ensures the scale isn't changed when new presets are loaded.

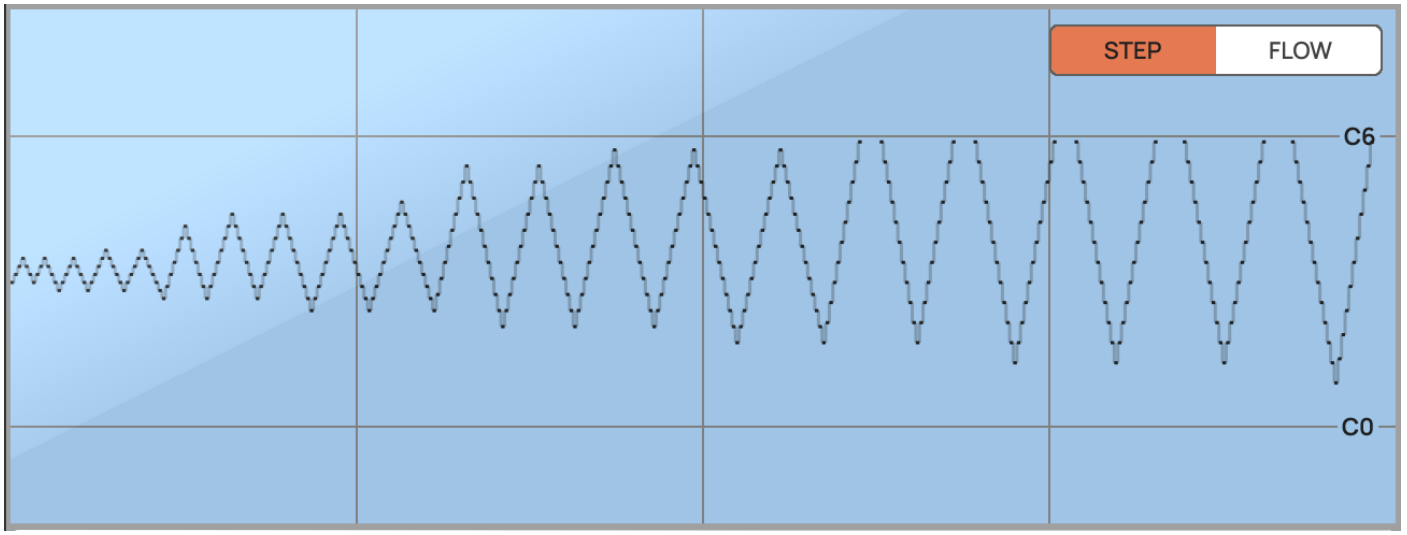
The **AS_PLAYED** scale selection dynamically creates a scale based on the played keys from MIDI-In. Selecting this mode allows you to play freeform chords and harmonies with ease. Key presses that overlap in time are coalesced into a single note sequence. A new sequence is only started when all keys are released.

The microtonal scales divide a semitone into either 4 (**MICROTONAL4**) or 16 (**MICROTONAL16**) equal intervals. These are useful for smoothly changing pitches in sound effects.

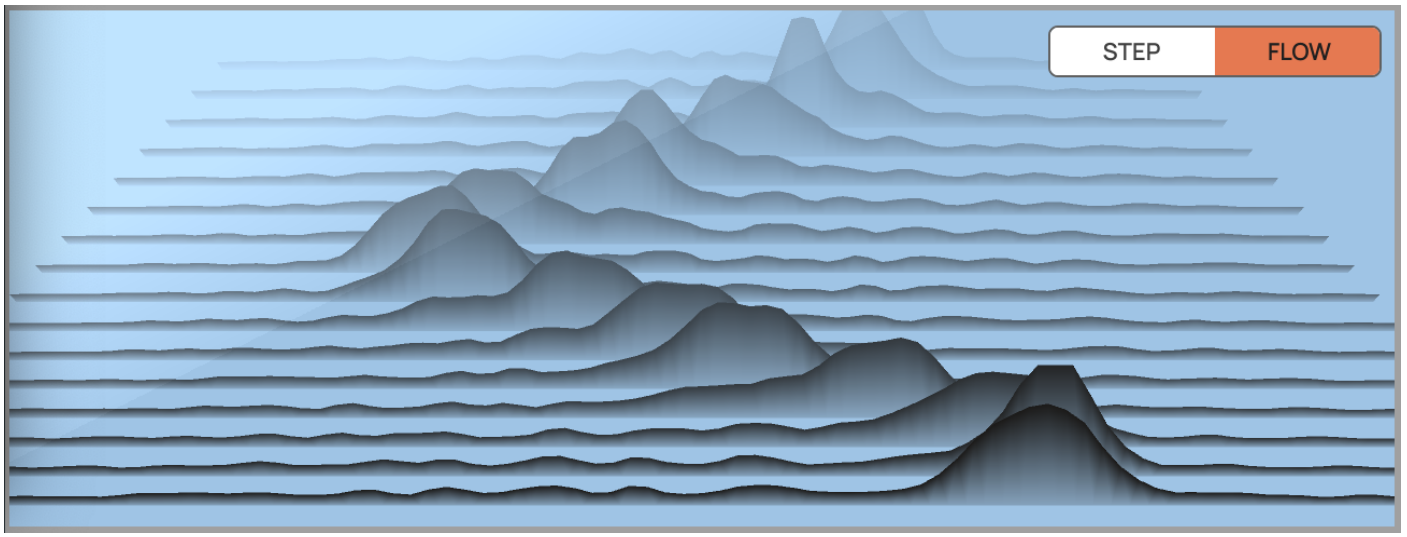
Step Display / Flow Visualizer

This panel on the UI has two modes selected using the toggle button on the top right. Firstly the step display represents the combined effect of both sequencers, taking into account the tuning and range. The display shows how the pitch of steps evolves over time on the x-axis, with height on the y-axis being the output note, low to high. If the range is restricted, the step display shows horizontal bars labelled with the note at the extremity.

When no note sequence is playing, the step display will show a representative output (by taking a central note). However, when a note sequence is being played, it will show the actual sequence with the current step highlighted.

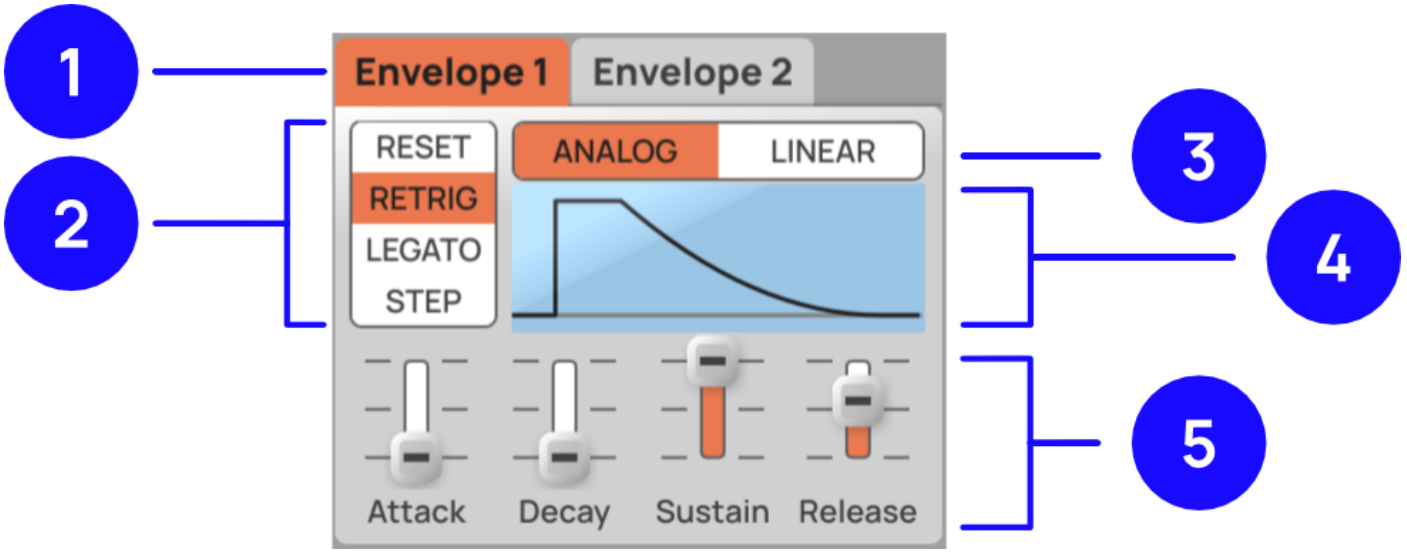


The flow visualiser is a 3D display which shows real-time note pitch and amplitude at the front. The x-axis shows pitch with amplitude on the y-axis. The flow visualiser gradually moves each display line backwards on the z-axis, fading into the distance.



Envelopes

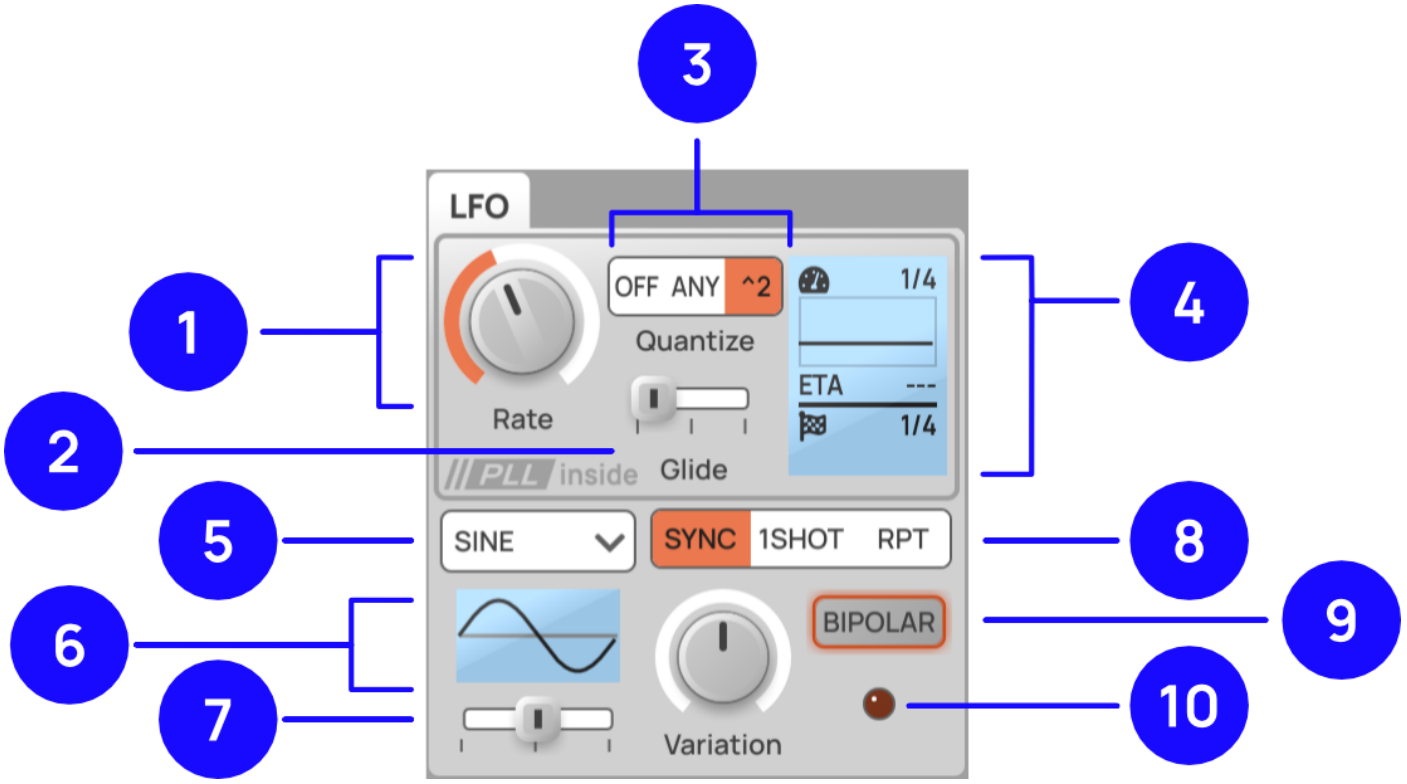
The two independent envelopes act as modulation sources but are typically used to control amplitude, filter, or pitch changes.



1. Tabs select either Envelope 1, or Envelope 2 for editing.
2. The reset mode determines how and when the envelope is reset:
    - **RESET** will reset the envelope to zero and restart the attack phase whenever a new MIDI-In note is triggered.
    - **RETRIG** will retrigger the envelope at the attack stage from its current level whenever a new MIDI-In note is triggered. This usually creates a smoother response than reset.
    - **LEGATO** will only retrigger when a new note sequence is started if no previous note was being pressed at that time.
    - **STEP** will retrigger on each step as determined by the step clock.
3. Envelope type selects between an analog inspected envelope implemented with a simple R/C circuit creating smooth curves and a linear envelope where each stage is a straight line.
4. The envelope display visually represents the current envelope settings.
5. The attack, decay, sustain, and release sliders determine the envelope shape with these traditional controls.

LFO (Low-Frequency Oscillator)

The LFO acts as a modulation source. It contains the same phase-locked modulation capabilities as the step clock.



1. The rate knob determines the base (unmodulated) step rate. This is always tempo synchronised to the host DAW.
2. The glide slider sets the length of transitions in units of beats over which the LFO will modulate any changes to the rate or phase. Setting it to zero will cause instantaneous changes.
3. The quantise selector determines how any modulation will be quantised.
    - **OFF** disables any quantisation allowing any multiple of the base step rate.
    - **ANY** setting will quantise the clock to any available rates, including triplets and dotted multiples.
    - **^2** is short for powers of two; in this setting, only progressive doubling of the clock rate is allowed.
4. The clock status display shows the current clock rate and the progress of any transition. See the clock status display section below for more details.
5. The waveform selector chooses between available waveforms. You can modify each waveform in unique ways with the variation knob:
    - **SINE** selects a sine wave which can be squashed or stretched with the variation knob.
    - **TRI-SAW** selects a triangle wave that can be bent into a rising or falling saw wave.
    - **SQUARE** selects a square wave with a variable pulse width
    - **S&H NOISE** selects a sample-and-hold noise source which can be morphed into random walk noise. Sample-and-hold noise chooses a completely random value in each period vs Random walk noise, which makes a random offset from each period's current value.
    - **SIMPLEX NOISE** selects a pseudo-random simplex noise function. The variation knob increases the amount of higher octaves.
6. The waveform display gives a visual representation of the selected waveform.
7. The phase control allows the LFO to be offset by up to plus/minus 180 degrees.
8. The LFO play mode selector determines how the LFO is started and stopped:
    - **SYNC** mode keeps the LFO synchronised to the host clock

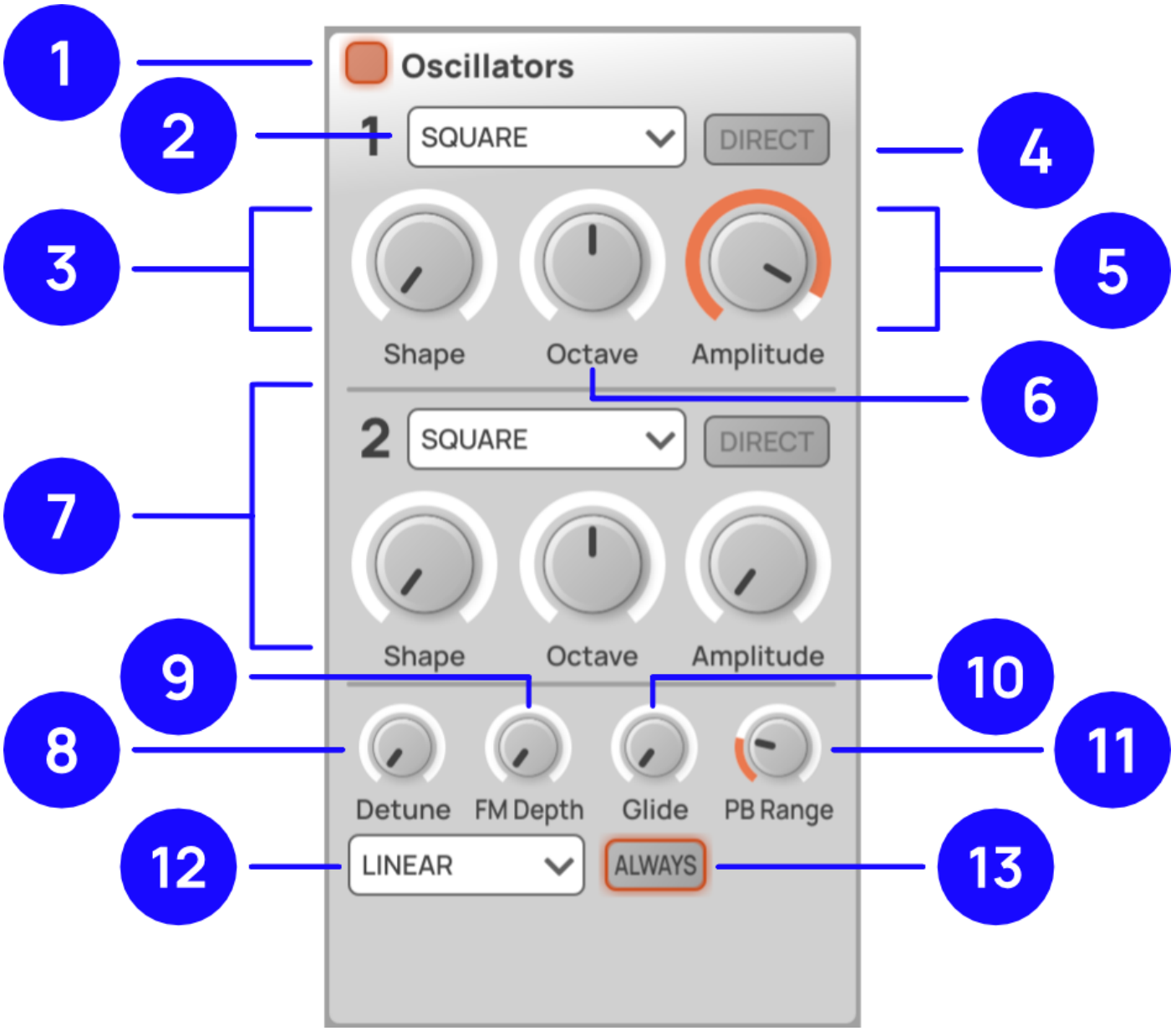
- **1SHOT** resets the LFO phase whenever a new note sequence is triggered and plays just one oscillator cycle.
- **RPT** is similar to 1SHOT but repeats indefinitely.

9. Bipolar mode, when enabled, sets the waveform to output both positive and negative values.
10. The pulse light flashes on each oscillator period to give visual feedback on the rate.

Oscillators

Glaids internal synthesiser consists of two identical oscillators, which are mixed together and fed into the filter. If the oscillators are disabled, MIDI is routed out of the plugin to drive an external synthesiser.

The oscillators respond to midi notes with velocity sensitivity controlling amplitude and amplitude Midi CC (7). Pitchbend works as expected with a configurable range. Midi CC Pan (10) controls panning.



1. Enable/disable the internal synthesiser.
2. Select a waveform for the first oscillator:

- **SINE-TRI** shape knob varies waveform between a pure sine wave and a triangle wave.
- **SQUARE** shape knob varies pulse width between 50% and 99%.
- **SAW** shape knob introduces supersaw character with a unison of three saws progressively detuned and spread across the stereo field.
- **WHITE NOISE** shape knob controls a tilt filter on the noise, where 50% gives a flat frequency spectrum. Lower values remove high-frequencies leading to pink and then brown noise. Higher values remove low frequencies leading to blue noise. The octave knob does not affect white noise.
- **SIMPLEX NOISE** uses the pseudo-random simplex noise function, creating band-passed noise with a central frequency on the played note. Higher values of the shape knob cause progressively shorter windowing leading to a more engine-like tonal sound.
- **RETRO NOISE** generates digital square noise using a linear feedback shift register (LFSR). This emulates the primitive noise of 1980s arcade machines, game consoles, and home computers. The shape knob progressively shortens the cycle length but is always kept in tune by restricting the cycle length to powers of two.
- **FRACTAL** generates sound by following the iterations inside a fractal function. The shape knob sweeps the location within the fractal. This waveform can generate anything from pure notes with exotic harmonics to all-out chaos and much in between. (Credit to HackerPoet's Fractal Sound Explorer for inspiration.)
- **BIPOLAR PULSE** generates a waveform somewhat like a square wave but alternates between positive and negative phases, with equal durations and peak amplitudes but opposite polarities. It starts from a baseline, rapidly rises to a peak positive amplitude, and then falls to a peak negative amplitude. The shape knob shifts the two phases relative to each other.
- **OCTAVES** generates an organ-like waveform consisting of five stacked sine waves of increasing frequency, one octave apart. The shape knob tilts the amplitudes of each sine to emphasise high frequencies with high values.

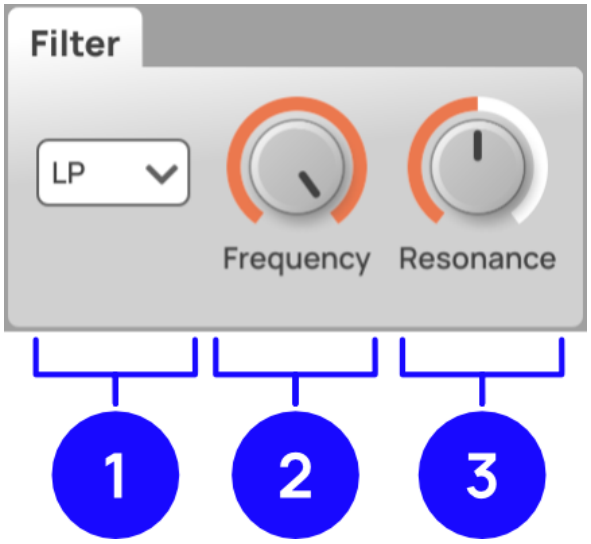
3. The shape knob uniquely varies the selected waveform for each, as described above.
4. Enabling direct mode sends this oscillator directly to the plugin's output, bypassing the filter and effects.
5. The amplitude knob controls the amplitude of the first oscillator.
6. The octave knob enables tuning of the oscillator up or down by two octaves. It also supports tuning to the fifths between each octave by selecting the 0.5 values.
7. Oscillator two has an identical architecture and controls to oscillator one.
8. To create a detuning effect, the detune knob tunes the oscillator one up and two down slightly.
9. FM depth controls if and how much oscillator one frequency modulates oscillator two. When set to zero, frequency modulation is disabled.
10. The glide knob determines how fast one output note portamentos or glides to each note from the last.
11. Pitch Bend (PB) range determines how many semitones up and down a full-scale pitch bend will be.
12. FM mode selects which of the frequency modulation modes is used:

- **EXPONENTIAL** is an analog style of frequency modulation where the modulation follows an equal spacing of musical notes both upward and downward. This can result in detuning.
- **TUNED EXP** is a variant of exponential FM where the detuning is compensated for.
- **LINEAR** is a modern digital approach to FM where the oscillator's frequency is modulated up and down by an equal amount; thus, the centre frequency remains the same, and no detuning occurs.

13. Glide Aways button toggles if gliding always occurs between notes or only between legato notes which overlap in time.

Filter

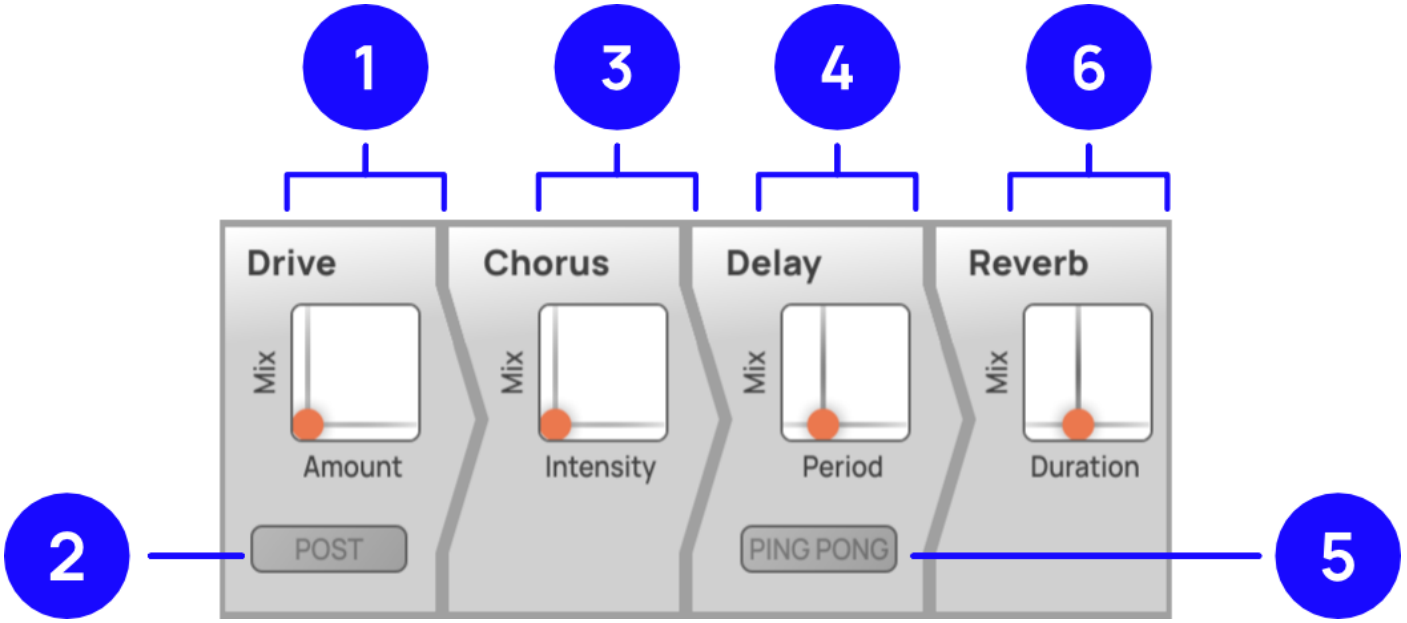
Audio output from the oscillators feeds into the filter section. The single selectable filter in the filter section can selectively remove or emphasise specific frequencies.



1. Select a filter type:
   - **LP** a 12db per octave low-pass state variable filter circuit
   - **HP** a 12db per octave high-pass state variable filter circuit
   - **BP** a 12db per octave band-pass state variable filter circuit
   - **MLP** a 24db per octave low-pass ladder filter circuit
   - **MHP** a 24db per octave high-pass ladder filter circuit
   - **MBP** a 24db per octave band-pass ladder filter circuit
2. The frequency knob controls the cutoff frequency of the filter.
3. The resonance knob can increase the filter's resonance, causing it to emphasise the frequencies around the cutoff. Reducing the resonance can soften the cutoff causing a more gentle effect on the frequency response.

Effects

The effects section follows from the filter section output in the audio signal flow. It comprises four effects units: drive, chorus, delay, and reverb.

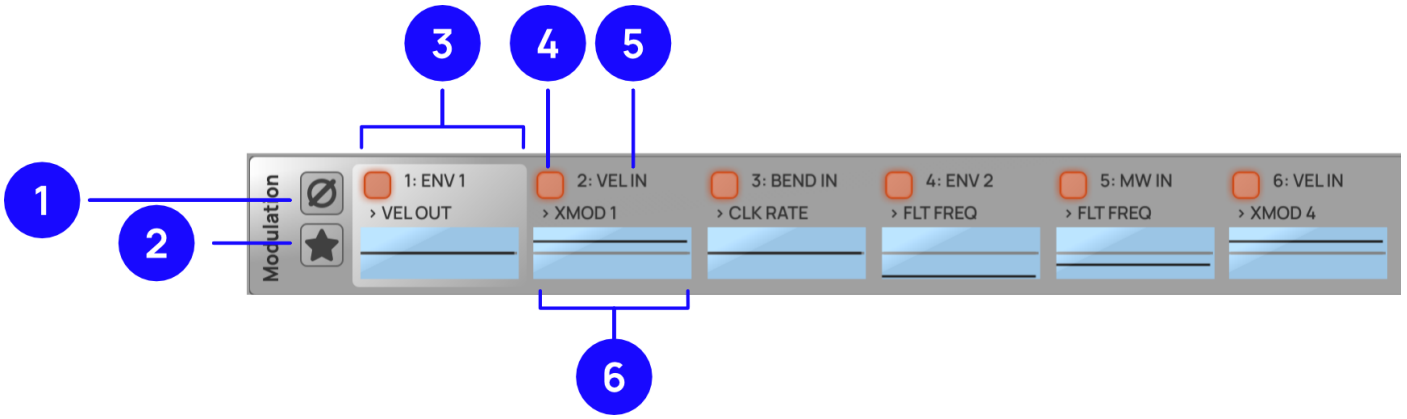


1. The drive effect adds saturation and distortion to the audio. This drive circuit adds both odd and even harmonics. The XY Pads y-axis determines how much of the effect it mixes into the signal. Setting it to zero (at the bottom) disables the drive entirely. The x-axis increases the drive and progressively adds even harmonics due to asymmetric distortion.
2. The POST drive button alters the signal path to put the drive effect at the end of the effects chain after reverb. This typically leads to more classical intermodulation distortion effects due to any delay or reverb feeding an input with a mix of multiple notes.
3. The chorus effect simulates a classic Juno Dimension chorus effect. The y-axis controls the chorus mix as well as width and depth. Setting it to zero (at the bottom) disables the chorus entirely. The x-axis controls the LFO frequency and intensity of high-frequency imaging components.
4. The delay effect mixes in a time-delayed signal copy. The time-delayed copy feeds back onto itself, resulting in decaying echoes of the original signal. The XY Pads y-axis controls the mix of the delayed signal and the feedback level. The x-axis controls the delay period, which snaps to various tempo synced rates.
5. The PING PONG button toggles ping-pong mode, causing the effect to bounce the delayed signal between hard left and hard right.
6. The final stage in the effects chain is the reverb. The XY Pads y-axis controls the reverb mix. The x-axis controls the reverb duration

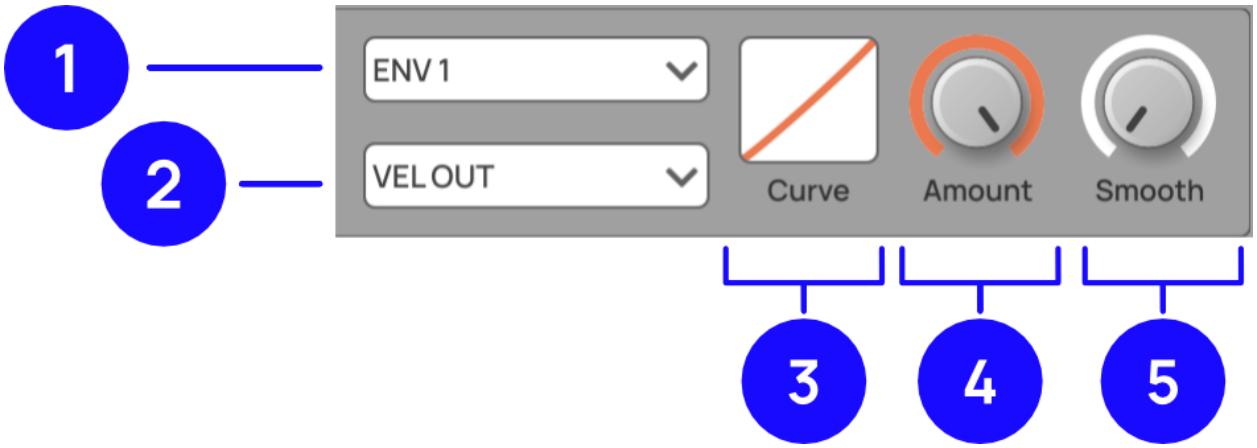
Both the delay and reverb effects support some advanced features through modulation. Firstly the send level into the effects can be modulated to just send segments of the audio into the delay/reverb for creative effects. The delay/reverb buffer can also be reset through modulation, allowing tails to be stopped early for clean separation of sequences.

Modulation

Glaid has six modulation slots that can modulate many destinations, including many controls, and even send modulation to MIDI-Out. Each slot takes a modulation source from MIDI-In or internal sources such as the LFO and envelopes.



1. Clear all modulation slots to the initial unmapped state.
2. Restore all modulation slots to a default useful mapping.
3. When you click on a slot, it becomes selected and will be visually highlighted. Selecting a slot updates the modulation detail, which appears on the right, to the selected slot. This allows fine control of this slot.
4. Enable/disable a modulation slot.
5. A summary of the source and destination is shown for each slot
6. The modulation chart shows current and a window of recent past values. The strong line shows the modulation output, and the faint line shows the input source. Depending upon the modulation source, some charts may only update when notes are playing or the source changes.



1. Select a modulation source.
2. Select a modulation destination.
3. The curve control introduces non-linearity into the modulation allowing small source values to have a disproportionately small or large effect.
4. The amount knob controls how deep the modulation is, with zero effectively turning the modulation off. Negative values (where appropriate) cause modulation in the reverse direction.

The amount knob will dynamically change the scale to match a suitable range for the selected destination.

5. The smooth knob adds a low-pass filter to the modulation causing abrupt changes to smooth out abrupt changes in the source.

Modulation sources and destinations may be unipolar (they have values between zero and one) or bipolar (they have values between minus one and one). The range will be adapted when the polarity of the source and destination do not match.

Modulation Sources

These are all the available inputs the modulation system can access to modulate any destination.

MIDI-In >	ModWheel	MIDI sent into the plugin is used as the modulation source in this section. The modulation wheel is a unipolar modulation source from MIDI CC 1
	Pitchbend	Pitch Bend is a bipolar modulation source.
	Velocity,	The velocity of the input note is a unipolar modulation source.
	Aftertouch	Channel pressure is a unipolar modulation source.
	Gate	This is the key gate with the value zero when no key is pressed and one when any key is pressed.
	Gate Trigger	This is a rising edge trigger on the gate which will pulse to a value one momentarily when the gate transitions from zero to one.
	Volume CC	Volume is MIDI CC 7 and is a unipolar value.
	Expression CC	Expression is MIDI CC 11 and is a unipolar value.
	Note Number	Note number is the midi note number of the last note played
Internal >	Unity	A value of 1 which can be helpful for a constant offset
	Random per note in	A random bipolar value sampled every time a note sequence is started.
	Random per note out	A random bipolar value sampled every time a new step is started.
	Envelope 1	The unipolar output from envelope one.
	Envelope 2	The unipolar output from envelope two.
	LFO	The output from the LFO can be either bipolar or unipolar.

	Sequencer Mod	The bipolar output from the modulation lane of the sequencer.
	Step count to 16	An incrementing unipolar value which reaches full scale after 16 steps.
	Step count to 64	An incrementing unipolar value which reaches full scale after 64 steps.
	Note Out	A unipolar value that is zero at C-2 and one at C7

Modulation Destinations

These modulation destinations are controllable through the modulation system. When you map destinations to parameters within the plugin, the modulation offsets the parameter.

Clock ›	Gate	Modulates the gate of the step clock, which controls each note's length relative to the step's length from 0% to 100%.
	Phase	Modulates the step clocks phase. (This offset is not directly applied to the step clock but through the phase-locked-loop mechanism, which transitions the rate over the set glide period.)
	Rate	Modulates the rate of the step clock. (This offset is not directly applied to the step clock but is controlled through the phase-locked-loop mechanism, which transitions the rate over the set glide period.)
LFO ›	Phase	Modulates the LFOs phase. (This offset is not directly applied to the step clock but is controlled through the phase-locked-loop mechanism, which transitions the rate over the set glide period.)
	Rate	Modulates the rate of the LFO. (This offset is not directly applied to the step clock but is controlled through the phase-locked-loop mechanism, which transitions the rate over the set glide period.)
Envelope 1 ›	Attack	Modulates the envelopes attack period.
	Decay	Modulates the envelope's decay period.
	Sustain	Modulates the envelope's sustain level.
	Release	Modulates the envelope's release period.
Envelope 2 ›	Attack	Modulates the envelope's attack period.
	Decay	Modulates the envelope's decay period.

	Sustain	Modulates the envelope's sustain level.
	Release	Modulates the envelope's release period.
XModulate ›	Mod 1 - Mod 6	The cross-modulation destinations are used to modulate the depth of other modulation slots.
Envosound ›	Count 1 - Count 4	Modulates the number of steps in each stage of the envosound sequencer.
	Pitch 1 - Pitch 4	Modules the pitch interval in each stage of the envosound sequencer.
Sequencer ›	Bank	Modulates the bank used by the sequencer.
Oscillators ›	Osc 1 Shape - Osc 2 Shape	Modulates the shape of oscillators.
	Osc 1 Amplitude - Osc 2 Amplitude	Modulates the amplitude of oscillators
	FM Depth	Modulates the depth of frequency modulation
Filter ›	Frequency	Modulates the filter's cutoff frequency.
	Resonance	Modulates the resonance of the filter.
Effects ›	Drive Mix	Modulate the drive mix.
	Drive Amount	Modulate the drive amount.
	Chorus Mix	Modulate the chorus mix.
	Chorus Intensity	Modulate the chorus intensity.
	Delay Mix	Modulate the delay mix.
	Delay Length	Modulate the delay length.
	Master Gain	Modulate the master gain.
	Delay Reset	Modulate resetting the delays buffer. A rising edge on the modulation crossing 50% will reset the delay buffer. This cleanly removes the delay tail.
	Delay Send	Modulates the send level to the delay. When unmodulated, 100% of the signal is sent into the delay. Modulating the send will cut off input to the delay while allowing the tail and non-delayed signal to pass.
	Reverb Reset	Modulate resetting the reverb buffer. A rising edge on the modulation crossing 50% will reset the reverb buffer. This cleanly removes the delay tail.

	Reverb Send	Modulates the send level to the reverb. When unmodulated, 100% of the signal is sent into the reverb. Modulating the send will cut off input to the delay while allowing the tail and non-delayed signal to pass.
MIDI Out ›	Volume CC	Modulates midi volume CC (7). Unmodulated, or with zero modulation, the value is full-scale 127.
	Velocity	Modulates the velocity of midi notes generated on each step. Unmodulated, or with zero modulation, the value is full-scale 127.
	Transpose	Modulates the note number of the midi notes generated on each step. This transposition is applied using the chosen tuning, so all transposed notes stay in key.
	Pitchbend	Modulates the pitchbend.
	ModWheel	Modulates the mod-wheel, midi CC 1.
	Trigger Probability	Modulates the probability of each step triggering a note. By default, steps always trigger a note if the gate length exceeds zero. However, modulating trigger probability allows you to control how likely it is that the note will be generated.
	Pan CC	Modules the midi pan CC (10).
	FX1 (12) CC	Modulates the external effects CC (12).
	FX2 (13) CC	Modulates the external effects CC (13).
	Sustain Pedal	Modulates the sustain pedal output.

Uninstall

This section describes the manual steps to completely remove Glaid from your system.

Windows

- Delete the VST3 plugins which are installed at `C:\Program Files\Common Files\VST3\Glaid.vst3`, `C:\Program Files\Common Files\VST3\GlaidMFX.vst3`
- Delete presets in *`C:\Program Files\Common Files\Tsuga\Glaid\`* and, if you wish, delete any user presets saved in *`C:\Users\[username]\AppData\Roaming\Tsuga\Glaid\`*

macOS

- Delete AU format plugins which are installed at: */Macintosh HD/Library/Audio/Plug-Ins/Components/Glaid.component*, */Library/Audio/Plug-Ins/Components/GlaidMFX.component*
- Delete the VST3 plugins which are installed in */Macintosh HD/Library/Audio/Plug-Ins/VST3/Glaid.vst3*, */Macintosh HD/Library/Audio/Plug-Ins/Components/GlaidMFX.vst3*
- Delete presets in */Macintosh HD/Library/Application Support/Tsuga/Glaid/*, and, if you wish, delete user presets saved in */Users/[username]/Library/Application Support/Tsuga/Glaid/*.