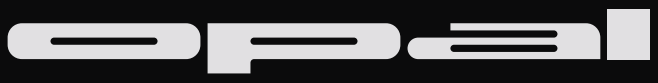


rhythm machine & drum synthesizer

user guide

1.2

Contents

Introduction

Opal is a five-track rhythm machine and drum synthesizer in the Max for Live format.

While its features and sound engines are focused on drums, it can be used to make all sorts of melodies, textures and soundscapes.

We have deliberately refrained from categorizing the engines in Opal as specific types of sounds; they are simply different synthesizers that each have a unique tone at your disposal.

Each track has its own sound engine with its own sequencer lane and modulation.

There's Gem, an FM synthesizer,
Mass, a modal synthesizer,
Dust, a pulsar noise generator,
Slate, a granular sampler

and lastly Void Reverb & Flux Sampler, two effects in one track.

Together they form a machine that can be used to make unique drum patterns for your tracks, or completely hold its own as a music creation machine.

Device Overview

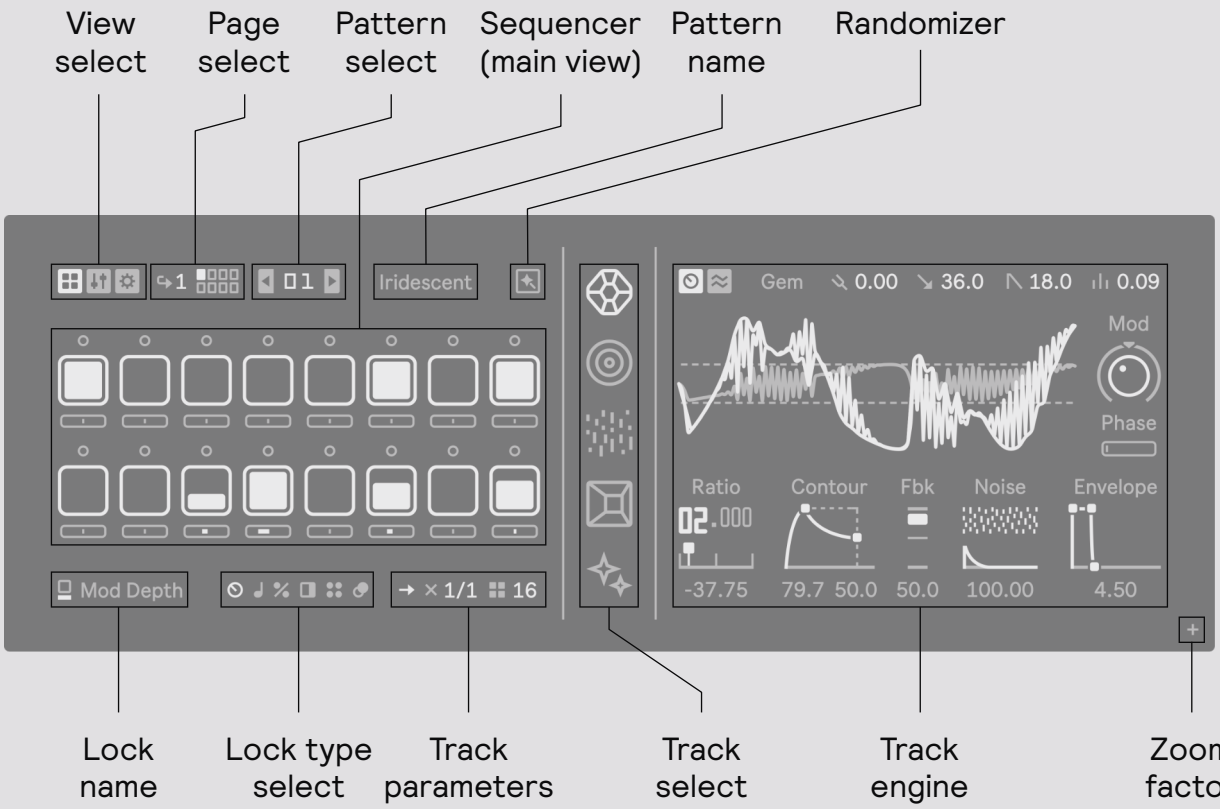
Opal comes in two different versions.

In-Rack places the device in the Ableton Live Device rack while Pop-Out is hosted in its own window, much like a regular plugin.

The interface in the Pop-Out can be scaled up to 4 times the size.

The accent color of the interface can be changed to any hue you like as well, for each instance of Opal.

Device Overview : Layout



View Select
Changes between viewing the Sequencer (current), Mixer, and Settings page

Page Select
The number selects how many sequencer pages in on a track and the boxes selects which page is viewed

Pattern select
Displays the active pattern number and navigates between the patterns

Pattern name
Displays the name of the active pattern, which can be change by typing into it

Randomizer
Opens the randomizer window

Lock name
Displays what parameter lock is currently being viewed in the sequencer

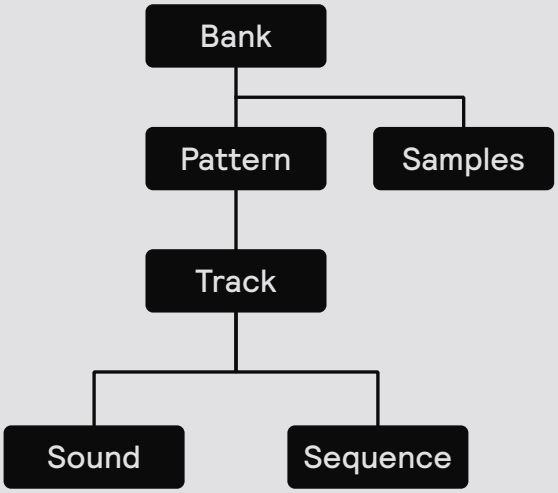
Lock type
Selects between the different kinds of parameter locks

Track parameters
Changes parameters that affect the currently selected track

Track select
Changes between tracks, each with their own sound engine

Zoom factor
Changes the interface scaling (Pop-Out only)

Device Overview : Data Structure

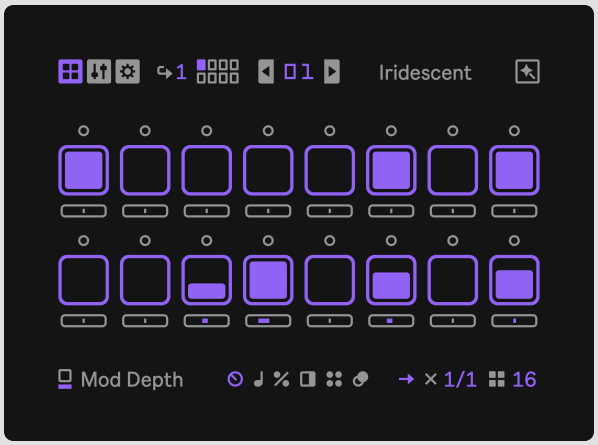


Every instance of Opal holds a “bank”, which is the collection of data used by the sequencer. In a bank there can be up to 64 patterns, each with sequence and sound data for each of the 5 tracks.

When a new pattern is selected, the sound data of each track will be updated along with the sequence data, meaning that each pattern has a unique preset for each sound engine alongside the sequencer.

Each bank also has up to 16 sample slots that can be played back on the Slate track. Note that samples are not stored in the Opal device itself, the data structure points to a file on disk that will be loaded once a Live Set is recalled.

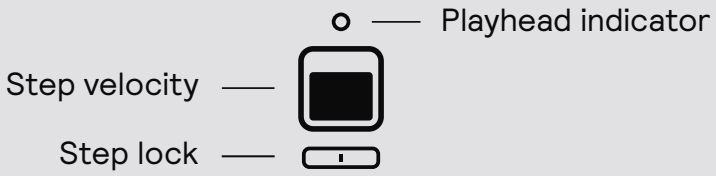
Sequencer



At a glance, Opal features a step sequencer with parameter locks, probability, notes, logical operations and ratcheting. Each track can have a different page length of up to 16 steps with individual time division and traversal. Each track can have multiple sequencer pages which lets you extend the sequence up to 128 steps.

By default the tracks only have one page, but by increasing the page number next to the page indicators you can extend the pattern up to 8 pages. View a page by pressing its indicator.

The step sequencer in Opal is deeply connected to the sound engines by a modulation method called Parameter Locks. Just like each step holds a velocity value, it can also hold a multitude of different parameters that are being sent when a step is triggered. Imagine each step with the possibility of having a unique sound for you to define.

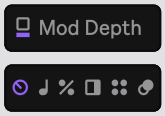


Each step holds a velocity value which controls the loudness of the sound. To change the velocity of a step, click on it to toggle the step on or off, or click and drag to set the velocity to a specific level. Note that when a step is removed its locks are removed as well.

The velocity value is indicated by the level bar at the center of the square. When a step has a velocity value above zero, it is regarded as active and will send a trigger once the playhead is running through that step. Where the playhead is at is indicated by the dot above the step lighting up.

Note! You can copy a step or page by pressing cmd/ctrl while clicking on it, then paste it by pressing opt/alt while clicking on any other step or page.

Sequencer : Parameter Locks

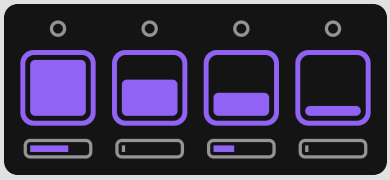


Current lock

Lock type select

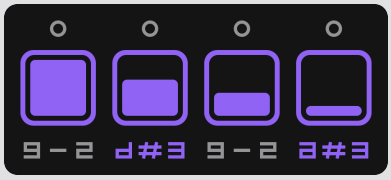
Parameter locking is a powerful modulation feature which lets you essentially create a new sound on every single step in the sequencer. The icon in the lower left hand side of the sequencer view shows what parameter is currently active for the lock value, and the icons next to it lets you select between these different lock types, each with a unique functionality that can be used to create dynamic and expressive patterns.

A lock is entered by changing the value underneath a step. Once a lock is active, it will use the accent color instead of gray. To clear a lock, simply double click it. Note that all locks are cleared when a step is removed.



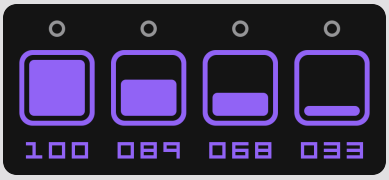
Parameter Lock

This is the default lock type and controls the parameters of the sound engines. When you click on or change an engine parameter, it will show up as a lockable slider under each step. This lets each step become a variation of the track's sound.



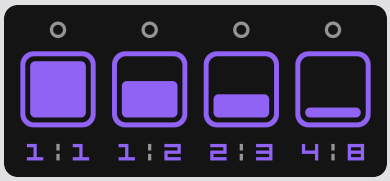
Note Lock

Note locks lets you change the note (pitch) of each step in order to create melodies and so on. Each track has a default note, set next to the lock name, which is overridden if there is a note lock. Tip! Hold shift to change the octave.



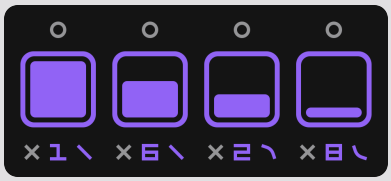
Probability

Probability sets the random chance of a step being triggered or not. A value lower than 100 means that the step has n% chance of triggering. This can be for example used to introduce random or unexpected variation in a pattern.



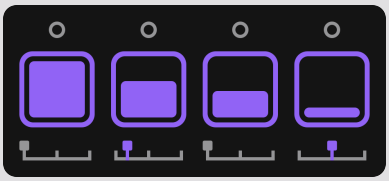
Modulo

This can set the note to trigger only on a specific loop count of the pattern steps. The first number decides which loop count to trigger on, and the second number how many counts. 1:2 will only trigger the step on the second loop, for example.



Ratchet

This can repeat the step up to 8 times within the step duration. The second control changes the slope of the ratchet which creates a sort of swing in the ratchet.

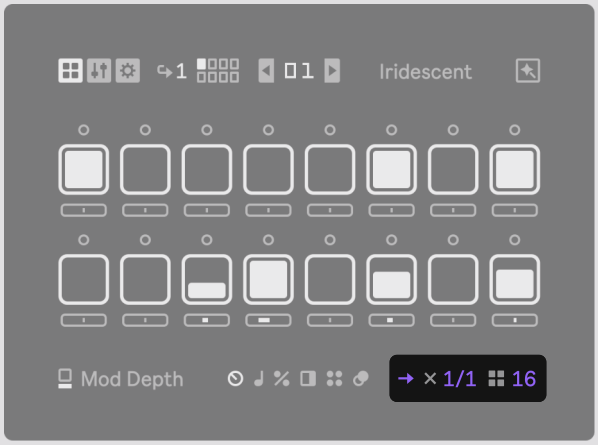


Nudge

This lets you shift each step forward in time, off the grid and unquantized. This is useful for programming swing, shuffle, polyrhythms or to just add a specific groove to a track.

Note! You can preview a step by clicking on it while holding down Cmd/Ctrl+Shift

Sequencer : Track Parameters



Each track can have individual settings for time division, length and traversal. This allows for creating polyrhythms, polymeters as well as some more playful ways to program rhythms.

→ Direction

This changes the traversal of the track, having it be played back either forwardly, like normal, or ping-pong. Ping-pong means that when the pattern reaches the last step the direction is reversed until it reaches the beginning again.

The ping-pong mode is denoted by this symbol ⇄

× 1/1 Division

This changes the speed of the track. 1/1 means that each step represents a sixteenth note at the current BPM and the step increment is as such. When the value is higher (e.g 1/2) or lower (2/1) the track will play back slower or faster.

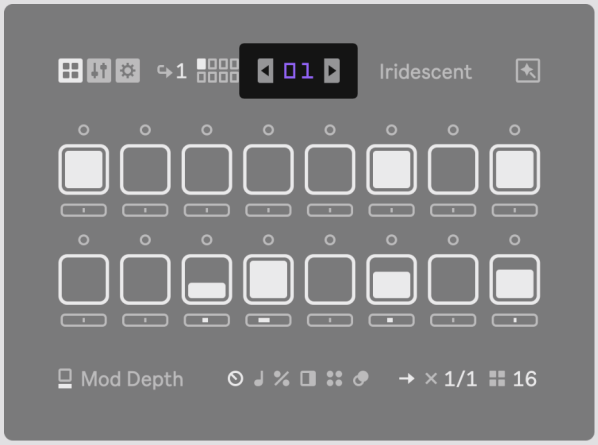
A setting of 3/4 or 3/2 can be used to program polyrhythms, for example.

16 Length

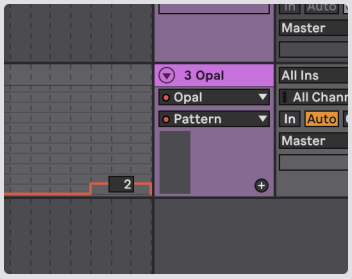
This changes the amount of steps a track page has and will in some cases equate to different meters. 12 steps is for example a pattern in ¾ time.

Polymetric sequencing can be done by giving each track its own length.

Sequencer : Patterns & Automation



To change the active pattern in Opal, press the arrows surrounding the pattern number to manually navigate between patterns. Each pattern can also be named by clicking and typing into the label on the right-hand side of the pattern number.



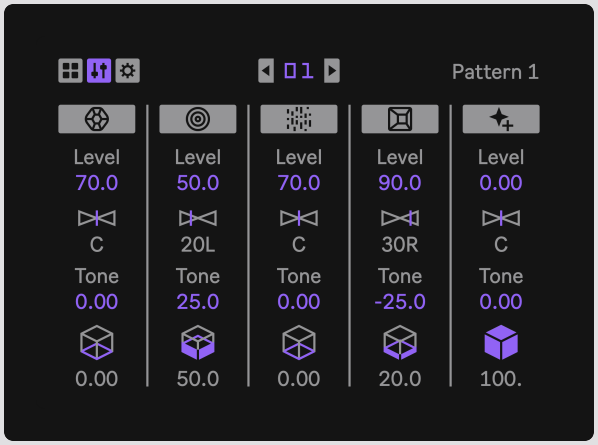
You can also sequence pattern changes by sending automation in Live. This is done by controlling the “Pattern” automation parameter. Open the automation lane of an Opal device and choose Pattern in the drop down menu. Note that this immediately changes the pattern, and in some cases it might be necessary to send a pattern change slightly ahead of time to ensure that all events land perfectly.

Automation in Live

Parameters pertaining to the mixer and otherwise non-lockable parameters can be automated from Live. These are, per track:

(Name) Output Level	Attenuates the track’s final output volume.
(Name) Output State	Enabled or disables (mutes) the track’s output.
(Name) Track State	Mutes the sequencer triggers, but not the audio.
(Name) Pitch Offset	Offsets the pitch of the track engine in semi-tones.

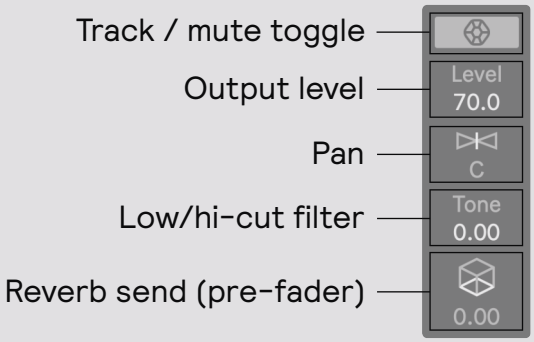
Mixer



The Mixer view will let you mix each track by attenuating its volume, control the stereo panning, send the track's output to the Void reverb effect as well as remove high or low frequencies with the Tone control.

The settings of the Mixer are saved per pattern, except for the Mute states which are saved (and automated) in the Live Set. All the Mixer controls are automatable from Live. The Tone and Reverb controls can also be parameter locked by the sequencer.

In the Pop-Out version of Opal the Mixer will also always be accessible from the Rack device which has bi-directional communication with the main window.



The track indicator can be toggled to mute the output of the track, and is handy for listening to only a few elements at once, or as a performance tool.

The Tone filter is used to remove high or low frequencies in the sound of a track. It's essentially a low/hi cut filter, but tracks the fundamental frequency of the sound which means that it becomes more of a relative tone control.

The reverb send is pre-fader, meaning that a track can be sent to the Void reverb even though its output level is turned all the way down. This opens up for more creative ways to mix, for example having one track completely reverbed out.

Sound Engines

Opal has four unique synthesizer engines that are focused on creating drum sounds, but has a wide palette, enabling any type of melodic sound creation as well.

Opal also has a dedicated FX track which features two effect engines with sequencer control.

Gem
FM

Mass
Modal

Dust
Pulsar

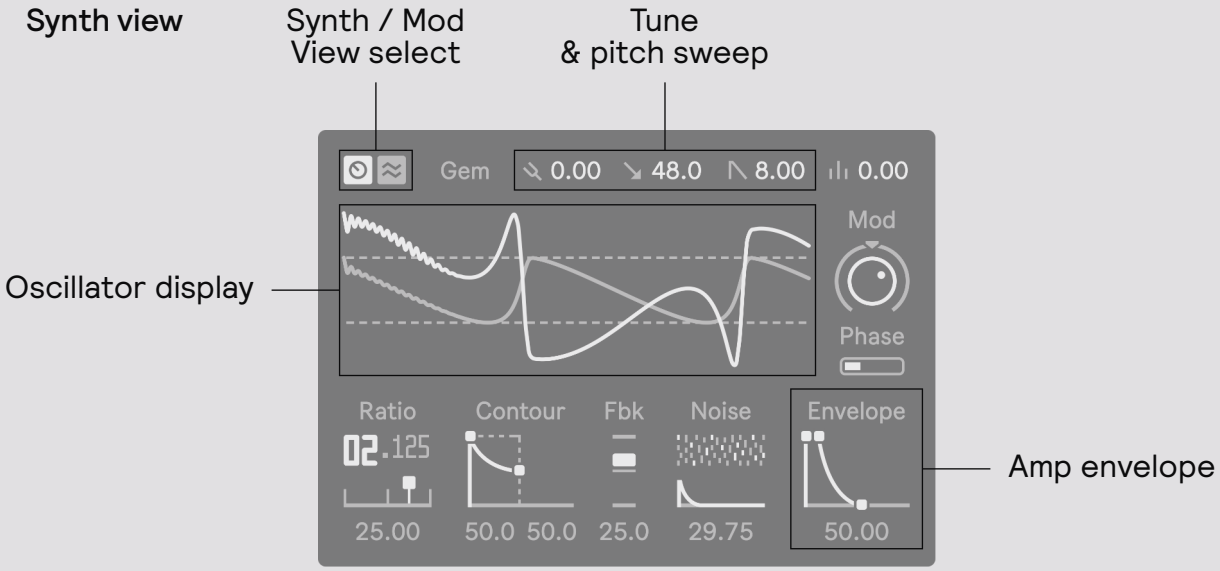
Slate
Granular

FX

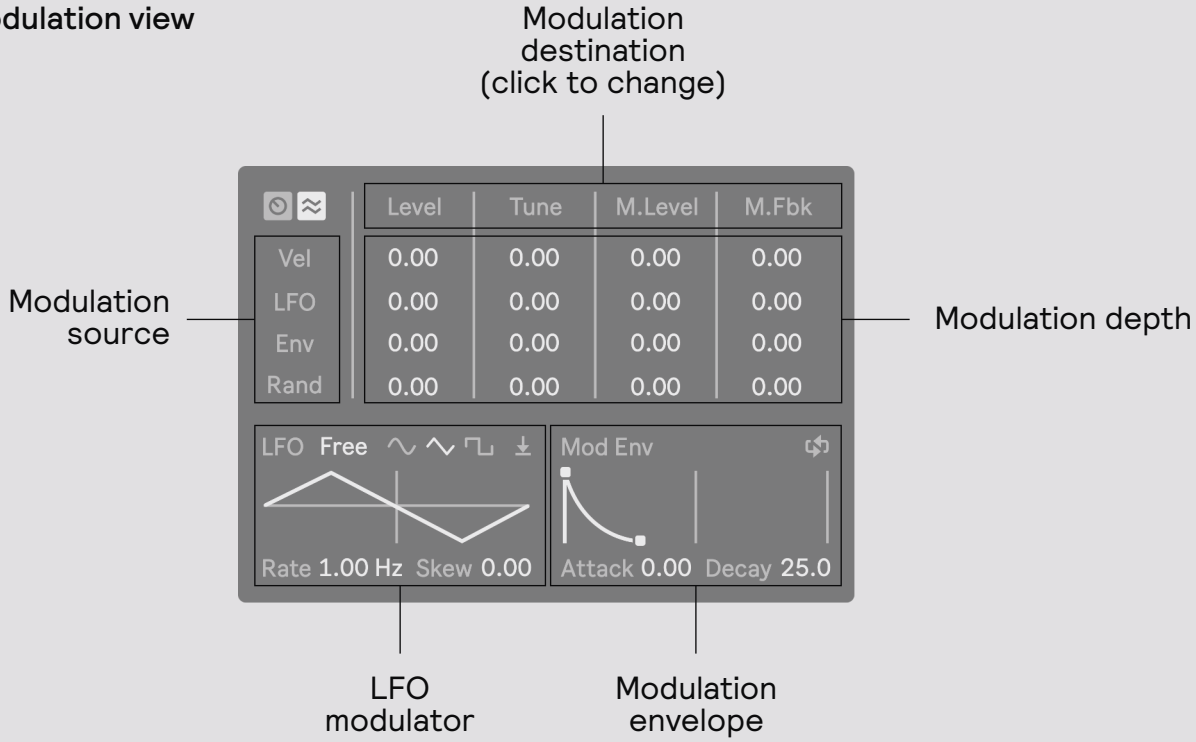
Sound Engines : Common Layout

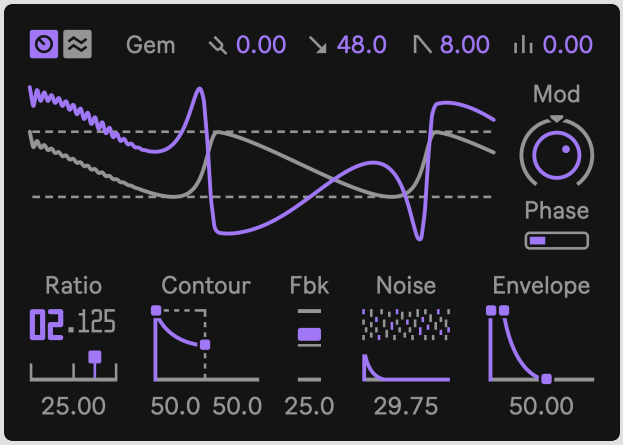
While the sound engines are all different, they share some common controls and layout. Each engine also has a dedicated modulation page where you can route different modulation sources to the parameters of the sound engine. To toggle between the views click the top-left view select button.

Synth view



Modulation view





Gem is an FM synthesizer capable of a wide variety of sounds, from deep and heavy bassdrums to glistening lead melodies. At its core, Gem consists of 2-Operator sinewave-based phase modulation (commonly referred to as FM) that has been fine-tuned to sound rich and punchy.

With bipolar modulation and feedback, it's possible make a vast range of different waveshapes- including common analog shapes such as square, triangle or sawtooth. It's a highly malleable form of synthesis that has been boiled down to its essentials, with an emphasis on the sheer quality of execution.

FM synthesis is the concept of introducing harmonic complexity by modulating the frequency (or for most digital FM synths, phase) of one oscillator (the carrier) with another (the modulator). By varying the modulation intensity, pitch and dynamics over time (using an envelope), the sound can change drastically and makes for a very sculptural approach to sound design.

The structure of Gem is very simple, it consists of one carrier (being modulated) oscillator and one modulator, with the addition of a dedicated noise source that is mixed into the modulation signal. While the setup itself is simple, the underlying sound engine has been carefully crafted to make the most out of these elements.

The display shows the Carrier oscillator in the accent color (here purple) with the modulating oscillator underneath in gray.

From left to right:

Tune sets a constant pitch offset of the track in semitones.
Sweep Amount controls the pitch sweep amount in semitones.
Sweep Time controls the time of the pitch sweep.
Unison Amount adds a voice above and below the fundamental.

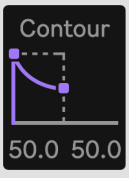
Mod controls the level of the modulating oscillator, and will as a result directly affect the timbre of the sound. The deeper the modulation, the more harmonics will be heard in the sound. This control is bipolar, meaning that the level can be either positive or negative, which opens up for slightly different timbral qualities to explore.

Phase controls the start-phase of the modulating oscillator. Each time a Gem voice is triggered, the phase of both oscillators is reset. This ensures a stable, repeating, timbre. By changing the start phase of the modulator it's possible to get different waveshapes and transients.

Ratio controls the relative frequency of the modulating oscillator and is essentially just a multiplication of the fundamental frequency - which in this case is the MIDI Note or step Note.

The coarse control (big number) controls the ratio in whole numbers, which will always result in a stable timbre, while the fine (small number) control adjusts the ratio in fractions. By using fine tune, you can introduce more inharmonicity and drifting in the timbre.

The slider controls the Drift of the ratio, which offsets the modulator in Hz, this is not relative to the fundamental frequency of the sound and can be used to add subtle variations in timbre that are consistent in speed regardless of the pitch of the sound.



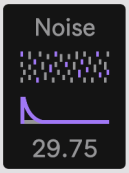
Contour is an envelope controlling the output of the modulating oscillator, which lets you change the timbre and dynamics over time. This envelope is an ADE envelope, which stands for Attack Decay End and is an envelope specifically developed for FM synthesis.

Attack controls the duration of the first stage of the envelope, which fades the sound in. Longer durations will cause the modulation to slowly increase while shorter will sound more immediate.

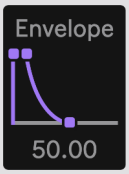
Decay/End controls the duration of the fade-out time of the envelope, from the end of the attack stage. The decay has an adjustable end-level, which means that the envelope can decay to values that are above zero. This is very useful for FM synthesis as it lets you control the level of modulation that is retained after the contour dynamics.

Feedback controls the amount of signal the modulating oscillator is sending back in to itself. This can result in a sharper sound, or at extreme settings very noisy and is useful for creating richer or harsher timbres with more overtones.

The feedback in Gem is bipolar and frequency compensated, meaning that it will stay consistent in shape across octaves and can be used to introduce different waveshapes depending on polarity. A positive feedback amount will result in a sawtooth-like shape while negative polarity will sound more like a squarewave.



Noise introduces a noise generator in the modulation signal and will affect both the carrier and modulator. The top control increases the noise amount while the bottom control increases the decay time of an internal envelope.

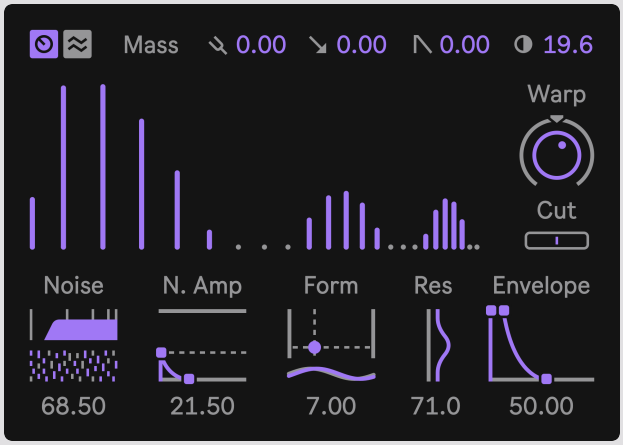


Amp Envelope is an Attack Hold Decay envelope which affects the output of the synthesizer voice and controls its dynamics over time.

Attack controls the duration of the fade-in stage of the envelope.

Hold controls the period between Attack and Decay, where the envelope will hold maximum value until it's time for the Decay.

Decay controls the duration of the final fade-out stage of the envelope.



Mass is a modal synthesizer, which is a type of physical modeling synthesis that employs a bank of bandpass filter to generate its sound. Typically, physical modeling is used to mimic real-world sounds, but with Mass the essence of the synthesis method is used to make all sorts of wildly synthetic sounds, often with an otherworldly quality due to its physically-inspired origins.

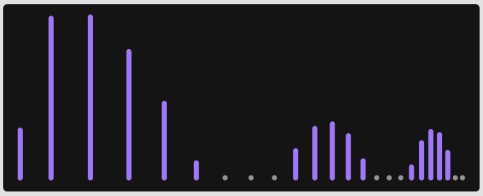
The sounds possible with Mass ranges from semi-realistic percussion, bells, textures, noises, strange phase-y melodic sounds to clean and precise timbres reminiscent of additive synthesis.

At its heart lies 24 resonant bandpass filters (partials) which amplitudes and frequency ratios are individually manipulated to create different kinds of timbres. By actuating the filter bank with an impulse generator, they emit a constant tone which can be dampened to decay in a natural-sounding fashion. By introducing noise into the actuation it can take the shape of many different kinds of percussion and textural sounds as well.

The display represents each partial, with its height being the amplitude and horizontal position its frequency ratio.

From left to right:

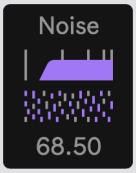
Tune sets a constant pitch offset of the track in semitones.
Sweep Amount controls the pitch sweep amount in semitones.
Sweep Time controls the time of the pitch sweep.
Tonal Tilt increases the slope of the partials, accentuating high frequencies.



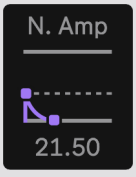
The main display controls **Spread**, the distance between the partials. By contracting or expanding the distance it's possible to make different kinds of inharmonic timbres. This can be very useful for metallic sounds like cymbals.

Warp is similar to spread (above), but instead changes the overall distribution curve of the partial frequencies, from linear to exponential and logarithmic. This can be used to slightly skew upper or lower partials or create all kinds of strange unnatural timbres.

Cut controls how many partials are active and can be used to reduce upper (positive values) or lower (negative values) partials. It smoothly attenuates the volume of each partial in order to reduce the definition in the sound.



Noise controls the tonality and texture of the noise generator. The top control adjusts a filter which can make the noise high- or low-passed, relative to the fundamental frequency of the sound. The bottom control adjusts the density of the noise, from full-spectrum white noise to a rougher, grainy noise.



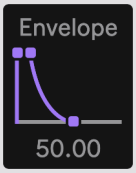
Noise Amp controls the level of the noise, as well as the duration of its internal Attack/Decay envelope. The noise level is controlled by changing the height of the Attack (first handle), with its maximum value resulting in using only noise as the actuation signal. The second handle controls the decay duration of the envelope.

Form controls the amplitudes of the partials and creates an adjustable comb-like pattern which can be used to create gaps and attenuation that results in different shapes and timbres. Moving the circle vertically will increase the depth of the pattern while the horizontal control will change the shape.

For example, if you move the circle to the top-right corner you will only hear every other partial which will result in a square-like sound. (given that there is no frequency deviation applied)

The bottom control adjusts the **Phase** of the pattern, which lets you discover different weights of attenuation across different partials.

Resonance controls the damping of the partials. At its maximum value, the timbre will have a more constant tone which doesn't get colored by attenuation over time. If lowered, you will start hearing a natural decay which will affect upper partials faster than lower ones. At very low values the partials will ring out very fast, creating more of a pluck-like sound. This can be useful for creating snare-like sounds, or textures by running noise through the filters in order to keep actuating them.

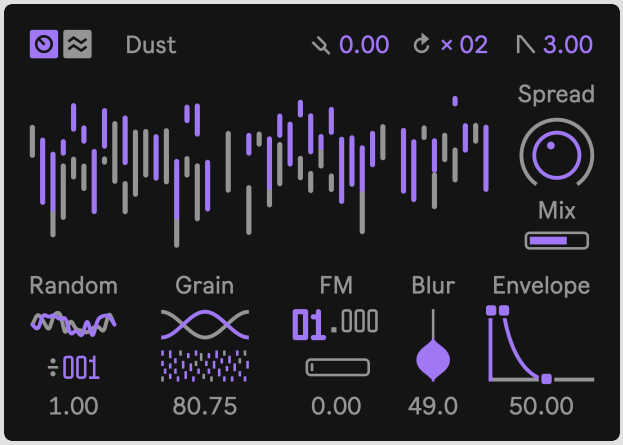


Amp Envelope is an Attack Hold Decay envelope which affects the output of the synthesizer voice and controls its dynamics over time.

Attack controls the duration of the fade-in stage of the envelope.

Hold controls the period between Attack and Decay, where the envelope will hold maximum value until it's time for the Decay.

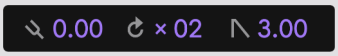
Decay controls the duration of the final fade-out stage of the envelope.



Dust is a noise generator that is based around the concept of Pulsar synthesis, which is a method adjacent to Granular synthesis. The sound is composed of very short particles of sounds that creates a texture when played fast and/or dense. By altering the speed and range of the particles it can be used to create all kinds of noises, but also tonal sounds as well.

Dust combines concepts from all kinds of different types of synthesis methods to create anything from pure white noise to perfectly soft spectral washes.
By layering multiple oscillators Dust can also generate classic electronic metal sounds which is very useful for making hi-hats and cymbals.

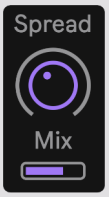
Instead of a pitch sweep, Dust has a ratcheting envelope which can be used to recreate clap-sounds and other types of ratcheting percussion.



From left to right:

Tune sets a constant pitch offset of the track in semitones.
Ratchet Count controls the number of times the ratchet envelope is repeated.
Ratchet Time controls the decay time of each ratchet.

The ratchet envelope can be used to make claps and other percussion sounds with a short, repeating bursts at the start of the sound. The ratcheting occurs before the Amp Envelope which will engage when the last ratchet has triggered.



Spread controls the detuning between a total of six pulsar oscillators and can be used to introduce a slight chorusing effect to wildly inharmonic detuning. Higher amounts can be very useful to make metallic-sounding timbres.

Mix controls the balance between the principal, single, pulsar oscillator in Dust and the detune group. Even if there is no spread applied, having the bank of oscillators mixed in can cause a chorusing effect due to the random pitch behavior of Dust.

Random controls the random pitch behavior of the oscillators. The top control sets the amount of random pitch modulation, and the bottom the rate.

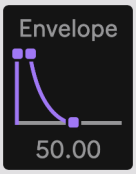
The rate is tied to the interval of each pulsar oscillator which also affects its temporal length. When the rate is set to 1 it will play as fast as the fundamental frequency, which means it will sound close to noise if the random amount is high. If you increase the rate the length of each grain will get extended and thus randomized less often, which will sound much more tonal.

Grain controls the pitch of each grain (top) and the density of playback (bottom). Essentially, this is windowed oscillator sync which can be used to make formant-like sounds, or introduce more high frequency content in a noisy sound.

A lower grain density will cause random interruptions in the pulsar train which can be used to introduce roughness into the sound.

FM lets you apply simple frequency modulation of each grain, this can be used to introduce more metallic or glassy timbres, or increase the harmonic intensity of each grain. The top controls the Coarse and Fine ratio, and the bottom slider controls the amount of modulation applied.

Blur is an effect that “smears” the sound, similar to that of a reverb but less dense. This can be used to smoothen a coarse sound, or introduce interesting temporal effects.

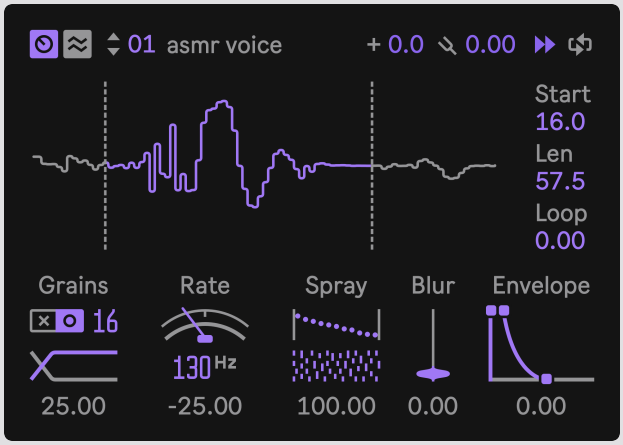


Amp Envelope is an Attack Hold Decay envelope which affects the output of the synthesizer voice and controls its dynamics over time.

Attack controls the duration of the fade-in stage of the envelope.

Hold controls the period between Attack and Decay, where the envelope will hold maximum value until it’s time for the Decay.

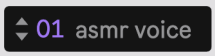
Decay controls the duration of the final fade-out stage of the envelope.



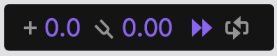
Slate is a sample playback engine equipped with a granular mode that can wildly transform any sample. At its core is a high quality sample playback engine with edge smoothing (click-less playback and looping), single cycle waveform support and a flexible loop mode.

The granular mode let's you go deeper in sound design by playing back small particles in a pattern that essentially reconstructs the original sound, but with the possibility to dramatically change the speed and pitch independently. By controlling the density and position of the grain playback, Slate can extend and alter a sample into a different, often uncanny, dimension. With per-grain diffusion, it's also possible to make smooth clouds of sound and reverb-like effects.

The two playback modes meet with the grain fade, a playback control that starts the sample in its original state which then gradually morphs into granules. This means that you can, for example, retain the transient hit of a drum sound while extending the body, or making it more textural.

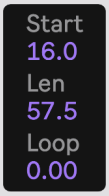


Slate has 16 slots of samples that are shared across all patterns in an Opal device. To load in a sample, simply drag and drop an audio file into the Slate window. The sample is then loaded in by referencing the location of the imported file on disk.



From left to right:

Gain controls the amount of post-gain applied to the sample.
Tune sets a constant pitch offset of the track in semitones.
Playback Direction can be set to play the sample forwards, backwards or ping-pong, meaning it will play the sample to the end and then change direction.
Loop Mode toggles looping playback.



Start sets the playback starting point of the sample.

Length sets the length of playback and is relative to the start point.

Loop Position sets the point in the sample where the loop will start, meaning that once the playback reaches the end and loop is activated, it will loop in the region between the loop position and length end.

Grains control the granular mode, with the toggle being used to turn the granular mode off, and the number next to it how many grains it should use. A higher amount of grains will result in smoother playback, but it can also be interesting to experiment with different settings since the amount of grains in combination with the other parameters will behave, and sound, slightly differently.

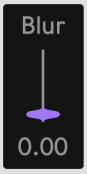
At the bottom is control of the Grain Fade envelope speed, which can be used to crossfade the granular playback (and some of its effects) in from the regular playback. This can be useful for retaining a transient quality in a percussion sample, or as an interesting effect.

Rate controls speed of the granular playback, which is independent from the pitch. At mid-point it will play back the sample in its original speed. Higher values will speed it up and lower values will speed it down, all the way to freezing the playback entirely.

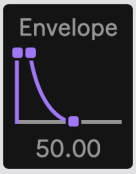
Hz (lower number) controls the size and therefore speed of the grains themselves. Higher values can be useful for stretching sounds out while retaining quality, and lower values can be interesting for creating more ambient transformations. Note that the number of grains used will have a big impact on the sound of this control, with more grains being better for higher values.

Spray introduces randomness in the granular playback. At the top you can control the amount of randomness in the sample playback order, which means that as the value increases each grain will be more likely to play back a snippet from somewhere else in the sample rather than the actual current position. This can be useful for creating interesting textures or scrambling the contents of a sample.

The lower control adjusts the density of the granular playback, meaning that at lower amounts there will be less of a chance that each grain triggers - which creates gaps in the playback.



Blur is an effect that applies diffusion to each grain, meaning that it introduces temporal smearing, or smoothing, of the sound. This can sometimes sound similar to a reverb and can be useful to make a sound more ambient or remove transients and other harsher qualities.

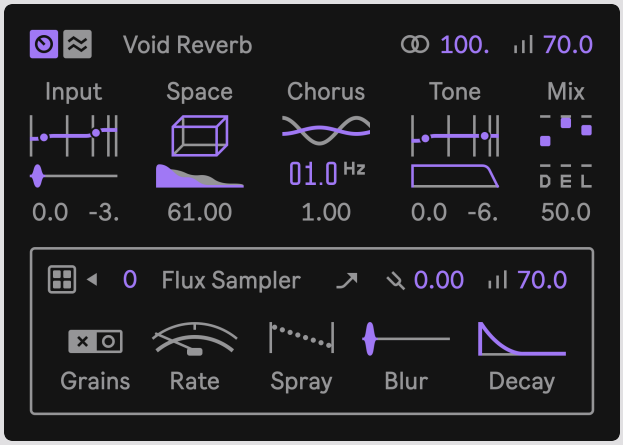


Amp Envelope is an Attack Hold Decay envelope which affects the output of the synthesizer voice and controls its dynamics over time.

Attack controls the duration of the fade-in stage of the envelope.

Hold controls the period between Attack and Decay, where the envelope will hold maximum value until it's time for the Decay.

Decay controls the duration of the final fade-out stage of the envelope.



The FX (effects) track hosts two different effect engines: **Void** and **Flux**.

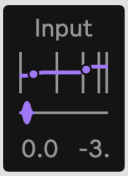
Void is a reverb that has been fine-tuned to sound great with a wide variety of input sounds, with an emphasis on delivering good transient response. Each stage of the reverb can be mixed differently to achieve the perfect balance between pre-diffusion, early reflections and the tail of the sound. With in-depth EQ:ing of the input and reverb signal, it's possible to greatly shape the overall tone of the effect, from dark ominous swashes to light and airy reflections.

Flux is an automatic sampler that continuously records the output of all the other tracks and divides it into 16 slices that can be played back by the FX track. Think of it like an always-recording tape loop that you can use to repeat or transform sections of your pattern by playing different snippets as single shot samples.

Flux can be used to build delays, stutters, glitches or to introduce organic variation in a pattern. With its granular capabilities, each slice can be stretched and pitched in ways that can bring exciting transformations to a pattern.

From left to right:

Width controls the stereo width.
Level controls the volume of the effect.



Input controls the EQ and diffusion of the input signal. At the top is a low- and high-shelf EQ which can reduce or increase the low and/or high frequencies of the input sound. This is useful to, for example, roll of bass frequencies that causes the reverb to sound too boomy or accentuate high frequencies for a more intense coloration.

The bottom control adjusts the amount of diffusion of the input sound and will make it sound more or less defined. At high settings it will become more of an effect of its own, creating a sort of blurred effect.

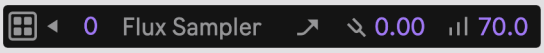
Space controls the size and duration of the reverb, with the top control adjusting the size of the reverb and the bottom adjusting the reverb decay. By using different combinations of these settings it's possible to design different kinds of small or large spaces.

Chorus controls the amount of temporal modulation in the reverb, which is essentially a random modulator that causes a sort of chorusing effect at certain settings. The top control adjusts the depth while the bottom changes the frequency of modulation.

Tone controls the coloration of the reverb itself. The top control is the same as the input EQ, but instead affects the effect loop. Reducing high or low frequencies can, with longer durations, create more tonal and defined washes of space.

The lower control adjusts the dampening of the early reflections, which can make the initial hit sound darker as well as the late signal receiving a less bright signal.

Mix controls the balance of each part of the reverb. D controls the Diffuse input signal, E controls the Early Reflections level and L controls the level of the Late "tail" of the reverb. Mixing each part differently lets you put emphasis on what quality of the reverb is most important.

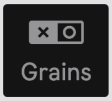


From left to right:

Grain Oct when enabled, randomly transposes the pitch an octave up in Grain mode, for a sort of shimmering effect.

Slice selects which slice is being used as the default slice when a step is placed. A value of zero results in no slice being played back.

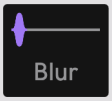
Tune sets a constant pitch offset of the track in semitones.
Level controls the volume of the effect.



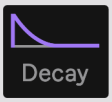
Grains toggles between granular playback being on or off.

Rate controls the speed of playback, if granular playback is on.

Spray controls the amount of randomness in the granular playback, higher values will cause the playback to jump randomly in the sample



Blur adjusts the amount of diffusion of the slice playback, which can create a smeared effect similar to that of a short reverb.



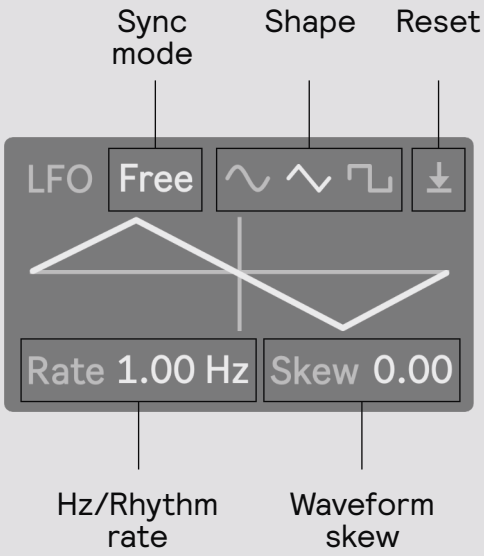
Decay controls the fade-out duration of slice amplitude envelope .

Each engine has a dedicated modulation page which offers four different modulation sources that can be routed to any parameter via a modulation matrix.

The different sources are Vel - velocity received from the sequencer steps (or a MIDI note), A dedicated LFO and Envelope per track, and a random value (Rand) that is received on each trigger of a step or MIDI note.

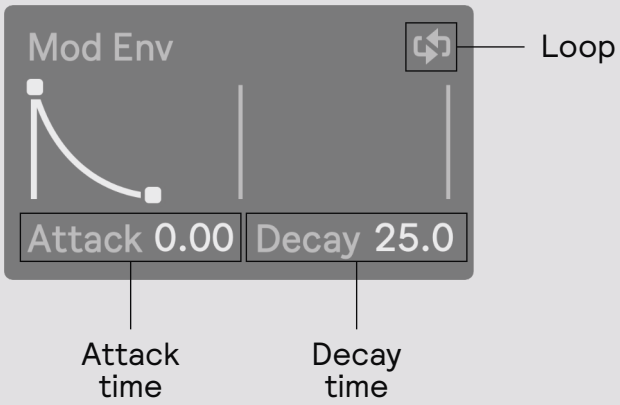
At the top of the modulation page you can select different destinations by clicking on the top labels. Each column represents the amount of modulation sent to that destination from the sources on the left. This means that each modulation source can be sent to four different destinations at once.

By clicking on the source label, for example “Vel”, you can parameter lock the source depth in the Opal sequencer. This is useful to vary the level of modulation from each source per step.



Sync Mode selects if the frequency of the LFO is set in Hz or as a rhythmic value, which is synced to the tempo of the Live Set.
Shape selects between different waveforms of the LFO, Sine, Triangle and Pulse
Reset toggles the phase of the LFO being reset by an incoming step/MIDI note
Rate controls the speed of the LFO, in either Hz or rhythmic values such as 1/16

Waveform Skew controls the waveshape of the LFO which behaves slightly differently based on the selected waveform. The sine will be compressed forward or backwards, the triangle will change its width which can be used to create a sawtooth shape and lastly the pulse's width will become more or less narrow.



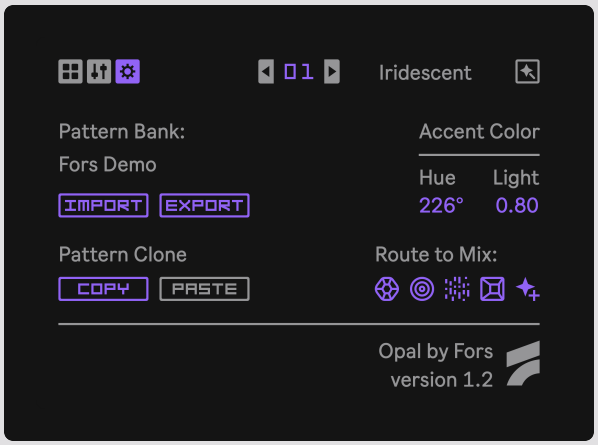
Loop toggles the envelope to loop once it reaches the end of the decay stage
Attack controls the duration of the attack (fade-in) stage of the envelope
Decay controls the duration of the decay (fade-out) stage of the envelope

Standalone Devices

Each of the sound engines (except for Flux) also comes as its own Max for Live device, triggered by MIDI notes with fully automatable parameters.

This lets you use all the engines like any instrument in Live, running multiples of the same voice on several tracks, stacking different voices and sequencing them via the piano roll or any other sequencer that might bring something else out.

Settings



Import & Export

It's possible to export the current pattern bank as JSON data by using the Export functionality. This saves all the patterns and sounds in a single file which can be edited in a text editor, distributed to a friend or as a backup method.

Pattern Clone

Patterns can be copied and pasted from one slot to another. To copy a pattern, press the Copy button while the pattern you want to copy is the active pattern. The Paste button will then light up, allowing you to paste the copied pattern, which will overwrite whichever slot is active.

Accent Color

Each instance of Opal can have an individual color based on the theme in Live. To change the color, change the Hue shift (0 degrees being the original hue) and Lightness controls.

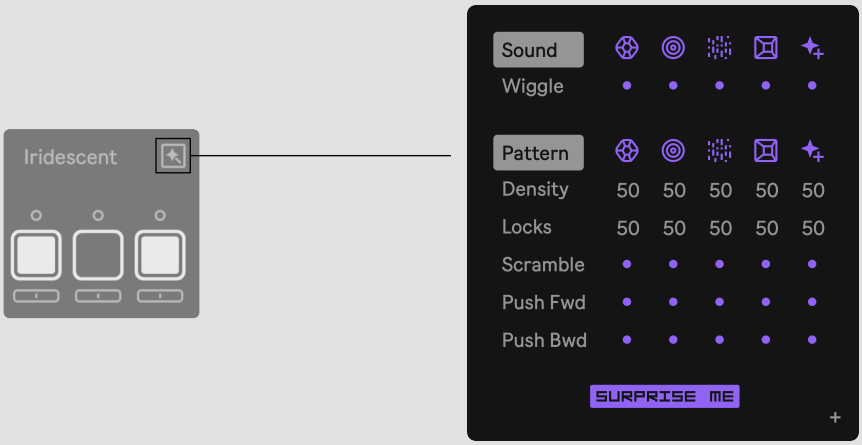
The accent of the standalone devices can be changed as well if you edit or create a JSON file like this named color.json in the same directory of the devices.

```
{
    "hue" : 0,
    "lightness" : 0
}
```
color.json

Route to Mix

When using the individual outputs of Opal, it's possible to select which outputs are routed to the internal mixer or not. When a track is disabled (grey) it will be routed only through the individual output at the pre-fader-level.

Randomizer



The randomizer in Opal lets you generate new sounds and sequences, wiggle the controls, scramble your patterns, shuffle things around or let Opal create an entirely new pattern for you.

By pressing any of the track icons, a new random sound or sequence will be created on that track.

Sound Wiggle

Pressing the wiggle button beneath a track will “wiggle” that track’s parameters to create a random variation of the sound. The more times you press the more the sound will deviate from the original.

Pattern Density & Locks

This controls how densely populated with active steps each track is when a sequence is randomly generated. A low density value will result in less steps being placed. Locks controls the chance of a random parameter lock being added to the step.

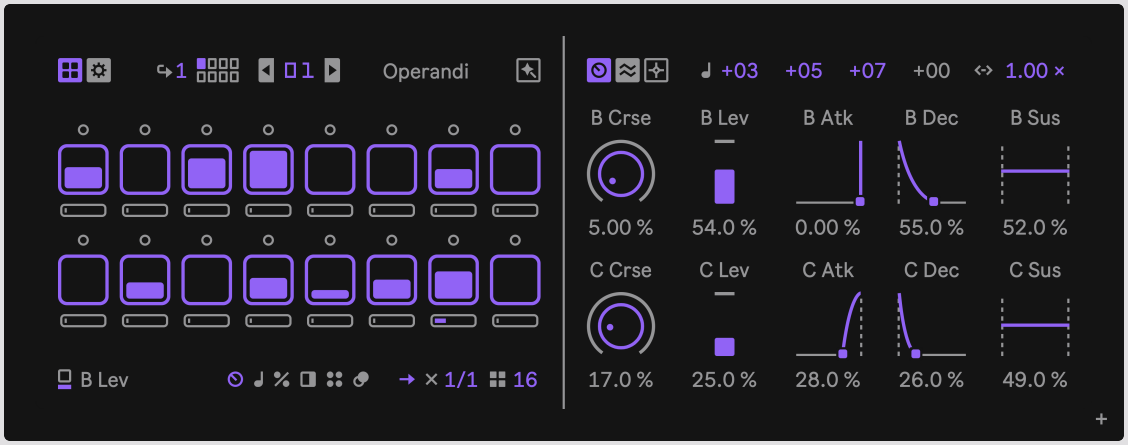
Scramble & Push

Scramble takes the track’s sequence and shuffles its order in a completely random manner. Push Fwd/Bwd will move the sequence forwards or backwards, which is useful to change where the sequence starts and to align the different tracks to your liking.

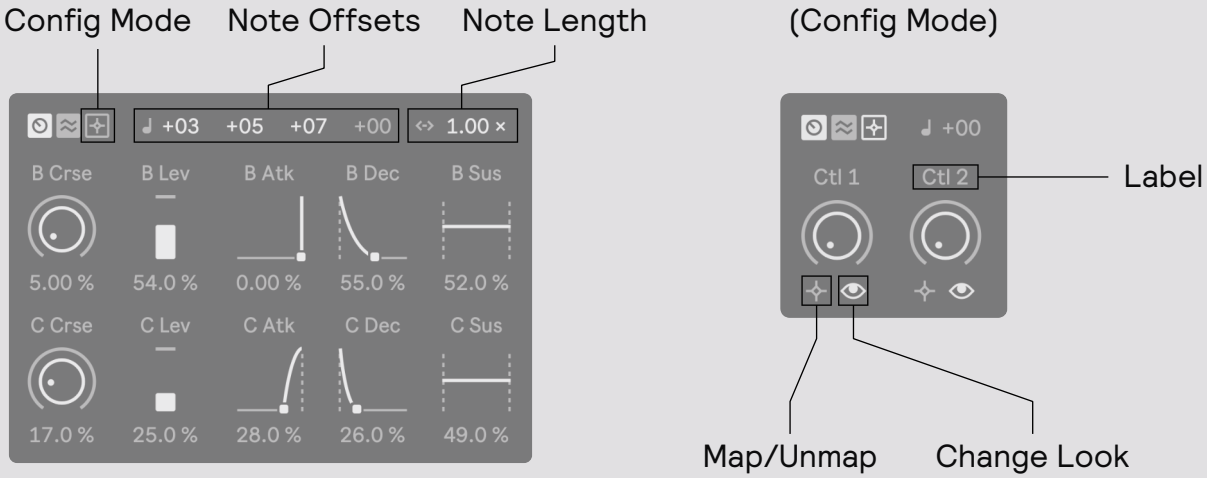
Surprise Me

Let Opal make a completely new random pattern for you.

Opal-Ctl



Opal-Ctl is the MIDI/Control version of Opal and lets you sequence and modulate other devices in Ableton Live. Opal-Ctl has the exact same feature set as the main device but instead has a single track with 10 customizable controls that can be mapped to other instruments and effects.



Entering Config Mode lets you map each control to an external device. To do this, press the Map button which will start blinking to indicate that it is armed for mapping. Next press the control that you would like to map – note that with the pop-out version you might need to press twice in order to move focus.

When mapped, the control's label will update automatically. You can also rename the label by clicking on it and typing. It is also possible to change the look of the control by pressing the eye-icon, this lets you select between a few different kinds of interface controls such as sliders, dials, toggles, envelope stages and filter types. To unmap, press the 'X' icon of a mapped control.

With the Note Offsets and Note Length you can send chords (by entering an offset below or above zero) and control the length of the output note. The length is always a multiple of a 1/16th note.

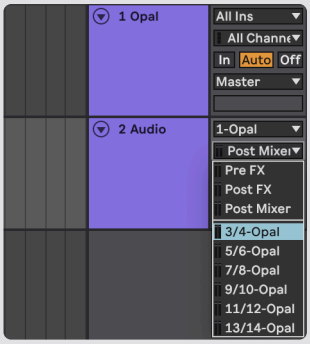
Individual Outputs

The main Opal device will output each of its track on a separate output which you can route to another track in Live for further processing.

An example of how to do this is to create a new Audio Track and select one of the Opal outputs as its input.

Outputs 3 / 4 through 13 / 14 correspond to each of the engines in Opal. Note that Flux and Void have their own outputs as well.

On the Config View it's possible to set whether the track's are only sent to the individual output, at pre-fader label which is useful if you want to work with external mixing, automation and effects.

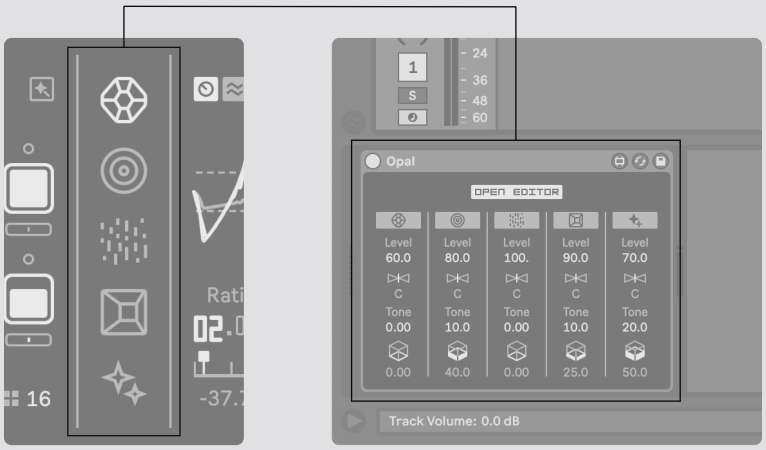


Saving Presets

The sound of a track can be saved by clicking on its icon (track selector) while holding down Cmd (Mac) or Ctrl (Win) - a file dialog will then open prompting you to choose where the preset file should be saved. It's recommended to name your saved preset file after the track type, for example "Gem Soft Chirp".

To load a preset file, drop it in the track-selector area on Opal-rack or the Mixer rack-window on the pop-out version, as seen below.

Note that this is a different format than the standard Live preset and is incompatible with the standalone devices.



Mapping & Push Compatibility

Modulation Mapping

The main Opal device has limited mapping options due to its inherent complex structure, parameter locking functionality and preset system. It is for example not possible to use external modulators to affect the different synth parameters in Opal. This is essentially a trade-off for having the sequencer's deep functionality.

It is however possible to use the standalone devices for this kind of mapping. Note that you map to the number values below each parameter in order to connect for example an LFO to the internal controls.

The main Opal device is not controllable with a Push 2

The reason for this is simple; the tools available to Max for Live developers do not allow for the level of control necessary. Similar to how modulation mapping works, it's also not possible to access the various synthesizer controls via a Push 2. This is again due to a limitation in tandem with how the sequencer has full control over all parameters.

The standalone devices are all however fully mapped to the Push 2 controls like expected.

That’s Opal.

We hope that this instrument inspires while bringing you many hours of music creation.

Design & Development
Ess Mattisson

Additional design
Felisha Ledesma

Additional development
Alexander Droste

Fors

2023

hi@fors.fm