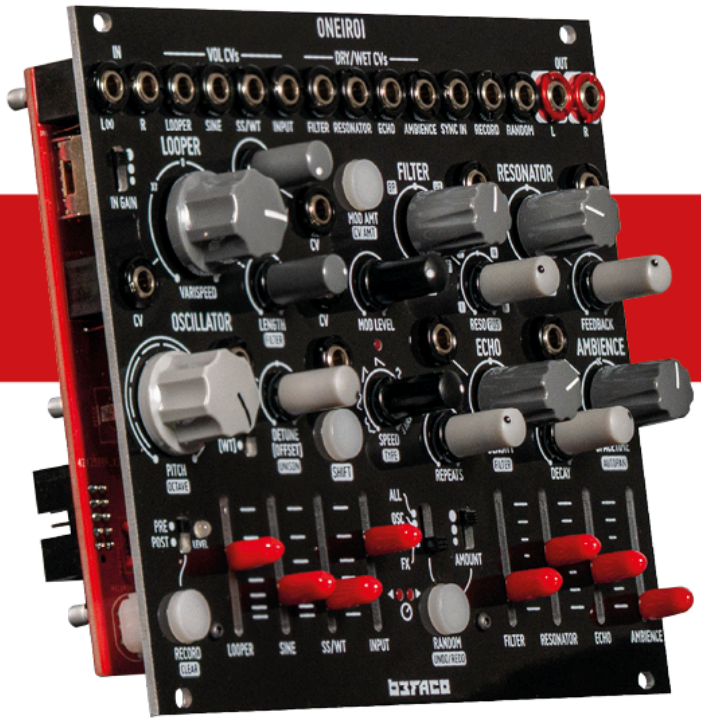


# ONEIROI
## USER MANUAL

The user manual was last updated on March 3, 2025.

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# 1 Intro

According to Greek mythology, the *Oneiroi* are dark-winged creatures that emerge from their cave each night to deliver dreams and nightmares. With this module, we've created a more practical way for you to receive their messages, even when awake.

# 2 What is Oneiroi?

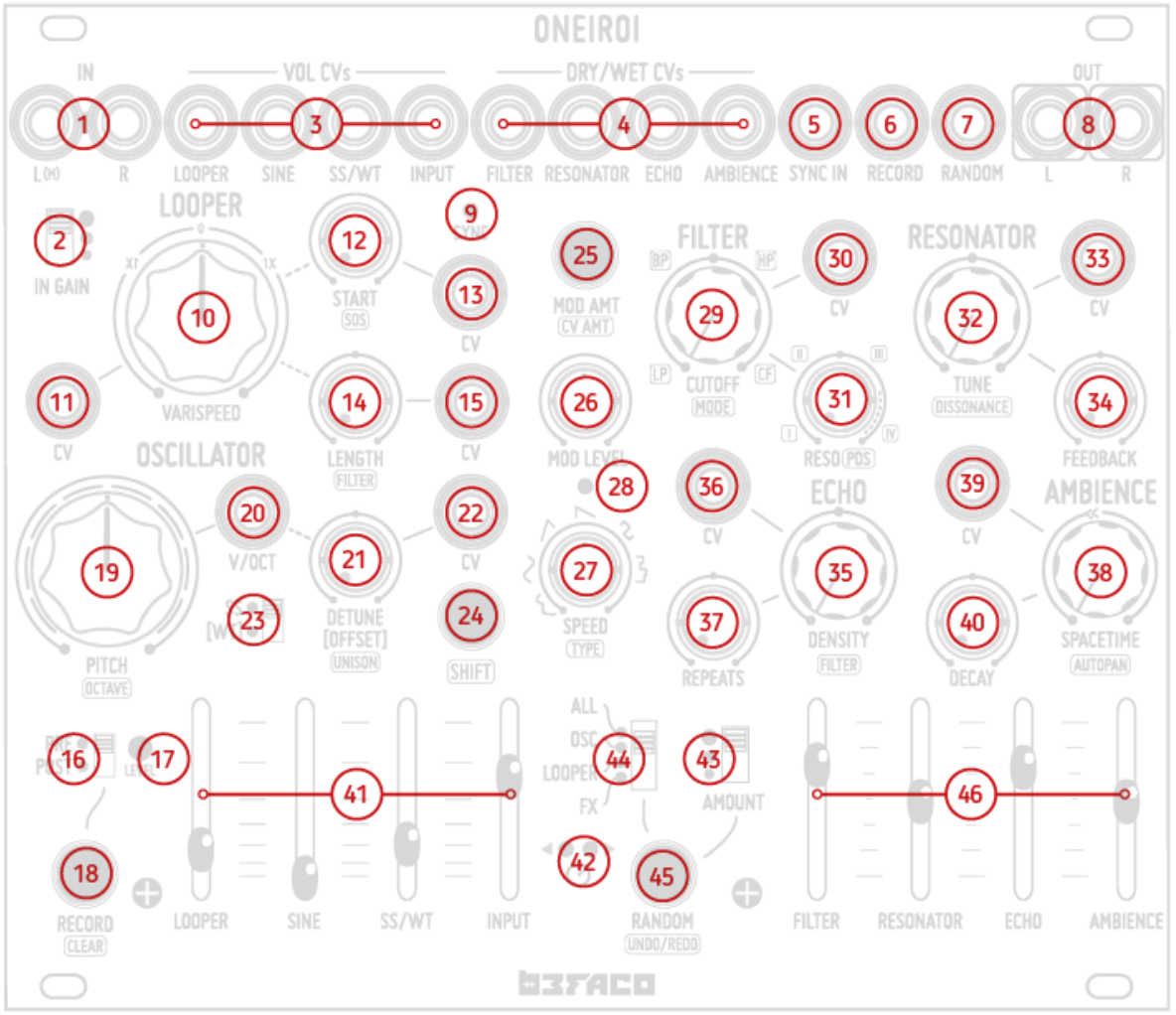
Oneiroi is an experimental synthesizer designed to create ambient pads and drone-like soundscapes. It has a full stereo signal path, 3 oscillators (2 of which are mutually exclusive), 4 effects, and a looper. It also includes self-modulation and a randomizer. Oneiroi is built on Rebel Technology's OWL platform.

# 3 Features

- Powered by the latest OWL revision (mk3), with 24-bit 48 kHz stereo audio (32-bit internal processing)
- Stereo input with three gain levels and a two-colored LED peak meter.
- Stereo output
- 5-second looper with continuous speed control (from 2x in reverse direction to 2x in forward direction)
- Stereo Sine oscillator
- Stereo Supersaw oscillator with detune control, inspired by the JP-8000
- 2048-sample dynamic wavetable oscillator (aliased) that uses the looper buffer, with offset control
- Single V/Oct input for the three oscillators and unison control
- Multimode Stereo filter: low-pass, band-pass, high-pass, and comb filter. The filter can be freely positioned along the effects chain
- 3-band resonator with tune and feedback controls
- A 2-tap echo with controls over time and density
- Reverb with macro control for size, filtering, and direction
- Mixer Section with eight faders for controlling volumes (exponential) and effects amount (constant power), with relative CV inputs
- CV controls for all the primary parameters, four of them can be dynamically assigned to the secondary ones as well
- Record either the stereo input or the module's output
- Various types of self-modulation with configurable routing and control over level and speed

- External synchronization via sync input (supported clock speed from 30 BPM to 300 BPM)
- Powerful randomizer with four different targets, three levels of intensity and undo/redo
- Soft take-over functionality for re-coupling parameters' positions and values after randomization, with LEDs showing where the value is in relation to the position of the control

# 4 Front Panel controls




1. Stereo input. The left channel normals to the right channel
2. Input gain switch
3. Volume CVs. It is affecting the levels of the four signal sources. Range 0 to 10V
4. Dry/wet CVs. It is affecting the four effect units. Range 0 to 10V

5. Sync in. Synchronizes the LFO and Delay time to an external source, and reset the looper to the start point. Accept triggers of a minimum of 1V
6. Record IN. Gate Input for recording. Start recording at a high level (>1V) and stop recording at a low level (0V)
7. Random IN. Randomize the parameters when high (>1V)
8. Stereo output. Eurorack level. The left channel normals to the right channel
9. Sync LED. Will light up when a positive voltage is received at the sync trigger input [5]
10. Looper playback Speed
11. Looper playback speed CV. Range -5V to 10V
12. Looper start position
13. Looper start position CV. Range -5V to 10V
14. Looper loop length
15. Looper loop length CV. Range -5V to 10V
16. Pre/post recording selector
17. Audio level Peak Meter shows the signal level in green for either the input or internal system signal, depending on the Pre-Post Recording selector (16). It lights up red when the signal is clipping
18. Record button
19. Pitch control. For the sine oscillator and the supersaw/wavetable
20. V/Oct input. Range 0V to 10V
21. Detune/offset. Controls either the supersaw detuning or the wavetable offset depending on the position of the Oscillator Mode Switch [20]
22. Detune/offset CV. Range -5V to 10V
23. Oscillator Mode Switch. Supersaw (up position) or wavetable (down position) selector
24. Shift button. For accessing secondary functions, marked on the front panel with inverted graphics like for example AUTOPAN
25. Modulation/CV Amount button. Access a secondary function of the knobs controlling the amount of internal Modulation and external CVs levels
26. Modulation Level. Master control for the intensity of the modulation
27. Modulation frequency
28. Modulation LED. Modulation voltage, visual indicator
29. Filter cutoff
30. Filter cutoff CV. Range -5V to 10V
31. Filter resonance
32. Resonator tune
33. Resonator tune CV. Range -5V to 10V
34. Resonator feedback
35. Echo density. Delay time control for the echo effect
36. Echo density CV. Range -5V to 10V
37. Echo repeats. Feedback control for the echo effect
38. Ambience spacetime. Macro control for size, filtering, and direction of the reverb
39. Ambience spacetime CV. Range -5V to 10V
40. Ambience decay

41. Volume faders. Manual controls for the four audio sources. When their equivalent CV input jacks are used (see number 3), they become attenuators of the incoming CV
42. Catch-up LEDs. While in “Catch Up” knob behavior (see Chapter 5), they indicate in which direction the potentiometers must be turned to match them with the real value of that parameter
    They also indicate key points of some parameters like pitch and Looper speed
43. Randomization amount
44. Randomization target
45. Randomize button
46. Dry/Wet faders: Manual controls for the Dry/Wet of the four FX processors. With their equivalent CV input jacks used (see number 4), they become attenuators of the incoming CV

# 5 Structure

The Oneiroi audio engine consists of two main components: sources and effects.
The available sources are:

- Sine oscillator
- Supersaw oscillator/wavetable oscillator (mutually exclusive)
- Looper
- External input (recorded when in PRE mode)
- Resample output (only for recording in POST mode)

The sine oscillator and the supersaw-wavetable combo share the same pitch control but have two separate volume controls.
External input and resample output are mutually exclusive when recording, but the external input has volume control and can be sent directly to the effects.

The effects units are:

- Filter
- Resonator
- Echo
- Ambience

The effects are connected in series. Each fader controls the dry/wet ratio of a specific effect in the signal path. When a fader is at its lowest position, the signal passes on to the next unit unaffected.
The filter is the only unit that can be moved to any position along the effects chain.

# 6 Shift button

This button is used to access secondary parameters (identified on the panel by labels with a white background).

There are two different ways of using the shift button:

- Momentary: Hold the Shift button at the same time as the chosen parameter is changed. It will deactivate at button release.
- Toggle: A single press of the button, without holding, toggles the Shift function on and off

If the SHIFT button light is ON, the labels with a white background will prevail.
Parameters with only one label will ignore this button.
All changes made on the SHIFT page must be saved to persist after a power cycle. (See Chapter 4.3)

# 7 Mod/CV amount button

This button is used for two things:

1. To access the modulation mapping. (see section “Modulation” below) The button will blink RED to indicate the modulation mapping page.
2. To access the CV mapping of the 9 primary CVs. ( see section “CVs” below). The button will Blink Green to indicate the CV mapping page.

Additionally, this button is used for saving the current state of the module. (see next chapter)

# 8 Manual Saving

When using Oneiroi, there are instances where the position of the manual controls does not match the actual parameter value. In these cases, it is important to perform the SAVE operation to ensure that all parameters maintain their state after power cycling.

To perform SAVE, Hold the MOD AMT Button for two seconds. The Buton's LED will blink to indicate that the saving operation has been performed.
Buffer content is not saved by the SAVE operation, so it is not retained between power cycles.

# 9 Synchronization

The SYNC IN input allows for synchronizing Oneiroi with an external source. The module needs a couple of seconds to align to the external sync and at the same time to go back to internal sync when the external is removed.
When no external source is connected, the module uses an internal clock frequency of ~0.2 Hz derived from the looper's buffer. The SYNC LED lights up accordingly.

Regardless of whether it's internal or external, the synchronization is used for:

- Retriggering the looper
- Clocking the internal modulation
- Synchronizing the echo time and the ambience's auto-pan

It is advisable to use a clock with a trigger per bar or less, such as a trigger every four bars or so, as the same clock is used for these three different tasks, including resetting the looper.

# 10 Sound Sources

## 10.1 Input

The input allows external sound sources to be processed through the Oneiroy.
The module has a stereo input whose signal goes simultaneously to the looper and The effects chain.
If only one cable is connected to the stereo input's "L(M)" connector, the signal will be split to both L and R channels, allowing them to be processed by the stereo signal path.
The input gain can be changed with the switch:

- the top position offers the greatest gain. It allows the connection of high-impedance sources like contact microphones,
- the middle position is perfect for line-level sources
- The bottom position is suited for connecting the output of other Eurorack modules.

The INPUT fader controls the input level that goes directly to the effects chain.

## 10.2 Looper

This unit can be used for recording and playing back approximately five seconds of either
the audio coming from the stereo input (PRE) or the audio sent to the module's output (POST), depending on the position of the PRE/POST switch.
The bi-color LED monitors the signal level coming from the stereo input when the
The PRE/POST switch is set to PRE, or the signal level is sent to the output when set to POST.
The LED turns red when the signal is clipping.

The VARISPEED knob controls both the direction and the playback speed, from 2x in the reverse direction at 0% to 2x in the forward direction at 100%. The playback can never be stopped unless the VARISPEED knob is at 12:00 where the looper is stalled. There are virtual
detents at -1x, 0 and 1x.

When a pulse is received at SYNC IN, the looper restarts at the point specified by START.

Recording is activated/deactivated using either the RECORD button or the RECORD input. The button's LED lights up accordingly.
The RECORD button can be operated in two ways:

- **Toggle.** A single press of the button, without holding, toggles the recording on and off
- **Momentary.** Holding the button pressed allows for recording until the button is released (holding the button while the looper is recording pauses the operation until released).

The RECORD Gate IN activates recording only when receiving a high signal. The RECORD button blinks when using the SHIFT or MOD/CV button during recording.

The buffer is prefilled with white noise by default, so the looper channel can be useful without the need to record anything.
The buffer content can be cleared by holding the SHIFT button and pressing the RECORD button.

**Sound-on-sound keeps previously recorded sound while recording new sound on top. The SOS knob adjusts the level of old material that is preserved with every loop.**

SOS level can be set by holding the SHIFT button and turning the START knob:
At 0% the old material is constantly replaced, and in between it fades away progressively slower and at 100% it never fades away. During recording, the SOS

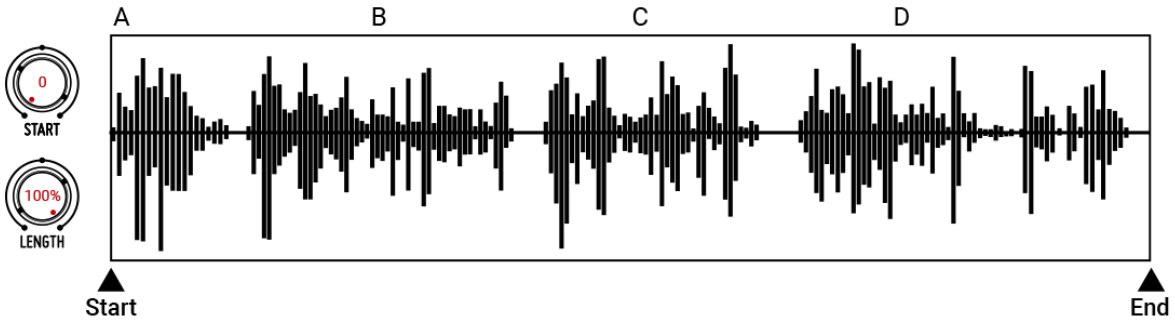
is processed through a DJ-style filter whose response can be changed by holding the SHIFT button and turning the LENGTH knob: at noon no filter is applied, going clockwise an HPF is applied, going counter-clockwise, an LPF is applied.

### 10.2.1 Length and Start Knobs

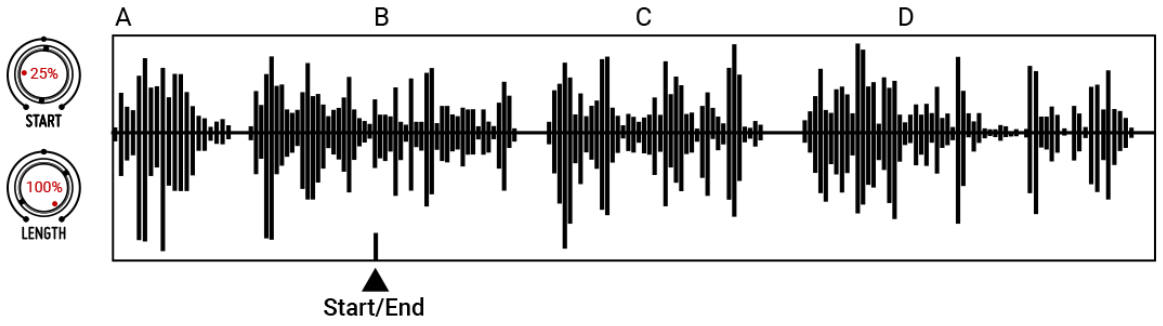
The LENGTH knob changes the size of the loop, with an exponential curve, from ~8 ms at 0% up to the full length at 100%.
The START knob allows you to pick the starting point of the loop.
At the minimum loop length, the unit acts as an oscillator whose note is C3 at +/-1x, C2 at +/-0.5x, and C4 at +/-2x speed.
**Note:** This will not work at v/oct.

**Some examples of Start and Length settings:**

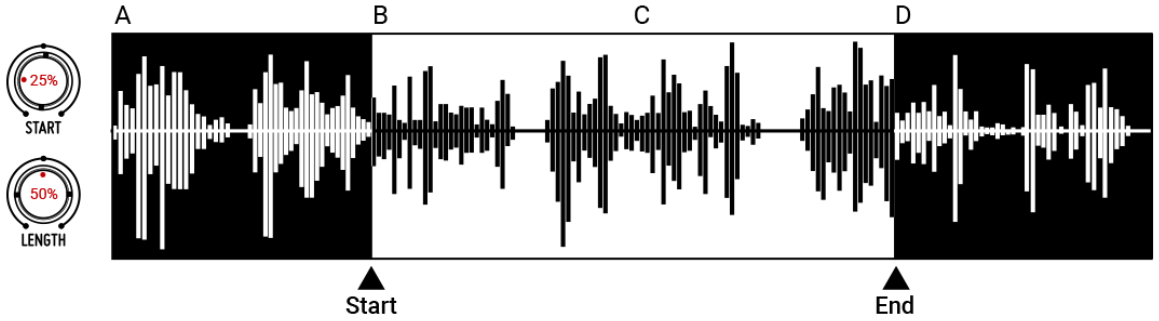
There are 4 examples, all with a buffer filled with the recording of a voice that spells "A… B... C... D...". For simplicity, the letters are equally distributed in the buffer, and each one starts exactly at every quarter of the buffer.



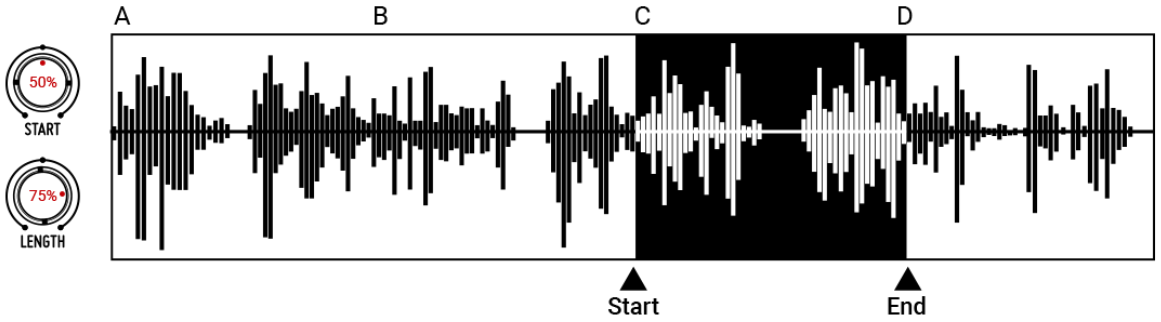

With START = 0 and LENGTH = 100%, the buffer is reproduced fully, and the audio loops as "A... B... C... D...".



With START = 25% and LENGTH = 100% the buffer is still reproduced fully but starts at "B", the audio loops as "B... C... D... A...".
The effect is the same as in the previous scenario, you simply can't tell where the loop starts unless you trigger it externally.




With START = 25% and LENGTH = 50%, the audio loops as "B... C...".
Now the loop starts at "B".
The shading represents the part of the buffer that is being excluded




With START = 50% and LENGTH = 75%, the audio loops as "C... D... A...".
The shading represents the part of the buffer that is being excluded

## 10.3 Oscillators

The module provides three stereo oscillators: one simple sine, one supersaw (inspired by the *Roland* JP-8000), and a wavetable. While the sine oscillator can be used alone, the other two are mutually exclusive and can be selected with the relative switch. Depending on which one is selected, the DETUNE knob controls either the detuning of the 7 saws of the supersaw or the selection of one of the 32 wavetables dynamically extracted from the looper buffer.
The full pitch range of the oscillators is 8 octaves, from C0 to C7. The PITCH control is centered on C and spans 6 semitones on either side. The current octave can be selected by holding the SHIFT button and turning the PITCH knob.
The v/oct input is common for the three oscillators, is summed to the PITCH knob,

and tracks 10 octaves on the 0-volt to 10-volt range. The frequency is clipped if outside the supported range.
Holding the SHIFT button and turning the DETUNE knob allows for altering the interval between the oscillators: the frequency of one of the two sine waves and that of both the supersaw and the wavetable oscillators are lowered one octave down at 0% and raised one octave at 100% (default is 50%, unison).

# 11 Effect units

## 11.1 Filter

This unit is either a 2-pole multimode filter that can be switched between low-pass, band-pass, and high-pass filtering, or a comb filter. The type can be selected by holding the SHIFT button and turning the CUTOFF knob. When the unit is used as a multimode filter, the CUTOFF knob controls the filter frequency cutoff (approximately from 10Hz to 22kHz), while when used as a comb filter the knob controls the position of the notches.
This filter has a unique feature - a chaotic noise generator that activates when the RESONANCE knob goes past 75%. The output of the noise generator is then combined with the input and filtered. Even when no input is provided, the noise is audible.

The filter can be placed at one of the four possible positions in the effects chain by holding the SHIFT button and turning the RESO knob:

- **I** At the beginning of the chain
- **II** Between the resonator and the echo
- **III** Between the echo and the ambience unit
- **IV** At the end of the chain

## 11.2 Resonator

The resonator unit consists of three separate instances of a stereo comb filter, each tuned to related frequency bands. Turning the TUNE knob changes the base frequency of the instances using three different ratios. The FEEDBACK knob generates sustained resonance and, at 100%, causes the unit to self-oscillate.SHIFT button and turning the TUNE knob, the resonance can be made more
dissonant (default is 0%).

## 11.3 Echo

This effect unit is based on a 2-tap ping-pong delay whose time ranges from 10 ms to 4 seconds using the DENSITY knob. The REPEATS knob allows you to repeat the delayed sound from one time at 0% to infinite at 100%.

When a clock is received at the SYNC IN, the DENSITY knob becomes a divider.

By holding the SHIFT button and turning the DENSITY knob it is possible to process the echo through a DJ-style filter: at noon, no filter is applied, going clockwise, an HPF is applied, going counter-clockwise, an LPF is applied.

## 11.4 Ambience

The Ambience processor is loosely based on a Schroeder reverberator.
It has a unique macro control called SPACETIME knob, which allows you to adjust size, filtering, and direction. At 50%, you get the smallest size and brightest tone, and at 0% or 100%, you get the biggest size and darkest tone.
If you set the value to less than 50%, the input signal will be reversed. The DECAY knob controls how long the tail will take to fade out.
This unit is provided with an auto-panner synchronized with either the external sync input or with the frequency of one looper cycle.
By holding the SHIFT button and changing the SPACETIME knob, it is possible to change the amount and the
frequency's division/multiplication at the same time: At 0% no auto-pan, at 100% full auto-pan at 8x the base frequency, in between there are 16 different ratios (default is 50%).

# 12 Modulation

This unit provides several types of modulation sources that can be mapped to all the parameters with knobs (except the ones on the modulation itself).
The modulation type can be selected by holding the SHIFT button and turning the SPEED knob (the types morph smoothly from one to the other).

There are 7 types of modulation that you can choose from:

- Chaos
- Sine LFO
- Ramp LFO
- Sawtooth LFO
- Square LFO
- Sample & Hold
- Envelope Follower

The amount of modulation can be changed with the MOD LEVEL knob. This control is a “modulation master” that prevails over all modulation mappings.

The Envelope Follower is placed just before the looper so that it can follow either the module’s input or output depending on the position of the PRE/POST switch.

The SPEED knob allows to slow the base frequency of the modulation down to 1/16 times or to speed it up to 16 times with common time divisions and multiplications.
When unsynced, the base frequency is calculated on the looper buffer length and is ~0.2Hz, so in this case the SPEED ranges from ~0.01Hz to ~3Hz.
The same applies when the module is synced, but the base frequency in this case is that of the received clock. The maximum frequency is capped at 80Hz.
For the modulation based on the envelope follower, the SPEED knob controls the slope of the envelope curve, from slow at 0% to fast at 100%.

By default, the modulation is sent to the filter’s CUTOFF. Still,
every knob (excluding those of the modulation itself) has an associated control that allows to specify the amount of modulation received by the relative parameter. The controls are accessed by entering the modulation mapping mode (MOD AMT button) and moving the knob of the parameter that you want to be affected by the modulation, from 0% to 100%.
This modulation mapping can be erased while in modulation mapping mode by pressing both the RECORD
and RANDOM buttons at the same time.

Be advised that all changes made must be manually saved to persist after a power cycle. (See Chapter 4.3)

# 13 Randomizer

The Randomizer allows you to create instant soundscapes by changing the parameters of one or more blocks in a random way.
Its behavior can be adjusted by using the position of the two switches: TARGET and AMOUNT.

The TARGET switch permits the selection of which units are affected by the randomization:

- All units (looper, oscillators, and effects)
- Oscillators only

- Looper only
- Effects only

The AMOUNT switch allows you to specify the amount of variation applied to the current value of the target parameters:

- The top position is for full-range randomization
- The middle applies a potential variation of +/- 20%
- The lower position applies a potential variation of +/- 2% respectively.

The oscillators' pitch is randomized by semitones. The faders and the supersaw/wavetable selector are excluded from the randomization, as are all the secondary parameters accessed with the SHIFT button, the modulation mapping, and the CV mapping.

To randomize, select both the target and the amount and press the RANDOM button or send a trigger at the RANDOM input.
To achieve a gradual transition to the new values instead of an immediate change, press and hold the RANDOM button for the desired duration of the morphing process. Release the button to start the morphing. The button will flash twice to indicate that the morphing is complete. Please note that this feature is not available for the RANDOM input.
The randomization can be undone and redone by holding the SHIFT button and pressing the RANDOM button. At any time, the parameters can be reset to the actual position of their controls by holding the SHIFT button and pressing both the RECORD and RANDOM buttons simultaneously.

All Random command changes must be manually saved to persist after a power cycle. (See Chapter 4.3)

# 14 Voltage Control

Each Oneiroi knob (except the modulation knobs) has a dedicated control to set the amount of CV it receives. To access the controls, enter the CV mapping mode by pressing the SHIFT and the CV AMT buttons together. Then, adjust the knob you want to be affected by the CV from 0% to 100% (the default is 100% for all primary parameters).
In addition, the 4 CVs of the effects, which are initially assigned to the main parameters, can also be similarly assigned to secondary parameters.
CV routing can be reset back to default (100% for all primary parameters) by pressing the RECORD and RANDOM buttons simultaneously.

All changes made must be manually saved to persist after a power cycle. (See Chapter 4.3)

# 15 Startup Settings

The startup settings configure how Oneiroi knobs work and their ranges while attenuating modulation and external CV.
These settings are stored in non-volatile memory so they stay the same after powering off the module.
To enter the startup settings mode, hold down both RECORD and RANDOM buttons while turning on the module, then release them once the two catch-up LEDs have turned on. The MOD AMT Button will become green to indicate you are at the startup Settings.

## 15.1 Knobs Behavior Modes.

Due to the multi-layered nature of Oneiroi, you will find many moments where the physical position of the knob does not match the parameter's value.
This issue is addressed in two different ways:

- **Jump Mode.** When a knob is moved, the value is immediately set to the current position of the knob. This is the default mode.
- **Catch Mode.** (AKA Pickup, Snap, Soft Takeover, or Pass-Thru) When you adjust a knob, the module waits for you to match the parameter's actual value before making any changes. In this mode, the Catch LEDs will guide you left or right until you reach the physical catch point. They will also blink together while catching it.

While in the startup settings page (RECORD+RANDOM at startup)
, The SHIFT button allows you to toggle between the two knob behaviors: LED on is Catch Mode, and LED off is Jump Mode.

## 15.2 Modulation Amount range.

The level controls of the LFO destinations and the CV inputs can work in two ways:

- Attenuator Mode. This is unipolar behavior, where you get the minimum level at the potentiometer's leftmost position and the maximum at the rightmost position. This is the default behavior.
- Attenuverter Mode. This is bipolar behavior, where you get the minimum level at the center position, the maximum level at the rightmost position, and the maximum level but with inverted polarity at the leftmost position.

The RECORD button allows toggle modulation amounts between Attenuverter Mode (LED on) and Attenuator Mode (LED off), while the RANDOM button does the same for the CV amounts.

### 15.3 CV Control Amount range.

Similarly to the Modulation destinations, the CV level controls of the CV inputs can work in Attenuator or Attenuverter Mode.

While in the startup setting page, the RANDOM button allows you to toggle CV amounts between Attenuverter Mode (LED on) and Attenuator Mode (LED off).

## 16 Specs

SIZE: 30 HP, 25mm deep
Power requirements:
+12V:200mA
-12V: 80mA
+5V:0mA
(10-pin to 16-pin cable)

## 17 Credits

Oneiroi is a collaboration between three forces of nature; Roberto Noris, Rebel Technology, and Befaco.

The Black Magic of Roberto Noris as a programmer and concept designer running on the Rebel's OWL3 Platform and dragged to reality by the reckless Befaco Team... What could go wrong?

Thanks to all the people who made it possible!!

Made with love in Barcelona.

## 18 ONEIROI Cheat Sheet

- **SAVE PARAMETERS TO FLASH:** Hold the MOD AMT Button until it blinks.
- **CLEAR MODULATION MAPPING:** While in modulation mapping mode, press the RECORD + RANDOM buttons at the same time

- **CLEAR CV MAPPING:** While in CV mapping mode (green light), press the RECORD + RANDOM buttons at the same time

- **CLEAR BUFFER:** SHIFT + RECORD At the same time.

- **RANDOM UNDO/REDO**: SHIFT + RANDOM At the same time = UNDO randomization. Do it again for REDO

- **MANUAL MODE** (ALL PARAMETERS TO KNOB POSITIONS): Hold the SHIFT button and press both the RECORD + RANDOM buttons at the same time.

- **STARTUP SETTINGS**: RECORD + RANDOM buttons while turning on the module:

    - SHIFT button toggles Knob behavior: ON = Catch Mode, OFF = Jump Mode.
    - RECORD button toggle Modulation Amount range: ON= attenuverter, OFF= attenuator.
    - RANDOM button toggle CV Amount range ON= attenuverter, OFF= attenuator.

# Appendix 1
# Updating the patch (via browser)

The Oneiroi software architecture is formed by three distinct layers of code: Bootloader, Firmware, and Patch. The Firmware and Patch are what enable the module to be compatible with the Owl platform. They handle the logistics, such as reading buttons and knobs, while the Patch contains the DSP code that defines the Oneiroi experience.
By this process, you are updating just the Patch.
The version number displayed in the web application refers to the firmware version, not the version of the Owl Patch you are uploading by this process.

From Patch V1.1 and beyond, when the module boots up, it indicates the patch version by blinking the RECORD LED for each major version and the RANDOM LED for each minor version.
For example, for version 1.1, the RECORD LED will blink once, followed by one blink of the RANDOM LED.
If updating from v1.0 to a larger version, a configuration erase is required after installation. Please check the GitHub Release page for more information.

If coming from v1.0 (meaning you hadn't installed any v1.1 betas before and didn't already follow this procedure), after installing a configuration, erase is required:

- Turn on the unit
- Connect the unit via USB and go to https://www.rebeltech.org/patch-library/device/

- Open the *Resources* tab
- Delete everything except *oneiroi.cfg* and restart
- **Please, only if you experience instability on the web when updating your unit, you can try:** https://shorturl.at/yJHSG

1. Find the latest patch from the release page: https://github.com/Befaco/Oneiroi/releases
2. Click on "Downloads" and download the file named "patch.syx"
3. Open a Web-MIDI-enabled browser. We recommend using Chrome or Chromium. Other Browsers would maybe work but it has not been tested.
4. Connect Oneiroi to your computer using any of the USBs on the back side. On your browser, go to the OpenWare Laboratory: https://pingdynasty.github.io/OwlWebControl/extended.html
5. Check if Oneiroi is connected to the page: The page should say: "Connected to Oneiroi vx.x.x"
6. Click "Choose file" and upload the patch.syx from your computer
7. Push "Store". A popup will appear asking for the slot. Accept to store to slot 1.

Done!

# Appendix 2
# Calibration Procedure

It calibrates the V/OCT CV IN tracking, the range of all manual controls, and the center position of the PITCH and VARISPEED knobs.

Updating the patch does not erase the calibration data, so no need to perform a calibration after the patch update.

Only needed after the module's assembly (usually only at the factory or by DIYers) or after some critical components have been replaced.

The more precise is your voltage source the more precise the calibration will be. A +/-0.005V tolerance voltage source is recommended for this operation.

A wrong calibration will disrupt the module's functionality. For example, an uncalibrated control can cease functioning entirely, or the V/OCT In will be erratic and/or out of range.

1. Power the module while holding [MOD AMT + SHIFT] buttons at the same time. The [RECORD] button should light up red indicating you are in Calibration Mode.

2. Place both the PITCH knob and the VARISPEED knob in the middle, this allows for calibrating the center point
3. Plug 2 Volts into V/OCT IN and push [RECORD] button. Now [SHIFT] button will light up red.
4. Plug 5 Volts into V/OCT IN and push [SHIFT] button. Now [RANDOM] button will light up red.
5. Plug 8 Volts into V/OCT IN and push [RANDOM] button. Now [MOD AMT] button will light up green.
6. Move all manual controls to the minimum position, this is all pots counter-clockwise and all faders down.
7. Move all manual controls to the maximum position, this is all pots clockwise and all faders up.
8. Push [MOD AMT] button to exit calibration mode.