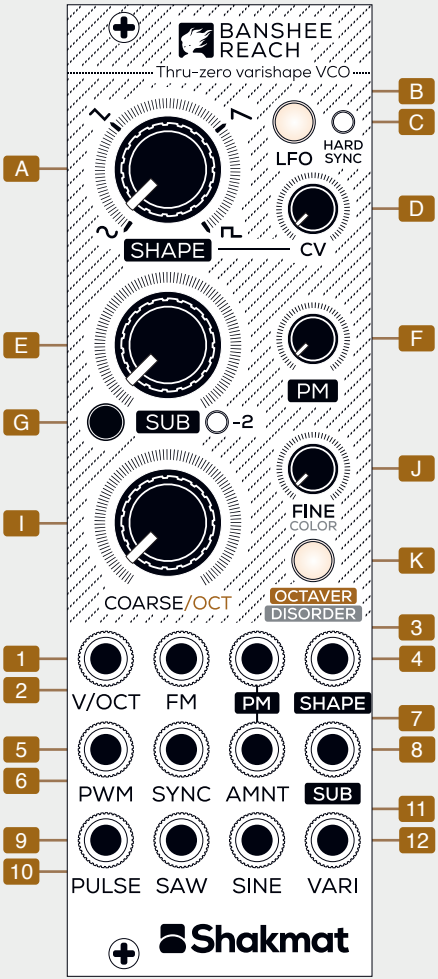
Shakmat
Banshee Reach

- 8HP Eurorack Module
- Built & designed in E.U.
- www.shakmat.com


BANSHEE
REACH
Thru-zero varishape VCO
LFO
HARD
SYNC
SHAPE
CV
PM
SUB
-2
FINE
COLOR
COARSE/OCT
OCTAVER
DISORDER
V/OCT
FM
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SHAPE
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SYNC
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Shakmat
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Introduction

Murmuring, singing, screaming, and howling, the Banshee Reach delivers an extensive panel of sounds. The module's heart is based on a triangle core VCO with thru zero frequency/phase modulation capabilities. Besides delivering the typical analog waveforms independently, the Banshee Reach has a vari output combining a continuously variable waveform crossfading with a sub-octave generator.

The module's analog core has been completed with digital control for frequency locking and octave transposition, making the Banshee Reach performance oriented. LFO mode, hard or soft sync, digital noise modulation, and PWM complete this rich feature list. Compact and powerful, the Banshee Reach is a VCO suited for west, east coast synthesis, and much more!

- A Shape potentiometer
- B LFO button
- C Hard Sync LED
- D Shape CV potentiometer
- E SUB potentiometer
- F PM potentiometer
- G -2 SUB button & LED
- I Coarse/Octave potentiometer
- J Fine/Color potentiometer
- K Octaver/Disorder button

- 1 V/OCT input
- 2 Linear Thru-zero FM input
- 3 Thru-zero PM input
- 4 Shape CV input
- 5 PWM input
- 6 Sync input
- 7 Amount input
- 8 SUB CV input
- 9 Pulse output
- 10 Saw output
- 11 Sine output
- 12 Vari output

Installation

The Banshee Reach requires a standard 2x5 pin eurorack power cable. Make sure the red stripe on the cable matches the -12V side of the Banshee Reach power header.

Tuning

The Banshee Reach has both coarse and fine manual tuning controls, like in almost all VCOs. The Coarse potentiometer **[I]** provides a continuous variation of the output signal frequency with a wide range, while the Fine potentiometer **[J]** gives a more precise ±1 semitone range of control.

Pressing the Octaver button **[K]** (button lights up) turns the octave mode on; the module stores the current coarse control frequency and turns the Coarse potentiometer **[I]** into an octave switcher. The fine knob still works as before. To return to free tuning mode, press the Octaver button **[K]** (button turns off); the coarse knob must pass through the stored frequency value to start controlling it again. Note the above digital control only affects the manual control. V/Oct and FM/PM inputs use a fully analog signal path.

If the Octaver mode is off, when the Coarse potentiometer [I] is set fully counterclockwise and the Fine potentiometer [J] is set around noon, the generated frequency will be a C0 (16,35 Hz) with no external voltage applied.

Vari, Shape & Sub

Besides the traditional Sine [11], Pulse [9] and Saw [10] outputs, the Banshee Reach has a Vari output [12], which is a continuously variable waveshape crossfaded with a square sub oscillator.

The Shape potentiometer [A] allows you to morph continuously between sine, triangle, saw, and square (or a pulse thanks to the jumper on the back of the module). Shape can be CV controlled using the Shape CV input [4] and the shape CV attenuator [D]. The Shape CV input [4] is normalized to the triangle core of the VCO, so with no patch cable, its attenuator acts as a waveshaper, subtly adding harmonics to sine and triangles.

The variable waveform is crossfaded with a square sub-octave generator via the Sub potentiometer [E] and CV input [8]. The Sub Button and LED [G] lets you choose the sub-octave waveform: minus 1 octave the LED is off, minus 2 octaves the LED is on, minus 2 octaves with a quarter pulse width, the LED is blinking.

Frequency and Phase Modulation

The Banshee Reach has 3 frequency/phase CV inputs: a V/Oct [1], a thru zero linear frequency modulation [2], and a thru zero phase modulation [3]. This last input has a dedicated modulation attenuator (PM potentiometer [F]), and a unipolar Amount input [7] that controls how much modulation is sent to the PM input [3].

LFO mode

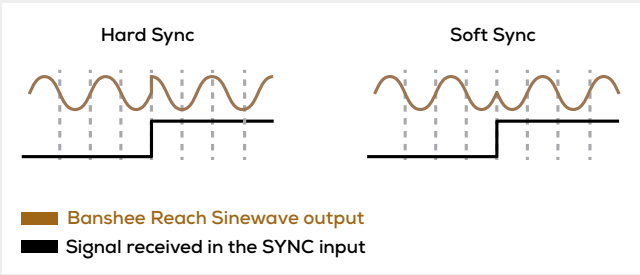
Banshee Reach can work as an LFO by pressing the LFO button [B], which will show the LFO's amplitude and polarity: green for positive and red for negative voltages.

Sync

The Sync input [6] can be set to either soft or hard sync modes. To switch between the two modes, hold the LFO button [B] for two seconds, in hard sync mode the Hard Sync LED [C] is on.

In hard sync mode, a rising edge received at the Sync input [6] causes the generated waveform to be reset to its beginning. In soft sync mode, a rising edge at the Sync input [6] causes the generated waveform to be inverted, its direction reversed. Soft sync leads to softer results with fewer harmonics compared to hard sync.

Fig. 01 — Sync mode effect on a sinewave

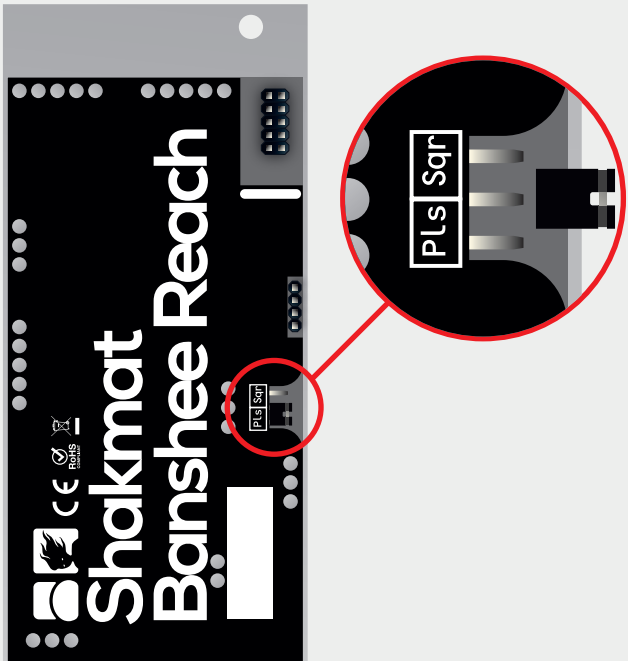


Pulse Width Modulation

The Pulse output [9] provides a pulse waveform that can be modulated via CV thanks to the PWM input [5]. With nothing inserted into the PWM input [5], the pulse width is 50%. Negative voltages reduce the pulse width to a minimum of 1%, while positive voltages can reach up to 99% width.

INFO

The Banshee Reach has a jumper on its back which allows to choose between a square or a pulse waveforms for the Vari output.



Disorder

Thanks to the Disorder feature, the Banshee Reach can be turned into a peculiar noise source. A digital control generates fast random signals modulating the analog core. Each output sounds different, with the Varishape output **[12]** and the Shape controlling the timber of the produced noise, as the Shape **[A]** and Sub **[E]** potentiometers act on the sound generated by the Vari output **[12].**

To activate the Disorder mode, press and hold the Octave/Disorder button **[K]** for a couple of seconds. If in free tuning mode, the Octaver button **[K]** blinks briefly; if in octave mode, the Octaver button**[K]** blinks off briefly.

The Coarse potentiometer **[I]** acts on the average frequency of the VCO, while the Fine potentiometer **[J]** acts on the amount and type of random signals modulating the analog core. All inputs work as before, so you can modulate the frequency and waveshape inputs.

In LFO mode, activating Disorder adds randomness to the LFO frequency, the amount of randomness is set by the Fine potentiometer **[J]**.

Current state storing

At anytime, store the module's state by pressing and holding the Sub button [G] for two seconds. All LEDs will blink for a second to confirm the storing process. This operation stores the following parameter for boot-up:

- Sync mode
- LFO mode
- Sub octave type
- Disorder function activation
- Octaver mode (and associated tuning)

Storing the current state in Octaver mode allows you to fire up your system at the same coarse frequency with octave shifting based on the Coarse potentiometer [I] position.

Specifications

Size	VCO Rate (potentiometer)
8 HP	16 Hz to 14 kHz
Depth	VCO Rate (CV input)
21 mm	1.33 Hz to 40 kHz
Current Draw	LFO Rate
92 mA @ +12v 52 mA @ -12v	90 Sec. - 11 Hz (goes down to 1100 sec with CV input)
	V/Oct input
	-8v to +8v
	Amount CV input
	0 to +5v
	Other CV inputs
	-5 to +5v
	Outputs
	-5 to +5v