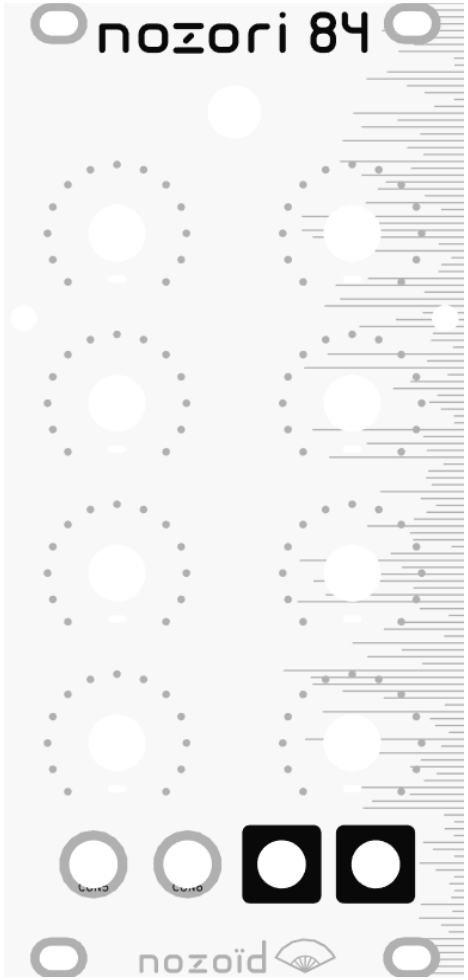
# NOZORI 84 modules documentation

A single piece of paper can be folded into innumerable shapes. In the same way, a single Nozori hardware can morph into multiple modules. Changing functionality is as simple as changing jumpers position!




Software V1.0 : 2019 03 27
Http://nozoid.com

# Nozori common specification

Lot’s of Nozori module share the same philosophy. Unless specified, here are some behaviors commonly found on various module.

The 3 way toggle of audio source usually deal with the range of the frequency (FQ) potentiometer:

- On top, (HIGH) the frequency potentiometer scan on the full audio range.

- In the middle position, (MEDIUM) the range is reduce in order to be easily used with a 1V/Octave input.

- On the bottom (LOW), the frequency range is very low in order to generate low frequency modulation.

For audio effect module, the 3 way toggle can be used to select the audio mode of the module:

- On top (STEREO), the module admit 2 audio inputs. This inputs are processed with the same parameters.

- In the middle (OPPOSITE), the module admit 2 audio inputs, but the processing parameters can be different for the 2 inputs: the modulation CV are applied at opposite polarity on the left and the right channel.

- On the bottom, (MONO + PAN), the module accept only 1 audio input. If plugged, the other input is used as a panoramic control to split the out.

In STEREO and OPPOSITE mode, if the IN right jack is not plugged, the left signal is used for the right channel. (you can generate a stereo output using a mono input in the OPPOSITE mode). In MONO mode, when the PAN jack is not plugged, the signals out are at full amplitude on both output.

Audio source module (like VCO), output 2 different octave of the same signal, unless a jack is plugged in the panoramic input. In this situation, a single signal is splited to the left and right out. The panoramic input range should be in the -5 / +5V range

The amplitude of an audio out is in the -5 / +5V range, unless a jack is plugged in the GAIN input. In this situation the output is amplified thanks to a VCA . The gain is exponential with input ranges from 0 to +5V.

Most of the time, when no modulation jack is plugged, the associated potentiometer control the amplitude of a chaotic LFO included in the module. A notable exception is the frequency modulation potentiometer that is used as a “fine tune” : it’s range is 1 octave.

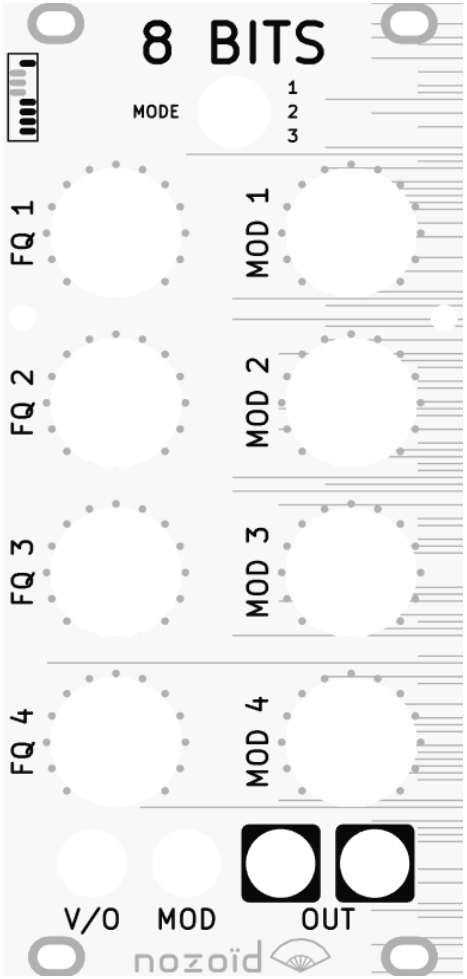
When a pitch modulation potentiometer is at full modulation, the range is 1V/Octave.

Modulation CV should be in the -5/+5V range. Positive voltage added to the controlled value, while negative voltage are subtracted. The total value is clipped in the range of the main control: you can not go higher or lower than the potentiometer range thanks to a modulation. (this rule accept some exception like for oscillator frequency). The range of the modulation is the half of the main range : in order to sweep the full range, you should put the main potentiometer halfway, and the modulation potentiometer at full modulation.

When the module do generate CV, the leds indicate CV input value (or default value).

When a signal is provide on a SYNC input, the frequency potentiometer adjust a divider/multiplier of this clock (1/16, 1/8, 1/4, 1/2, 1, 2, 4, 8, 16), while the frequency modulation potentiometer adjust fraction of this clock : (2/3, 3/4, 4/5, 1/1, 5/4, 4/3, 3/2). In this situation, the frequency Potentiometer should be halfway, and the MOD Potentiometer should be at 0 in order to use the frequency of the input. The phase is not respected between the clock input and the internal clock.

Leds: when both leds quickly blink alternately, the configuration switches are not set to a useful module.

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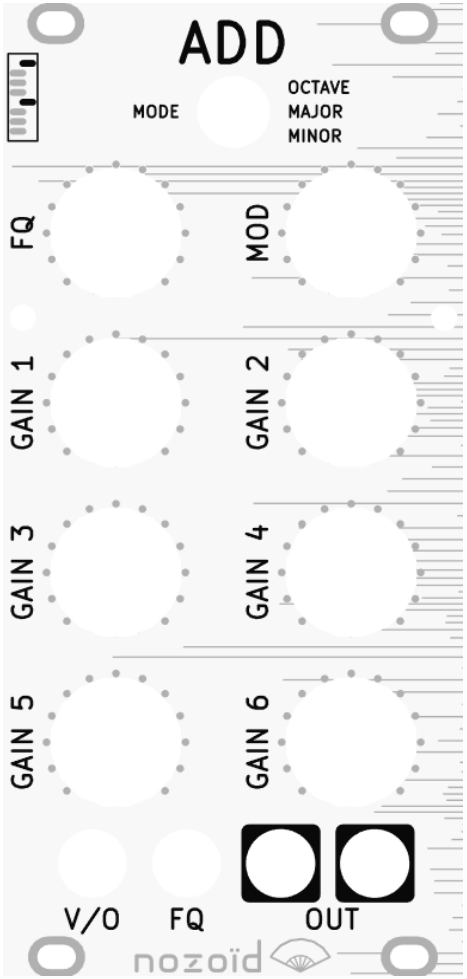
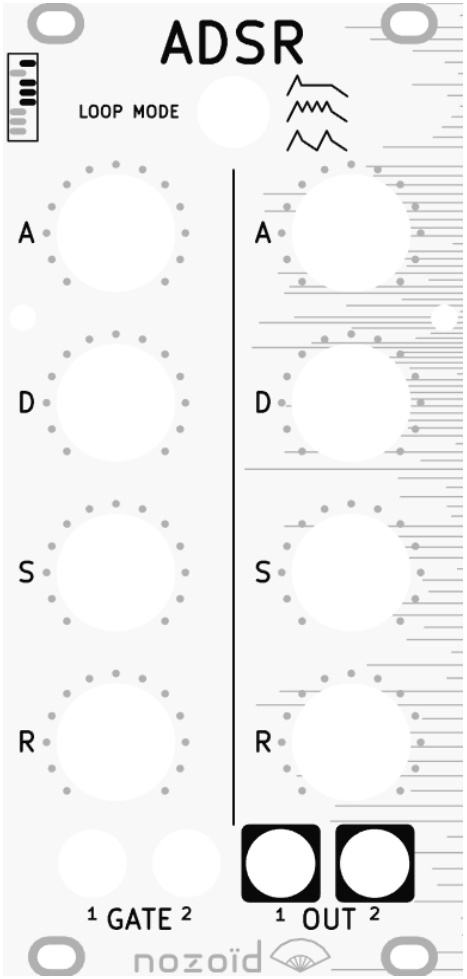
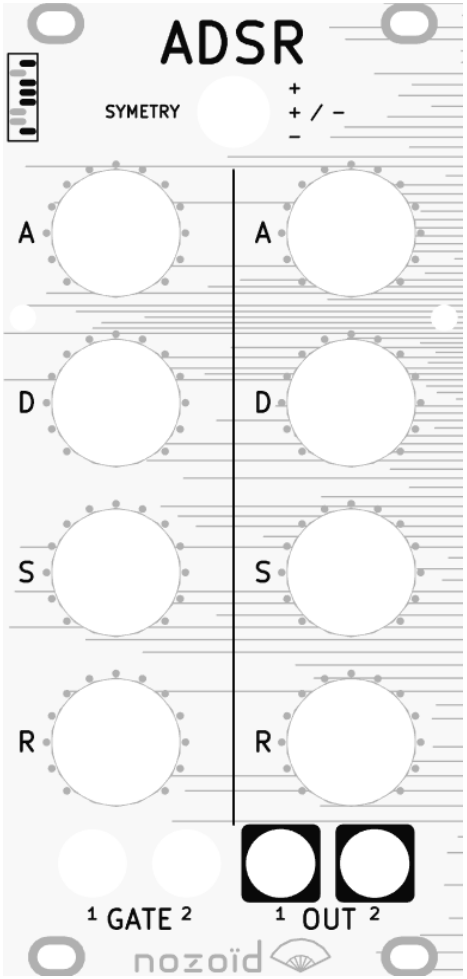
|---|
| 8 bit audio generator<br>This module mix 4 oscillators (8 bits sawtooth) in various ways in order to create cheap tune. |
| Module number: 143 (10001111) |
| Potentiometer 1: Frequency of oscillator 1 (from 6Hz to about 2KHz) |
| Potentiometer 2: Frequency modulation of oscillator 1 (or fine tune if IN2 is unplugged) |
| Potentiometer 3: Frequency of oscillator 2 (from 6Hz to about 2KHz) |
| Potentiometer 4: Frequency modulation of oscillator 2 (or fine tune if IN2 is unplugged) |
| Potentiometer 5: Frequency of oscillator 3 (from 6Hz to about 2KHz) |
| Potentiometer 6: Frequency modulation of oscillator 3 (or fine tune if IN2 is unplugged) |
| Potentiometer 7: Frequency of oscillator 4 (from 6Hz to about 2KHz) |
| Potentiometer 8: Frequency modulation of oscillator 4 (or fine tune if IN2 is unplugged) |
| In 1: Frequency (1V/Octave)  (0V if unplugged) |
| In 2: Frequency modulation value (1V if not plugged) |
| Out 1: Audio out 1 |
| Out 2: Audio out 2 |
| Selector: algorithm<br>Top: 1+2 XOR 3+4 // 1+4 XOR 2+3<br>Middle: 1 XOR 2 // 3 XOR 4<br>Bottom: 1 & 2 // 3 & 4 |



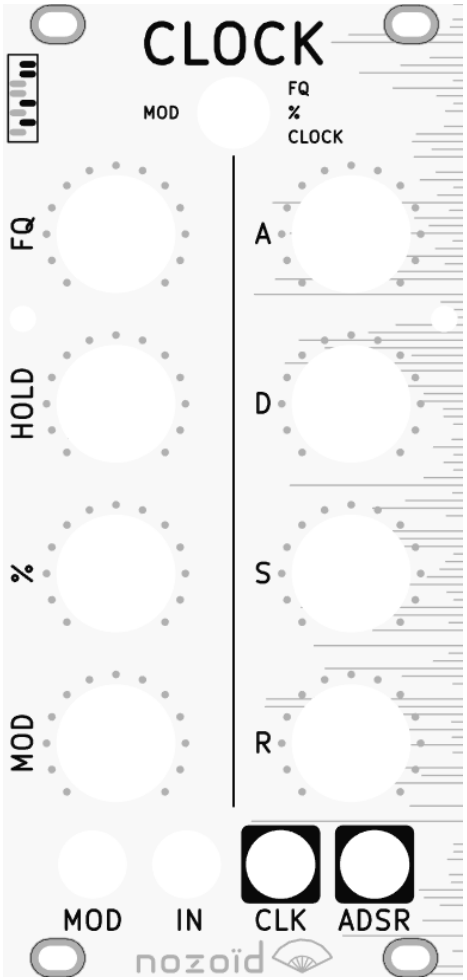

| |
|---|
| Additive synthesis : a sinusoidal oscillator with 6 different harmonics<br>Add up to 6 different harmonic to a sinusoidal signal! The tuning of this harmonics can be change with the 3 way switch. |
| Module number: 136 (10001000) |
| Potentiometer 1: Main frequency (from 3Hz to about 5KHz) |
| Potentiometer 2: Frequency modulation |
| Potentiometer 3: Harmonic 1 amplitude |
| Potentiometer 4: Harmonic 2 amplitude |
| Potentiometer 5: Harmonic 3 amplitude |
| Potentiometer 6: Harmonic 4 amplitude |
| Potentiometer 7: Harmonic 5 amplitude |
| Potentiometer 8: Harmonic 6 amplitude |
| In 1: Frequency (1V/Octave)  (0V if unplugged) |
| In 2: Frequency modulation value (1V if unplugged) |
| Out 1: Oscillator out |
| Out 2: Oscillator out (same as out 1, but without the fundamental) |
| Selector: Harmonic frequency<br>Top: Octave (+12, +24, +36, +48, +60, +72 half tone)<br>Middle: Major scale (+2, +4, +5, +7, +9, +11)<br>Bottom: Minor scale (+2, +3, +5, +7, +8, +10) |



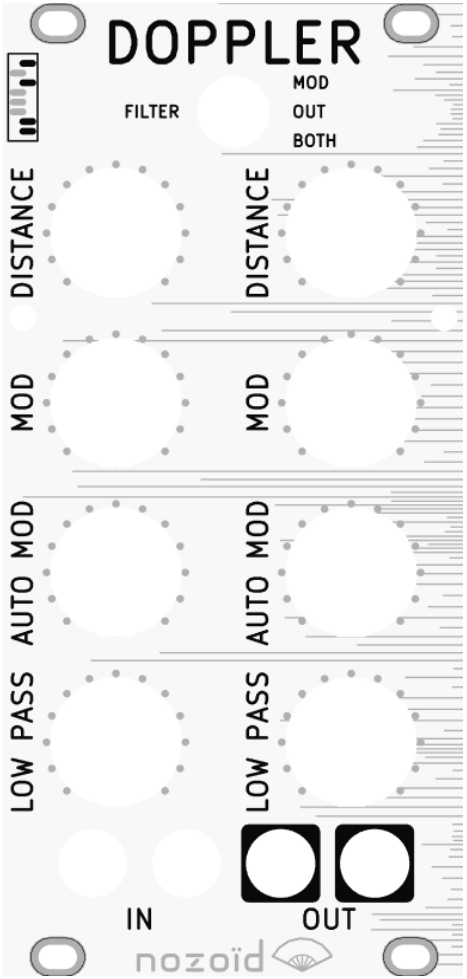

| |
|---|
| Dual ADSR with loop mode<br>A dual ADSR, with 2 different kind of loop mode. This are exponential ADSR for a more natural sound evolution. |
| Module number: 184 (10111000) |
| Potentiometer 1: ADSR 1: Attack time (from 0.5ms to 90s) |
| Potentiometer 2: ADSR 2: Attack time (from 0.5ms to 90s) |
| Potentiometer 3: ADSR 1: Decay time (from 0.5ms to 90s) |
| Potentiometer 4: ADSR 2: Decay time (from 0.5ms to 90s) |
| Potentiometer 5: ADSR 1: Sustain level |
| Potentiometer 6: ADSR 2: Sustain level |
| Potentiometer 7: ADSR 1: Release time (from 0.5ms to 90s) |
| Potentiometer 8: ADSR 2: Release time (from 0.5ms to 90s) |
| In 1: Gate 1 (default to gate OFF exept in ADSR loop mode (bottom selector) where the GATE in ON by default) |
| In 2: Gate 2 (default to Gate 1 if unplugged) |
| Out 1: ADSR 1 |
| Out 2: ADSR 2 |
| Selector: loop mode<br>Top: no loop<br>Middle: AD loop: start an attack at the end of the decay time<br>Bottom: ADSR loop: start a release at the end of the decay time and start an attack at the end of the release time |




| |
|---|
| Dual ADSR with positive or negative output<br>A dual ADSR, that can be either positive, or negative. This are exponential ADSR for a more natural sound evolution. |
| Module number: 185 (10111001) |
| Potentiometer 1: ADSR 1: Attack time (from 0.5ms to 90s) |
| Potentiometer 2: ADSR 2: Attack time (from 0.5ms to 90s) |
| Potentiometer 3: ADSR 1: Decay time (from 0.5ms to 90s) |
| Potentiometer 4: ADSR 2: Decay time (from 0.5ms to 90s) |
| Potentiometer 5: ADSR 1: Sustain level |
| Potentiometer 6: ADSR 2: Sustain level |
| Potentiometer 7: ADSR 1: Release time (from 0.5ms to 90s) |
| Potentiometer 8: ADSR 2: Release time (from 0.5ms to 90s) |
| In 1: Gate 1 |
| In 2: Gate 2 (default to Gate 1 if unplugged) |
| Out 1: ADSR 1 |
| Out 2: ADSR 2 |
| Selector: out mode<br>Top: both ADSR are positive<br>Middle: ADSR 1 is positive, ADSR2 is negative<br>Bottom: Both ADSR are negative |




| |
|---|
| Stochastic Clock with ADSR and VCA<br>This module is a clock generator, with included ADSR and VCA.<br>Random gate signal can be skipped. The “%” potentiometer select the proportion of discarded gate.<br>A modulation input parameter can be used to modulate this proportion, the clock frequency, or to be used as an external trigger depending of the switch position.<br>The ADSR curves are exponential.<br>In clock mode, the input 1 bypass the clock generator and the module use this external clock. This clock can be divided by 1 to 8 depending on the MOD potentiometer. In this mode, the FQ potentiometer is unused. |
| Module number: 202 (11001010) |
| Potentiometer 1: Clock Frequency (from 17s to 10ms) |
| Potentiometer 2: ADSR: Attack time (from 0.5ms to 90s) |
| Potentiometer 3: Hold time of the clock (from 0% to 100% of the clock time) |
| Potentiometer 4: ADSR: Decay time (from 0.5ms to 90s) |
| Potentiometer 5: Syncope percentage of the clock (0% for all clock, 50% : 1 every 2 clock signal is randomly skipped, 100% : no clock) |
| Potentiometer 6: ADSR: Sustain |
| Potentiometer 7: Modulation |
| Potentiometer 8: ADSR: Release time (from 0.5ms to 90s) |
| In 1: Modulation (chaotic oscillator if not plugged) |
| In 2: VCA audio in (5V if unplugged : out is the envelope) |
| Out 1: Clock out |
| Out 2: VCA out (ASDR out if in 2 is not plugged) |
| Selector: Modulation influence<br>Top: Clock frequency<br>Middle: syncope percentage<br>Bottom: bypass the clock for a direct control of the ADSR (via the MOD input) |

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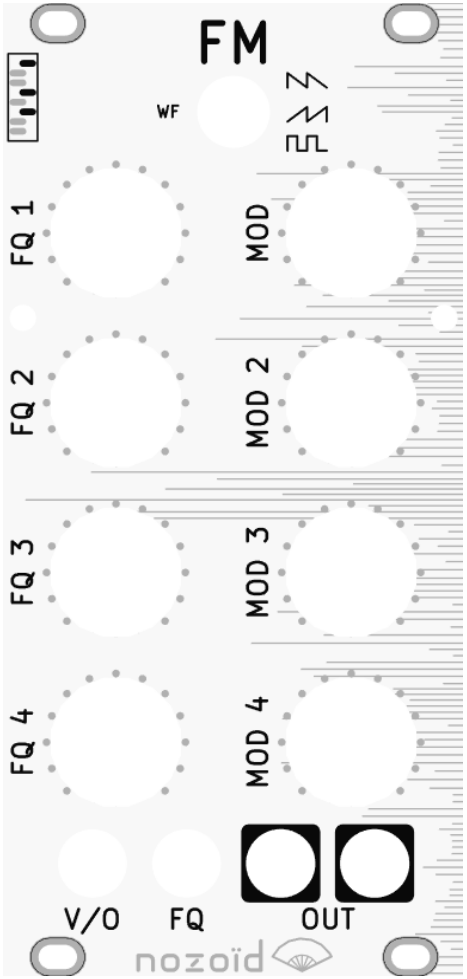
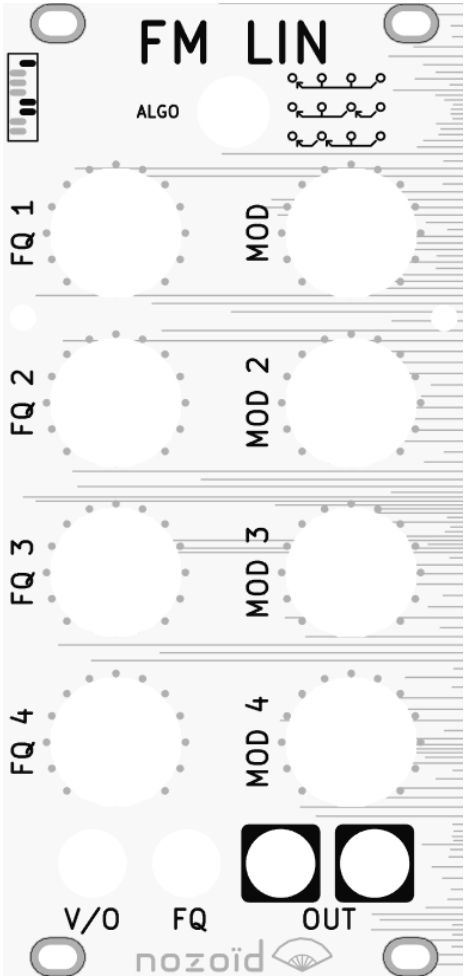
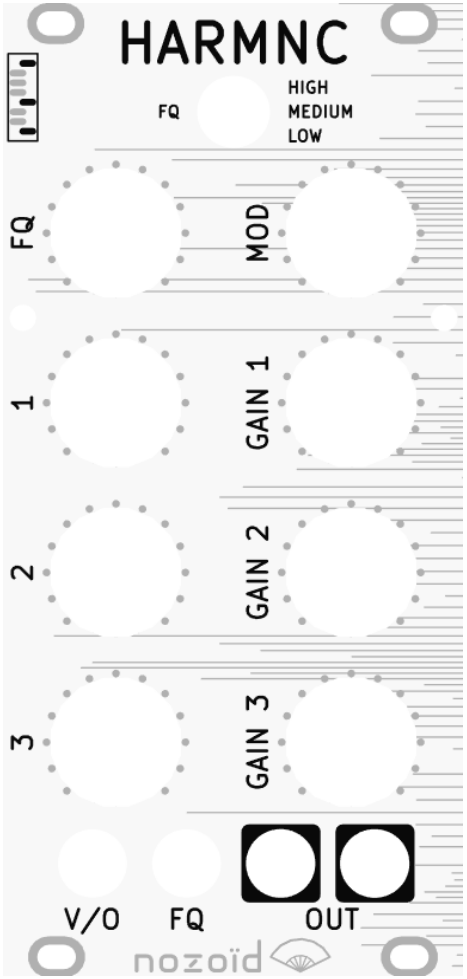
|---|
| Emulate a Doppler effect applied on an audio source<br>This module is basically a delay with audio control of the delay time (with a maximum time of more than 150ms). Important modulation of the distance may result in a clipped signal if the distance is set to low, or to high. This create a stranger distortion effect.<br>If the modulation is composed with high frequency, the result can be a bit harsh. The low pass filter can attenuate this high frequency in different ways. |
| Module number: 163 (10100011) |
| Potentiometer 1: Distance of the source 1 |
| Potentiometer 2: Distance of the source 2 |
| Potentiometer 3: Source 1 distance modulation according to source 2 |
| Potentiometer 4: Source 2 distance modulation according to source 2 |
| Potentiometer 5: Source 1 distance auto modulation (this is not a physical effect) |
| Potentiometer 6: Source 2 distance auto modulation (this is not a physical effect) |
| Potentiometer 7: Filter amount |
| Potentiometer 8: Filter amount |
| In 1: Audio in 1 (and modulation source) |
| In 2: Audio in 2 (and modulation source) |
| Out 1: Audio out 1 |
| Out 2: Audio out 2 |
| Selector: Low passe filter filter (must be set at full for the “correct” Doppler effect)<br>Top: Filter the distance value<br>Middle: filter the output of the effect<br>Bottom: Filter both distance and output values. |




| |
|---|
| Sinusoidal oscillator with 3 modulations oscillators<br>This module is very similar to the SIN FM module, but the waveform of the modulation are different, resulting in a less round and more treble in the produced sound. |
| Module number: 148 (10010100) |
| Potentiometer 1: Oscillator 1 frequency (from about 7Hz to 10KHz for audio out left) |
| Potentiometer 2: Oscillator 1 frequency modulation |
| Potentiometer 3: Oscillator 2 frequency (from about 2Hz to 7KHz) |
| Potentiometer 4: Oscillator 2 modulation gain |
| Potentiometer 5: Oscillator 3 frequency (from about 2Hz to 7KHz) |
| Potentiometer 6: Oscillator 3 modulation gain |
| Potentiometer 7: Oscillator 4 frequency (from about 2Hz to 7KHz) |
| Potentiometer 8: Oscillator 4 modulation gain |
| In 1: Frequency (1V/Octave)  (0V if unplugged) |
| In 2: Oscillators frequency modulation value (1V if unplugged) |
| Out 1: Left output |
| Out 2: Right output (1 octave higher than out left) |
| Selector: Waveform of the modulation oscillators<br>Top: Rising saw<br>Middle: Falling saw<br>Bottom: Square |




| |
|---|
| 4 sinusoidal oscillators linear FM synthesis<br>Frequency modulation (linear/sub zero) of 4 sinusoidal signals using 3 different algorithm. This module is a sound generator. |
| Module number: 140 (10001100) |
| Potentiometer 1: Oscillator 1 frequency (from about 7Hz to 10KHz for audio out left) |
| Potentiometer 2: Oscillator 1 frequency modulation |
| Potentiometer 3: Oscillator 2 frequency (from about 0.1Hz to 20KHz) |
| Potentiometer 4: Oscillator 2 modulation gain |
| Potentiometer 5: Oscillator 3 frequency (from about 0.1Hz to 20KHz) |
| Potentiometer 6: Oscillator 3 modulation gain |
| Potentiometer 7: Oscillator 4 frequency (from about 0.1Hz to 20KHz) |
| Potentiometer 8: Oscillator 4 modulation gain |
| In 1: Frequency (1V/Octave)  (0V if unplugged) |
| In 2: Oscillators frequency modulation value (1V if unplugged) |
| Out 1: Left output |
| Out 2: Right output (1 octave higher than out left) |
| Selector: Connection order of the oscillators<br>Top: Oscillators 2, 3 and 4 controls the oscillator 1 frequency<br>Middle: Oscillators  2 and 3 control the oscillator 1 frequency, oscillator 4 control oscillators 3.<br>Bottom: Oscillators  3 and 4 control the oscillator 2 frequency, oscillator 2 control oscillators 1. |

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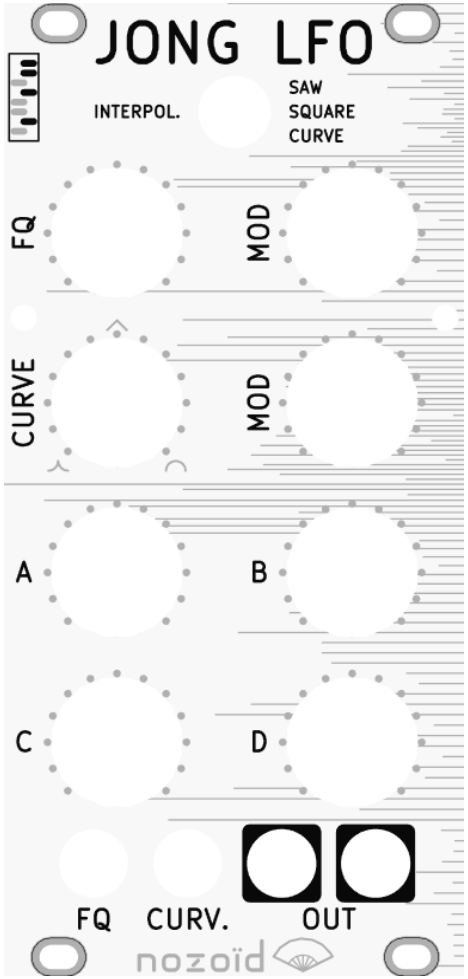
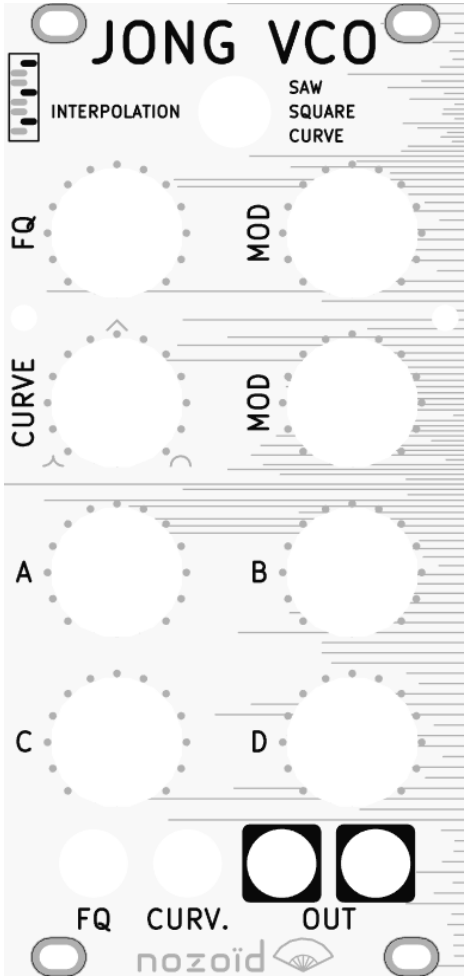
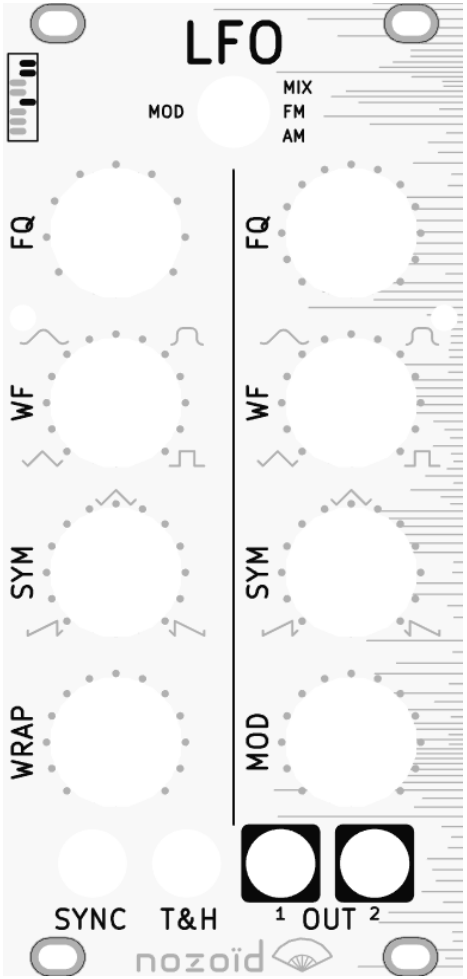
|---|
| Sinusoidal oscillator with 3 harmonics at variable relative frequency<br>Add 3 harmonics to a sinusoidal signal. The frequency of the harmonics can be adjusted from 0 to 1 octaves regarding the fundamental frequency. (2 octave for harmonics 2 and 3). |
| Module number: 137 (10001001) |
| Potentiometer 1: Main frequency |
| Potentiometer 2: Frequency modulation (from about 7Hz to 20KHz) |
| Potentiometer 3: Harmonic 1 relative frequency (1 Octave range) |
| Potentiometer 4: Harmonic 1 amplitude |
| Potentiometer 5: Harmonic 2 relative frequency (2 Octave range) |
| Potentiometer 6: Harmonic 2 amplitude |
| Potentiometer 7: Harmonic 3 relative frequency (2 Octave range) |
| Potentiometer 8: Harmonic 3 amplitude |
| In 1: Frequency (1V/Octave) (0V if unplugged) |
| In 2: Frequency modulation value (1V if unplugged) |
| Out 1: Oscillator out |
| Out 2: Oscillator out (same as out 1, but without the fundamental) |
| Selector: Frequency range<br>Top: High (10~20000Hz)<br>Middle: medium (0.1~200Hz)<br>Bottom: low (0.01~20Hz) |




| |
|---|
| Peter de Jong chaotic attractor<br>This module is a strange attractor : it generate pseudo random value at various frequency. This module can be used like a step sequencer or a LFO. The 4 parameters (A, B, C, D) control the randomness of this attractor.<br>“Curve” act like a small waveshaper (EXP/LIN/LOG).<br>The interpolation switch allow to change the shape of the output.<br>This module is very similar to the JONG VCO : only the frequency range changes. |
| Module number: 210 (11010010) |
| Potentiometer 1: Frequency of the 1st oscillator (from about 13s to 10ms per steps) |
| Potentiometer 2: Frequency modulation |
| Potentiometer 3: Curve (exp/lin/log) |
| Potentiometer 4: Curve modulation |
| Potentiometer 5: 1st parameter of the attractor |
| Potentiometer 6: 2nd parameter of the attractor |
| Potentiometer 7: 3rd parameter of the attractor |
| Potentiometer 8: 4th parameter of the attractor |
| In 1: Frequency modulation value (chaotic oscillator if not plugged) |
| In 2: Curve modulation value (chaotic oscillator if not plugged) |
| Out 1: X out |
| Out 2: Y out |
| Selector: interpolation type<br>Top: linear (saw)<br>Middle: none (square)<br>Bottom: cubic (curve) |




| |
|---|
| Peter de Jong chaotic attractor at audio frequency<br>This module is a strange attractor : it generate pseudo random value at various frequency. This module can be used like a step sequencer or a LFO. The 4 parameters (A, B, C, D) control the randomness of this attractor.<br>“Curve” act like a small waveshaper (EXP/LIN/LOG).<br>The interpolation switch allow to change the shape of the output.<br>This module is very similar to the JONG LFO : only the frequency range changes. |
| Module number: 146 (10010010) |
| Potentiometer 1: Frequency of the 1st oscillator (from about 10Hz to 20KHz) |
| Potentiometer 2: Frequency modulation |
| Potentiometer 3: Curve (log/lin/exp) |
| Potentiometer 4: Curve modulation |
| Potentiometer 5: 1st parameter of the attractor |
| Potentiometer 6: 2nd parameter of the attractor |
| Potentiometer 7: 3rd parameter of the attractor |
| Potentiometer 8: 4th parameter of the attractor |
| In 1: Frequency modulation value (fine tune (1V) if not plugged) |
| In 2: Curve modulation value (chaotic oscillator if not plugged) |
| Out 1: X out |
| Out 2: Y out |
| Selector: interpolation type<br>Top: linear (saw)<br>Middle: none (square)<br>Bottom: cubic (curve) |




Dual LFO
LFOs with parametric wave form. The output of this LFO can continuously change from saw/sin/square, and from a rising saw/triangle/falling saw.
The 1st LFO output can be wrapped to get more complex Waveform.
When a clock signal is provided, the 1st LFO automatically synchronize to this signal. The Frequency potentiometer select the divisor/multiplier of the input frequency (1/16, 1/8, ¼, ½, 1, 2, 4, 8 or 16).
The 2nd LFO has a Trig and Hold input : when plugged, the output is updated only at rising edge of this signal. This generate square patterns.
The Modulation potentiometer of the 2nd LFO allow the LFO 1 to modulate the LFO 2 in 3 different ways. This module create a huge range of different CV.

Module number: 200 (11001000)

Potentiometer 1: LFO1 Frequency (from about 30s to 1KHz)

Potentiometer 2: LFO2 Frequency (from about 30s to 1KHz)

Potentiometer 3: LFO1 Waveform (triangle, sinus, round square, square)

Potentiometer 4: LFO2 Waveform (triangle, sinus, round square, square)

Potentiometer 5: LFO1 Symmetry (rising saw, triangle, falling saw)

Potentiometer 6: LFO2 Symmetry (rising saw, triangle, falling saw)

Potentiometer 7: LFO1 Wrap

Potentiometer 8: LFO2 Modulation

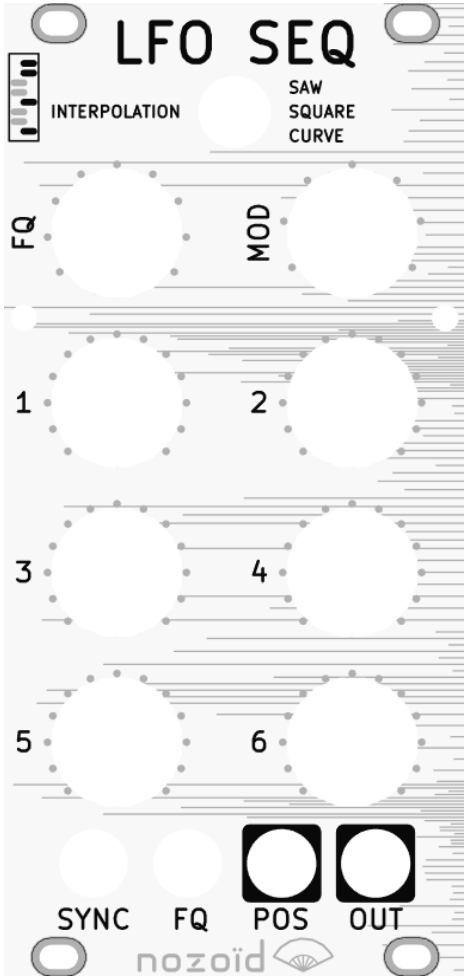
In 1: LFO1 synchro (when plugged the LFO1 frequency is a multiple of this clock)

In 2: LFO2 Trig & Hold (when plugged, hold value until a new edge)

Out 1: LFO 1 Out

Out 2: LFO 2 Out

Selector: Modulation type:
- Top: Mix from LFO1 to LFO2
- Middle: Frequency modulation
- Bottom: Amplitude modulation




6 step LFO / Sequencer
This module is halfway between a sequencer and a LFO : you can select 6 point to create the shape of the LFO curve. This LFO can be synchronize to any clock.
When a sync signal is provide, the Frequency potentiometer select simple divider/multiplier of the frequency (1/16, 1/8, 1/4, ½, 1, 2, 4, 8, 16), while the modulation frequency potentiometer add complex fraction of this frequency (2/3, 3/4, 4/5, 1/1, 5/4, 4/3, 3/2).

Module number: 201 (11001001)

Potentiometer 1: Frequency (from about 10s to 150Hz)

Potentiometer 2: Frequency modulation

Potentiometer 3: Step 1 value

Potentiometer 4: Step 2 value

Potentiometer 5: Step 3 value

Potentiometer 6: Step 4 value

Potentiometer 7: Step 5 value

Potentiometer 8: Step 6 value

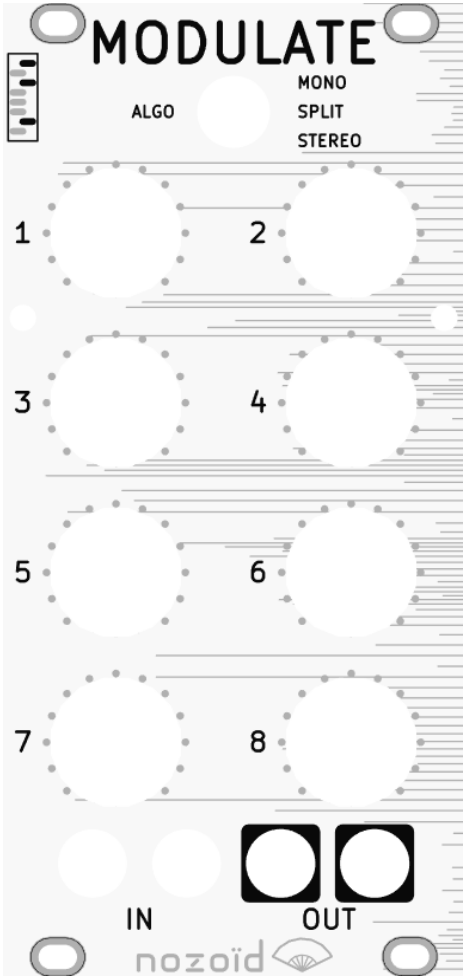
In 1: LFO synchro (when plugged the LFO frequency is a multiple of this clock)

In 2: Frequency modulation value

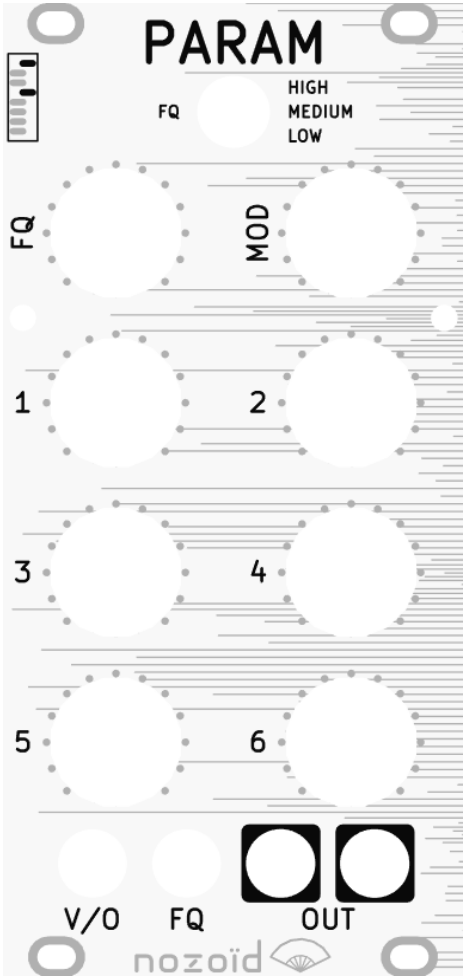
Out 1: LFO position output (look like a 6 steps sawtooth)

Out 2: LFO main output

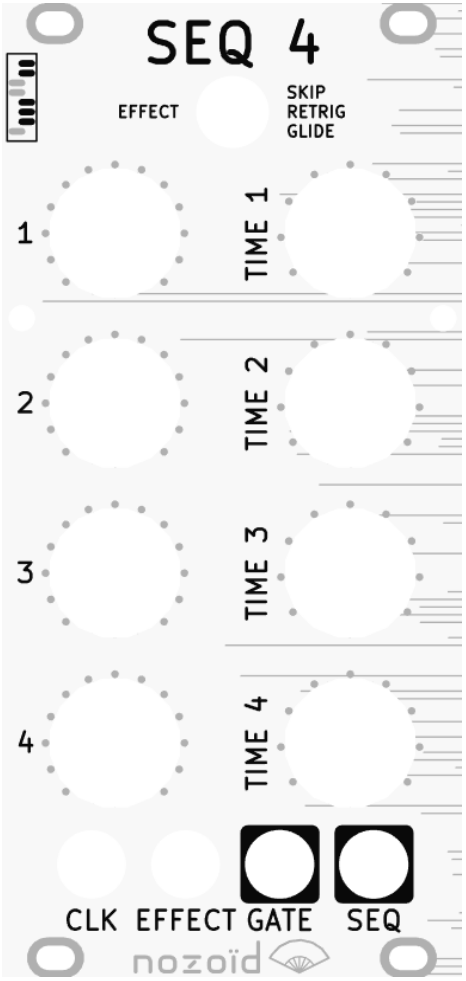
Selector: Interpolation type
- Top: linear (saw)
- Middle: none (square)
- Bottom: cubic (curve)




| |
|---|
| Modulate 2 audio sources together using various algorithms<br>Modulation can be : amplitude modulation, ring modulation, binary interaction, clipping or other waveshaping between the 2 audio sources. |
| Module number: 162 (10100010) |
| Potentiometer 1: Effect 1 amplitude |
| Potentiometer 2: Effect 2 amplitude |
| Potentiometer 3: Effect 3 amplitude |
| Potentiometer 4: Effect 4 amplitude |
| Potentiometer 5: Effect 5 amplitude |
| Potentiometer 6: Effect 6 amplitude |
| Potentiometer 7: Effect 7 amplitude |
| Potentiometer 8: Effect 8 amplitude |
| In 1: Audio in 1 |
| In 2: Audio in 2 |
| Out 1: Audio out 1 or left |
| Out 2: Audio out 2 or right |
| Selector: stereo type<br>Top: MONO : The potentiometer controls the amplitude of 8 different effects. Audio out left and right are the same.<br>Middle: SPLIT : The 4 potentiometer of the left controls the amplitude of 4 audio effects on the left channel. the 4 potentiometer of the right controls the amplitude of the same effects on the right channel.<br>Bottom: STEREO : The potentiometer controls the amplitude of 8 different stereo effects. |




| |
|---|
| 6 points parametric audio oscillator<br>This module is a VCO with parametric waveform: the output passes through the 6 points set by the potentiometer value. |
| Module number: 144 (10010000) |
| Potentiometer 1: Oscillator frequency (from about 0.1Hs to 20KHz depending on the settings) |
| Potentiometer 2: Oscillator frequency modulation |
| Potentiometer 3: Point 1 |
| Potentiometer 4: Point 2 |
| Potentiometer 5: Point 3 |
| Potentiometer 6: Point 4 |
| Potentiometer 7: Point 5 |
| Potentiometer 8: Point 6 |
| In 1: Oscillator frequency (1V/Octave) |
| In 2: Oscillator frequency modulation value (1V if unplugged) |
| Out 1: Oscillator output 1 |
| Out 2: Oscillator output 2 (same waveform as out left but 1 Octave higher) |
| Selector: Frequency range<br>Top: High (10~20000Hz)<br>Middle: medium (0.1~200Hz)<br>Bottom: low (0.1~20Hz) |

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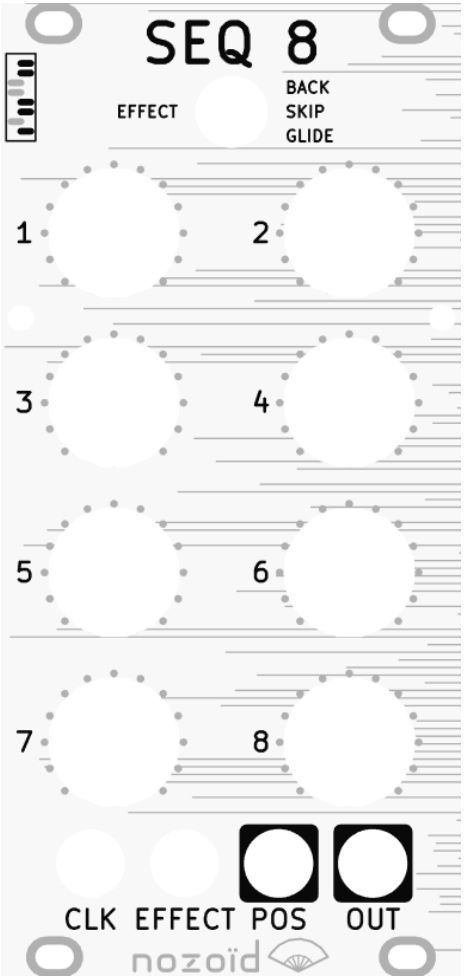
| 4 step sequencer with parameterizable step length<br>Since duration of all steps can be adjusted, this 4 steps sequencer is not so basic.<br>Rythm as complex as : “1 0 0 0 2 0 3 0 0 0 4 0 0 0 0 0” can be programmed is few seconds...<br>This 4 steps sequencer synchronize to a clock input.<br>The “effect” input can be used to trig one of the 3 possible effect available (Skip a step, re-trig multiple gate, or glide from 1 value to another) |
| Module number: 206 (11001110) |
| Potentiometer 1: Step 1 duration (0 to skip, 1, 2, 3, 4, 5, 6, 7, 8) |
| Potentiometer 2: Step 1 value |
| Potentiometer 3: Step 2 duration |
| Potentiometer 4: Step 2 value |
| Potentiometer 5: Step 3 duration |
| Potentiometer 6: Step 3 value |
| Potentiometer 7: Step 4 duration |
| Potentiometer 8: Step 4 value |
| In 1: Clock |
| In 2: Effect |
| Out 1: Gate out |
| Out 2: Seq out |
| Selector: Effect mode<br>Top: Skip (do not mark next step)<br>Middle: retrig (mark multiple gate during a step)<br>Bottom: glide |

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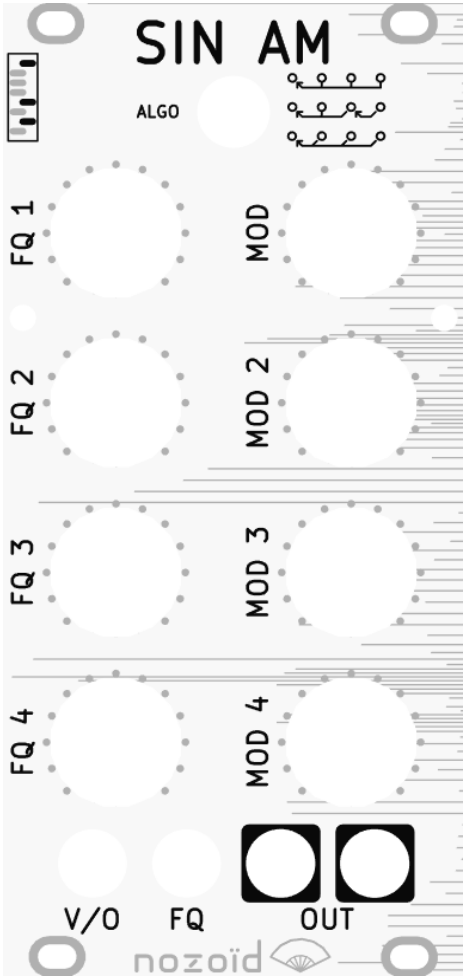
| 8 steps sequencer<br>This is a simple 8 steps sequencer with back, freeze or glide effect. |
| Module number: 205 (11001101) |
| Potentiometer 1: Step 1 |
| Potentiometer 2: Step 2 |
| Potentiometer 3: Step 3 |
| Potentiometer 4: Step 4 |
| Potentiometer 5: Step 5 |
| Potentiometer 6: Step 6 |
| Potentiometer 7: Step 7 |
| Potentiometer 8: Step 8 |
| In 1: Clock input |
| In 2: Effect |
| Out 1: Position |
| Out 2: Step out |
| Selector: Effect type<br>Top: Back (when a high level is apply to this input, a clock signal goes backward)<br>Middle: Skip (The step value is ignore when this input is high)<br>Bottom: glide (linear interpolation of the output when this input is high) |

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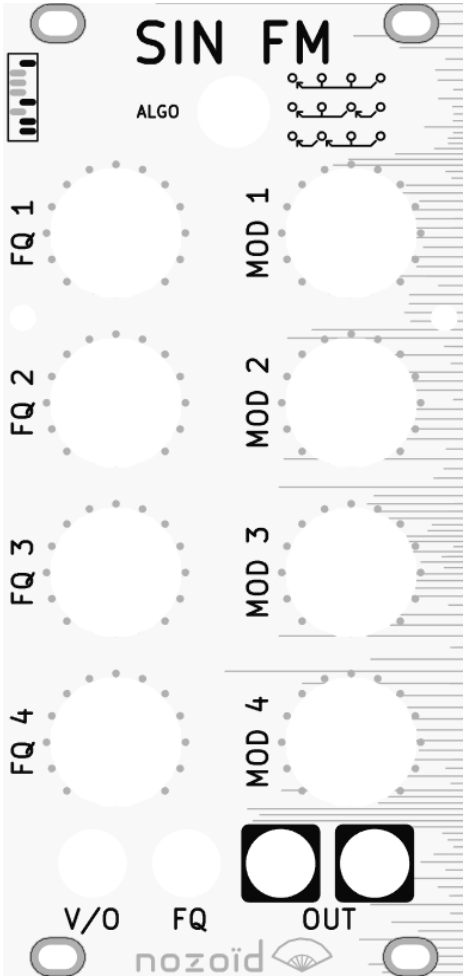
| 4 oscillators AM modulation oscillator<br>Amplitude modulation of 4 sinusoidal signals using 3 different algorithm. This module is a sound generator. |
| Module number: 138 (10001010) |
| Potentiometer 1: Oscillator 1 frequency (from about 0.1Hz to 20KHz) |
| Potentiometer 2: Oscillator 1 frequency modulation (1V/Octave at full modulation) |
| Potentiometer 3: Oscillator 2 frequency |
| Potentiometer 4: Oscillator 2 modulation gain |
| Potentiometer 5: Oscillator 3 frequency |
| Potentiometer 6: Oscillator 3 modulation gain |
| Potentiometer 7: Oscillator 4 frequency |
| Potentiometer 8: Oscillator 4 modulation gain |
| In 1: Frequency (1V/Octave)  (0V if unplugged) |
| In 2: Oscillators frequency modulation value (1V if unplugged) |
| Out 1: Left output |
| Out 2: Right output (same waveform as out left 1 but 1 Octave higher) |
| Selector: Connection order of the oscillators<br>Top:  4 > ( 3 > ( 2 > 1))<br>Middle: 4 > 3 / 3 > (2 >1)<br>Bottom:  4+3+2 > 1 (clipping may occur providing harsher sound for high modulation) |

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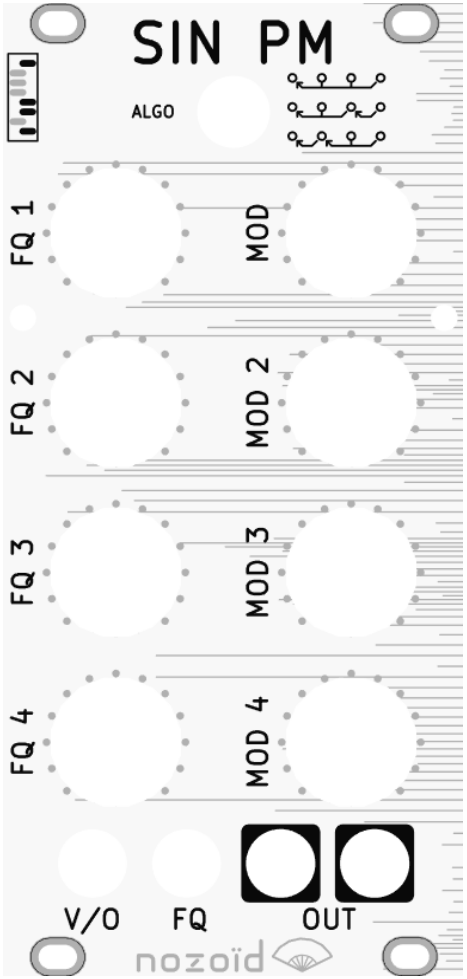
| 4 oscillators FM modulation oscillator<br>Frequency modulation (exponential) of 4 sinusoidal signals using 3 different algorithm. This module is a sound generator. |
| Module number: 139 (10001011) |
| Potentiometer 1: Oscillator 1 frequency (from about 0.1Hz to 20KHz) |
| Potentiometer 2: Oscillator 1 frequency modulation |
| Potentiometer 3: Oscillator 2 frequency |
| Potentiometer 4: Oscillator 2 modulation gain |
| Potentiometer 5: Oscillator 3 frequency |
| Potentiometer 6: Oscillator 3 modulation gain |
| Potentiometer 7: Oscillator 4 frequency |
| Potentiometer 8: Oscillator 4 modulation gain |
| In 1: Frequency (1V/Octave)  (0V if unplugged) |
| In 2: Oscillators frequency modulation value (1V if unplugged) |
| Out 1: Left output |
| Out 2: Right output (same waveform as out left but 1 Octave higher) |
| Selector: Connection order of the oscillators<br>Top: Oscillators 2, 3 and 4 controls the oscillator 1 frequency<br>Middle: Oscillators  2 and 3 control the oscillator 1 frequency, oscillator 4 control oscillators 3.<br>Bottom: Oscillators  3 and 4 control the oscillator 2 frequency, oscillator 2 control oscillators 1. |

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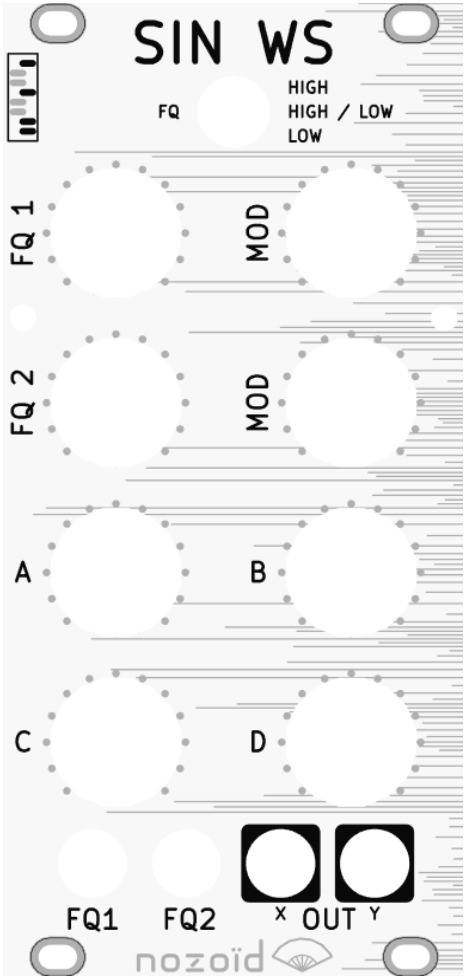
| 4 oscillators Phase Modulation oscillator<br>Phase modulation of 4 sinusoidal signals using 3 different algorithm. This module is a sound generator. |
| Module number: 141 (10001101) |
| Potentiometer 1: Oscillator 1 frequency (from about 7Hz to 20KHz) |
| Potentiometer 2: Oscillator 1 frequency modulation |
| Potentiometer 3: Oscillator 2 frequency |
| Potentiometer 4: Oscillator 2 modulation gain |
| Potentiometer 5: Oscillator 3 frequency |
| Potentiometer 6: Oscillator 3 modulation gain |
| Potentiometer 7: Oscillator 4 frequency |
| Potentiometer 8: Oscillator 4 modulation gain |
| In 1: Frequency (1V/Octave)  (0V if unplugged) |
| In 2: Oscillators frequency modulation value (1V if unplugged) |
| Out 1: Left output |
| Out 2: Right output (same waveform as out left but 1 Octave higher) |
| Selector: Connection order of the oscillators<br>Top: Oscillators 2, 3 and 4 controls the oscillator 1 frequency<br>Middle: Oscillators  2 and 3 control the oscillator 1 frequency, oscillator 4 control oscillators 3.<br>Bottom: Oscillators  3 and 4 control the oscillator 2 frequency, oscillator 2 control oscillators 1. |

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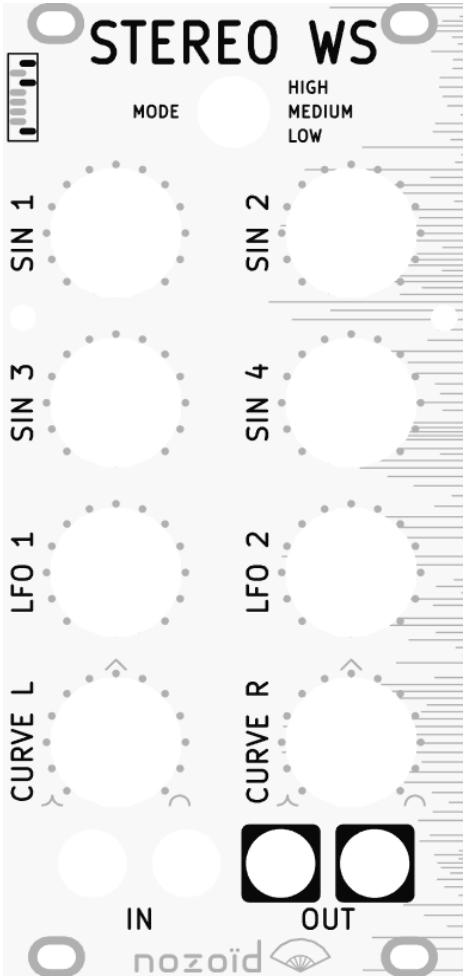
| Dual oscillator and a Peter De Jong waveshaper<br>This modules is based on 2 oscillator that go through a dual input waveshaper based on Peter De Jong equations. The switch change the frequency range off the oscillator from a VCO to a LFO.<br>A, B, C, D are the coefficient of the waveshaper. |
| Module number: 147 (10010011) |
| Potentiometer 1: Frequency of the 1st oscillator (from about 1Hz to 1KHz) |
| Potentiometer 2: Frequency modulation |
| Potentiometer 3: Frequency of the 2nd oscillator |
| Potentiometer 4: Frequency modulation |
| Potentiometer 5: 1st parameter of the attractor |
| Potentiometer 6: 2nd parameter of the attractor |
| Potentiometer 7: 3rd parameter of the attractor |
| Potentiometer 8: 4th parameter of the attractor |
| In 1: 1st frequency modulation value (1V if not plugged) |
| In 2: 2nd frequency modulation value (1V if not plugged) |
| Out 1: X out |
| Out 2: Y out |
| Selector: Frequency range<br>Top: FQ1 : high / FQ2 : high<br>Middle: FQ1 : high / FQ2 : low<br>Bottom: FQ1 : low / FQ2 : low |




Stereo Wave Shaper
This waveshaper is design to use 2 audio input in order to mix them in a non linear way, using 1 or 2 iteration of this equation:
OUT 1 = Sin (A*IN1) - Cos (B*IN2)
OUT 2 = (Sin B*IN2) - Cos (A*IN1 )
2 different LFO at variable frequency can change the offset of the signals in order to create variation of the output timbre.
The curve parameters change the timbre of the outputs.
This module add lot's of harmonics to inputs signals, so it work bast with low frequency inputs.

Module number: 161 (10100001)

Potentiometer 1: GAIN SIN 1

Potentiometer 2: GAIN SIN 2

Potentiometer 3: GAIN SIN 3

Potentiometer 4: GAIN SIN 4

Potentiometer 5: LFO 1

Potentiometer 6: LFO 2

Potentiometer 7: LFO 3

Potentiometer 8: LFO 4

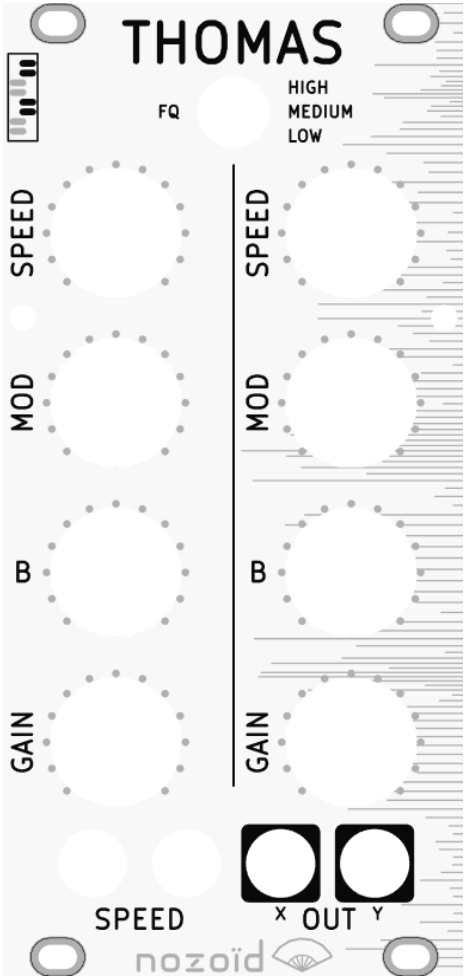
In 1: Audio in 1 (110Hz sin if unplugged)

In 2: Audio in 2 (110Hz sin if unplugged)

Out 1: Out A

Out 2: Out B

Selector: effect type
- Top: High sound modification
- Middle: Medium sound modification
- Bottom: Low sound modification

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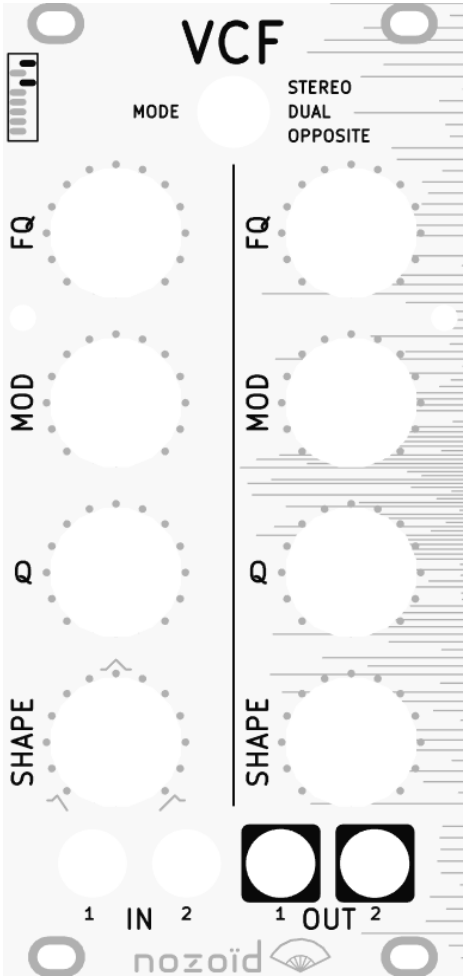
| Dual Thomas strange attractor for CV or audio noise source<br>Dual chaotic attractor. The output is the sum of (X,Y) value of both attractor.<br>B is the control factor of the algorithm.<br>This module can be used as an audio noise generator or lower frequency CV generator depending on the position of the frequency selector. |
| Module number: 204 (11001100) |
| Potentiometer 1: Speed of the attractor 1 (relative frequency of the oscillator) |
| Potentiometer 2: Speed modulation |
| Potentiometer 3: Control factor of the attractor |
| Potentiometer 4: Gain of the X/Y value of the attractor |
| Potentiometer 5: Speed of the attractor 2 (relative frequency of the oscillator) |
| Potentiometer 6: Speed modulation |
| Potentiometer 7: Control factor of the attractor |
| Potentiometer 8: Gain of the X/Y value of the attractor |
| In 1: Speed modulation 1 value (fine tune if not plugged) |
| In 2: Speed modulation 2 value (fine tune if not plugged) |
| Out 1: Sum of both attractor X value |
| Out 2: Sum of both attractor Y value |
| Selector: Frequency range<br>Top: High<br>Middle: medium<br>Bottom: low |

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| Dual filter with parametric control of the frequency response.<br>Dual parametric filter. The shape of the frequency response can be continuously adjusted from low pass, band pass, high pass. With dual in/out, this filter can be used for stereo signals.<br>LP 24dB is at 0%, LP12dB is at 25%, BP is at 50% and HP at 100% of the “morph” potentiometer. |
| Module number: 160 (10100000) |
| Potentiometer 1: VCF 1 cutoff frequency |
| Potentiometer 2: VCF 2 cutoff frequency |
| Potentiometer 3: VCF 1 cutoff frequency modulation (fine tune in stereo mode) |
| Potentiometer 4: VCF 2 cutoff frequency modulation (fine tune in stereo mode) |
| Potentiometer 5: VCF 1 resonance factor |
| Potentiometer 6: VCF 2 resonance factor |
| Potentiometer 7: VCF 1 frequency response (from low pass 24dB/O, low pass 12dB/O, band pass 12dB/O, high pass 12dB/O) |
| Potentiometer 8: VCF 2 frequency response (from low pass 24dB/O, low pass 12dB/O, band pass 12dB/O, high pass 12dB/O) |
| In 1: Filter audio in |
| In 2: Filter audio in (audio in 1 if unplugged) or frequency modulation depending on the filter mode |
| Out 1: Filter 1 out |
| Out 2: Filter 2 out |
| Selector: Filter mode<br>Top: Stereo (2 independent filter without frequency modulation)<br>Middle: dual (audio 1 is send to both filter, audio 2 is used as the frequency modulation)<br>Bottom: opposite (like dual, but modulation is positive for filter 1, negative for filter 2) |