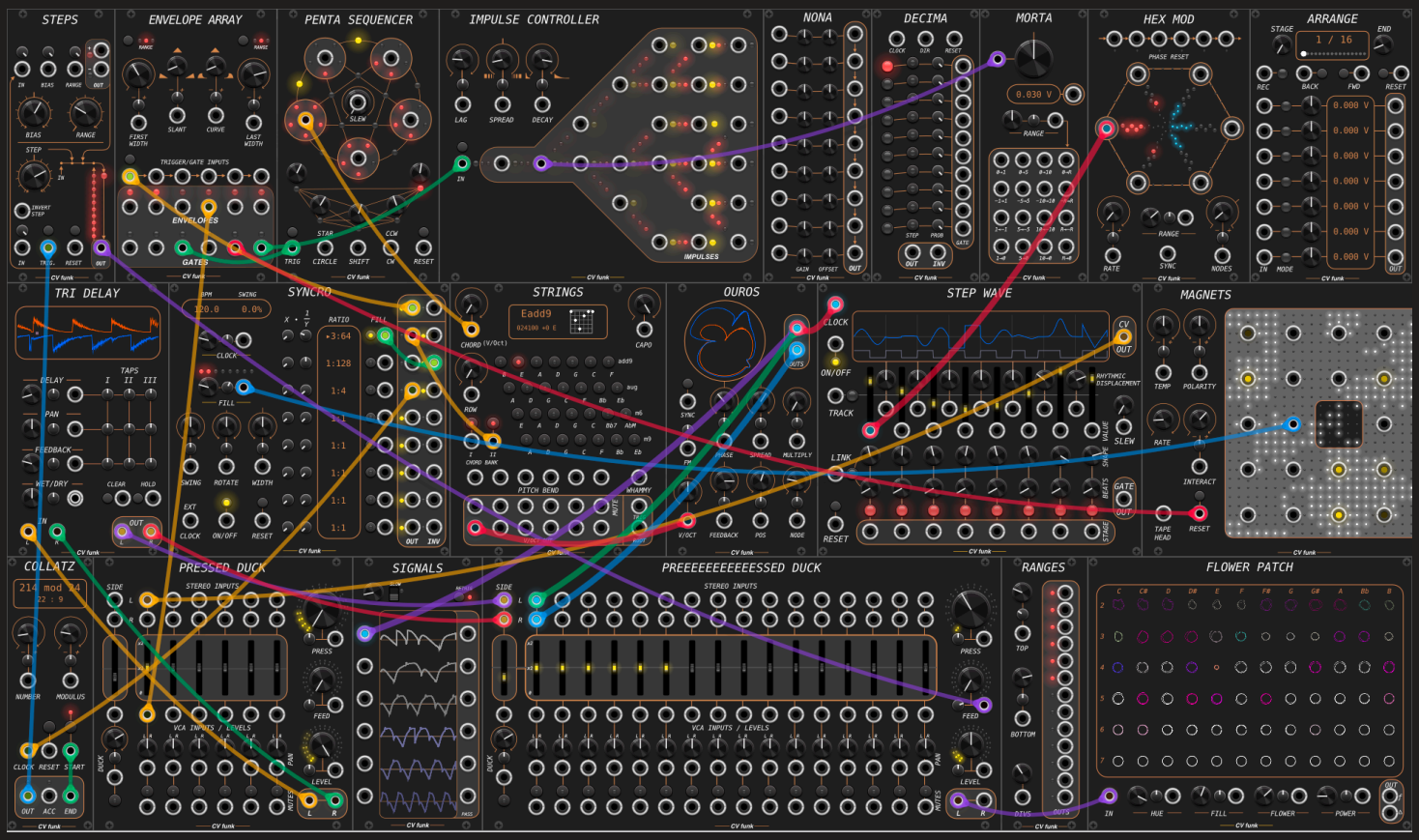
CV funk

CV funk Module Collection for VCV Rack



User Manual

Version 2.0.25

CV funk

DONATE

All CV funk modules are made available for free. If you enjoy these modules and want to support their development you can make a donation at this link:

LICENSES

All source code for these plugins can be found on GitHub (https://github.com/codygeary/CVfunk-Modules).

CV funk Module Menu

*Explore the vast possibilities of modular synthesis with the **CV funk Module Collection**, designed for VCV Rack. This suite of 21 modules simplifies generating a complex spectrum of modulation and sound from simple inputs. The modules are each carefully engineered to inject dynamic modulation, intricate sequencing, and immersive soundscapes into your musical creations! From the precise steps of the **Penta Sequencer** to the wide range of creative freedom offered by the **Step Wave**, each module is designed to explore patch-programmable modular synthesis in a new way, inviting you to dive deep into the complexities of sound design with intuitive macro-controls.*

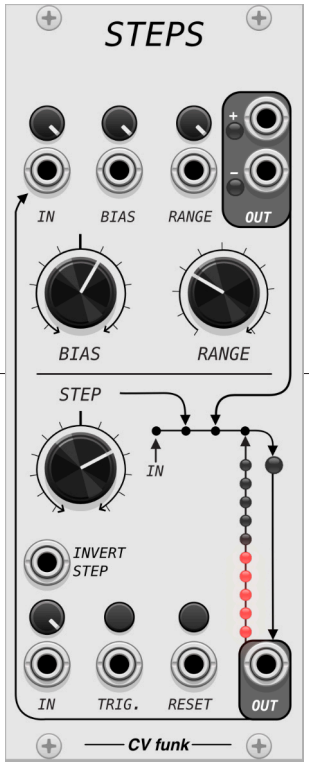
STEPS

Comparator Stage

IN: The signal to be compared. An input ***breaks all normals*** to stepper stage.

BIAS: Center of the window. Range ±5V

RANGE: Size of the window. Range 0–10V



OUT1: Two 10V gate outputs indicate if **IN** is above or below the window.

OUT is scaled by **RANGE** and normalized to the stepper circuit.

Stepper Stage

IN: Sums with the **STEP** knob to set the step size. Range ±1V

TRIG: Triggers the stepper.

RESET: Resets the stepper to **BIAS**. If the comparator normals are broken, resets to 0V.

INVERT STEP: Gate signal inverts the value of **STEP+IN**

MIXER: The mixer sums up:

IN + STEP + OUT1 + OUT2

Steps out of the window range result in ±RANGE from the OUT1 normal.

OUT2: Outputs the stepper value.

Normals to Comparator **IN**.

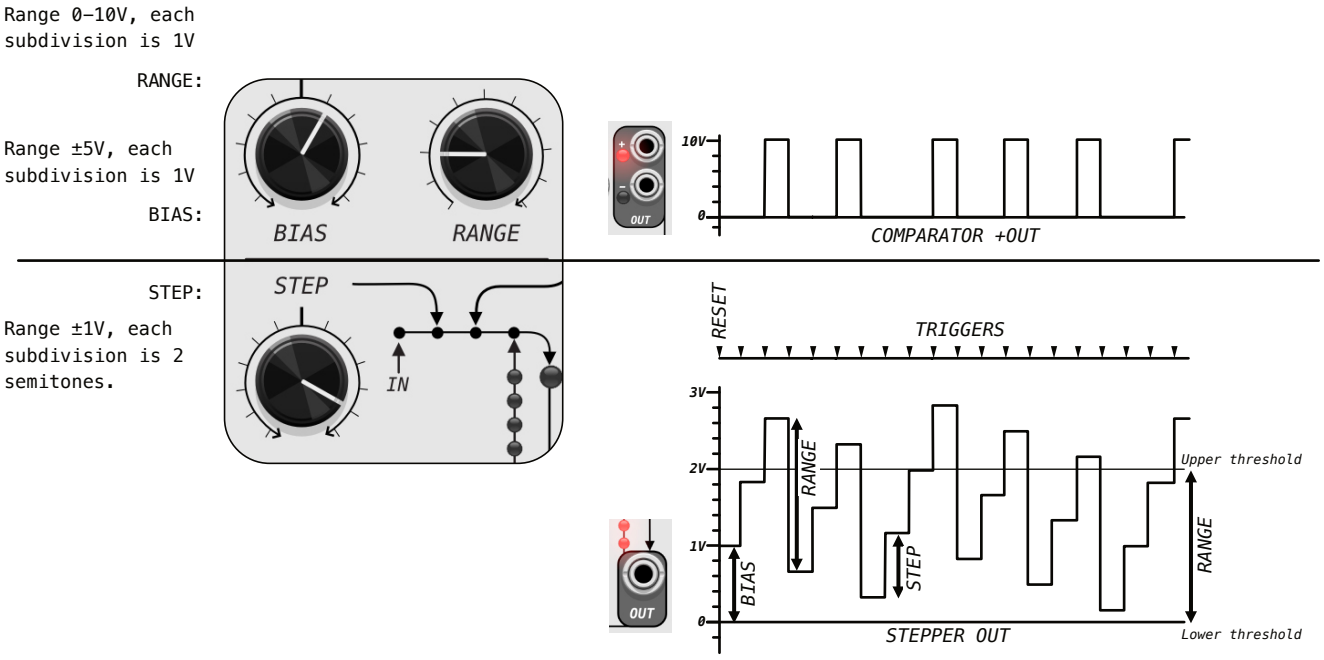
BUTTONS: Manual trigger inputs for **TRIG** and **RESET**

LIGHTS: The column of lights indicate the position of the stepper in the window range in 10% increments.

The single larger light indicate when a step has been triggered or reset.

STEPS combines comparator functionalities with a step sequencer to provide precise control over step signal generation. The stepper increments a voltage in a voltage window, and can be used to generate CV for fixed-interval scales of any width.

STEPS



Usage

1. Parameter Control: Adjust the **BIAS**, **RANGE**, and **STEP** parameters to set the initial conditions for comparison and step modulation.

2. Comparator Input: Feed the signal to be compared into the comparator stage **IN**. The module compares this input against the internally set threshold, influenced by **BIAS** and **RANGE** parameters.

3. Normalized Connections: Using the comparator input breaks the normalization to the stepper section, allowing both sections to be used independently. When normalized, the comparator provides feedback voltages to the stepper to bump it back into the window range after a step goes out of bounds. The lag of one step for corrections produces variation in the output.

4. Interval Sequencing: Utilize the **STEP** input to dynamically control the interval between steps. The **STEP** knob ranges from −1...1V, and is summed with the input. Inputs are scaled down 1/5, so that a −5...5V signal will sweep the full knob range for step size.

5. External Modulation: Patch signals into **BIAS** input, **RANGE** input, and **INVERT** input for dynamic control over the module's parameters.

6. Trigger and Reset: Use **TRIG** input to advance the step sequencer and **RESET** input to reset the sequence to its initial state.

Patch Suggestions

Dynamic Rhythms: Create dynamic rhythmic patterns by modulating **STEP** with LFOs or other modulation sources. Patch the comparator gate **OUTs** to obtain different clock divisions.

Melodic Sequencing: Use the stepper **OUT** to drive the pitch of an oscillator, crafting evolving melodic lines influenced by the comparator's operation. For more interesting patterns use a sequencer set to a slow clock division to program **STEP**, **RANGE** and **BIAS**, allowing you to sequence musical phrasing rather than individual notes.

Counting: Adjust the ratio between **RANGE** and **STEP** size to derive the number of desired steps. For example setting **RANGE** to 4V and **STEP** size to 1V will result in a comparator gate to be outputted once every four steps.

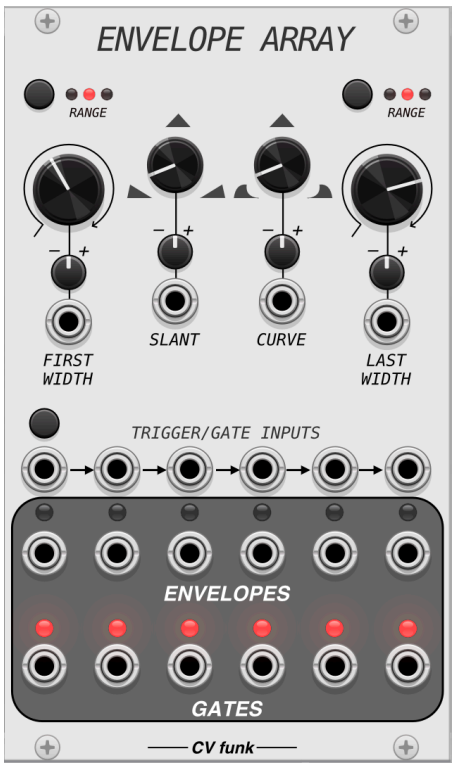
ENVELOPE ARRAY

RANGE: The **RANGE** buttons select between three range settings: fast, seconds, minutes. The setting applies to their associated **FIRST** and **LAST** knobs, with the intermediate outputs bridging even across different ranges.

BUTTON: Manually triggers the first channel.

FIRST WIDTH: Sets the cycle time of the first channel. The knob ranges based on the range setting. CV can add or subtract to select widths even beyond the knob range.

LAST WIDTH: Sets the cycle time of the last channel. Intermediate channels will have times that span **FIRST** and **LAST**.



SLANT: Sets the slant of all related envelopes.

CURVE: Adjust from Log to Linear to Exp and extremes.

Note: **SLANT** and **CURVE** will slightly influence the WIDTH.

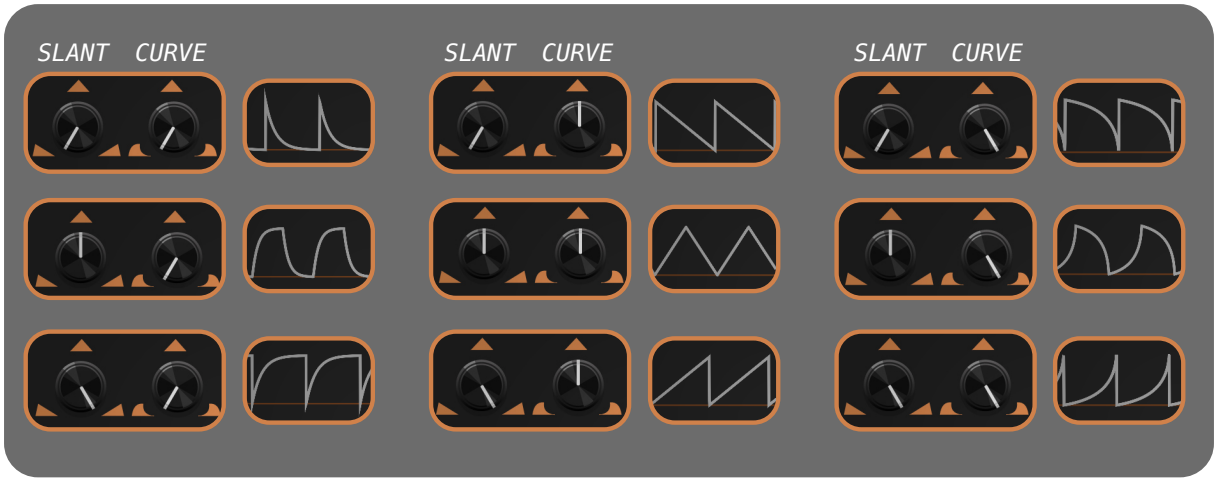
ENVELOPES: Six related envelope outputs.

INPUTS: Each channel has its own input trigger. Triggers are normalized to the right by default.

GATES: Each gate goes high when the envelope is at 0V. Allows for extensive self-patching and chaining of multiple modules.

ENVELOPE ARRAY is an advanced envelope generator module for VCV Rack, designed to provide a wide array of dynamic control over amplitude shaping with six stages and complex modulation capabilities. The module can be self-patched to create a wide variety of modulations and is capable of self-oscillation when self-patched.

ENVELOPE ARRAY



***SLANT** and **CURVE** combine to provide a wide range of possible envelope shapes.*

Usage

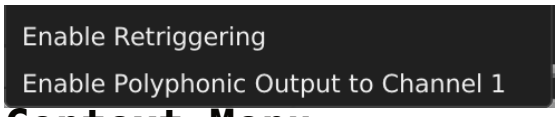
1. Set Envelope Stages: Adjust **FIRST** and **LAST** width knobs to define the width of initial and final stages of the envelope array, the other outputs will take intermediate values.

2. Shape Modulation: Use **SLANT** and **CURVE** knobs to shape the envelope's trajectory, creating everything from logarithmic to linear to exponential responses.

3. Dynamic Control: Patch CV signals into the respective attenuation inputs for real-time modulation of **SLANT**, **CURVE**, and **FIRST**/**LAST** width parameters.

4. Monitor Envelopes: Observe the module's LED indicators for real-time visual feedback on the envelope stages and end-of-cycle signals.

5. Integrate with System: Utilize the end of function **GATE** outputs to trigger or synchronize with other modules, creating complex rhythmic patterns or sequences



Context Menu

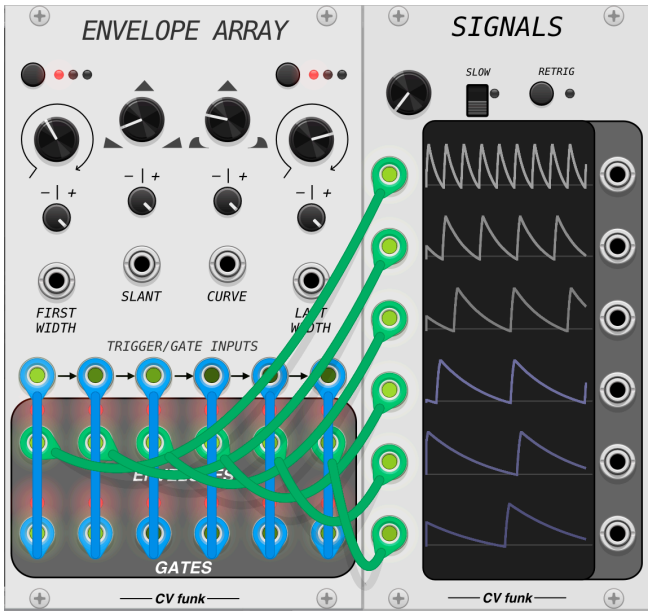
1. Enable Retriggering: This setting changes the retriggering behavior. By default the module will not retrigger until the function reaches 0V. With retriggering enabled, the envelope will retrigger any time during the fall phase (but not during the rise phase).

2. Enable Polyphonic Output to Channel 1: Enabling this option will make Channel 1 of **ENVELOPES** and **GATES** output 6-channel polyphonic signals.

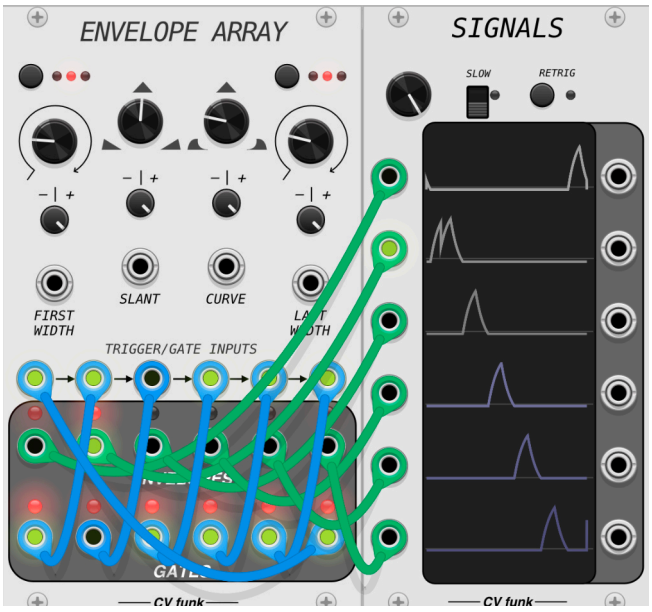
Patch Suggestions

Complex Modulation: Use the ***Envelope Array*** to modulate filter cutoffs, oscillator frequencies, or VCA amplitudes, creating evolving textures and timbres.

Rhythmic Sequencing: Connect the **GATE** outputs to sequencer reset inputs, using the envelope stages to define rhythmic patterns.

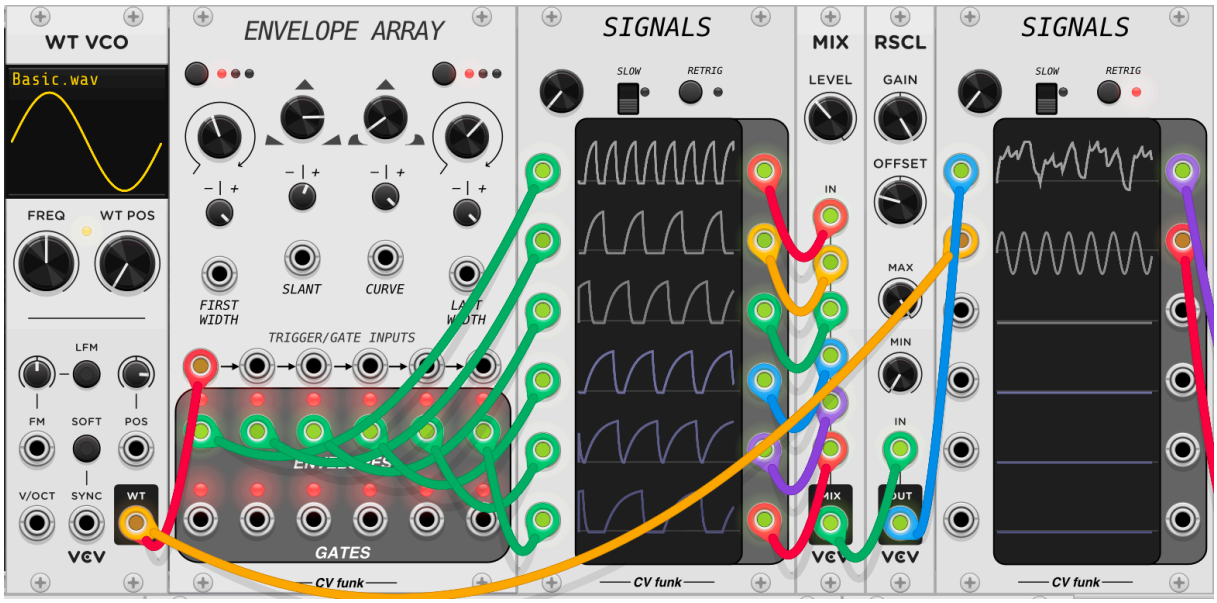


Six Oscillators: Self-patch each channels **GATE** to **IN.** The **GATE** will trigger a gate at the end of each cycle, starting a new cycle. The oscillators will not be in phase.



Chained Envelopes: Patch Channel 1 **GATE** into Channel 2 **IN,** Channel 2 **GATE** into Channel 3 **IN,** etc. When one envelope completes it triggers the next in the series. Patch Channel 6 **GATE** back to Channel 1 **IN** to daisy chain all of the envelopes. Use the envelope outs to self-modulate other parameters to generate more complex modulation patterns.

ENVELOPE ARRAY



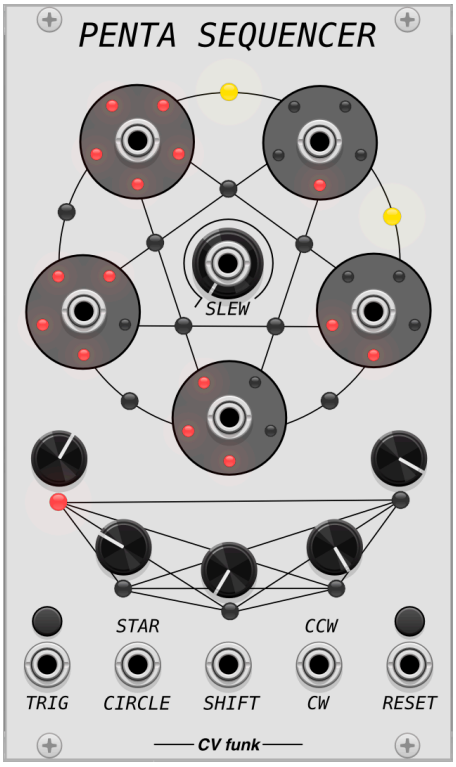
Sub Harmonics: Set both ranges to audio rate. Patch the output from another oscillator into Channel 1 **IN**, and adjust the **FIRST** range to be shorter than the wavelength (use *SIGNALS* to help you adjust the range). Patch all 6 envelope outputs to a mixer. Use *VCV RSCL* to DC offset the envelopes by −5V. Since each channel cannot reset until it is at the end of its cycle, the channels will be retriggered in overlapping ways but synchronized with the root oscillator, resulting in rich harmonics.

PENTA SEQUENCER

OUTS A–E: Five outs, A,B,C,D,E each output one of the five notes. LEDs around the OUT indicate which stage I–V they are outputting.

SLEW: Sets the slew limit based on note timing and interval. Set to the left left there is is no slew. At full right it slews based on the last trigger interval and the distance to the next note on the current track. CV to the central input jack will override the knob, the CV range is −5…5V with 0V making a 50% slew.

KNOBS I–V: Sets the voltage at each stage I, II, III, IV, V.



TRIG: Trigger input, cycles the output mappings on the current path, either STAR or CIRCLE.

SHAPE: (STAR/CIRCLE) Defaults to CIRCLE (I→II→III→IV→V→I), a gate input engages STAR mode (I→III→V→II→IV→I)

DIR: (CW/CCW) Defaults to CW (clockwise). A gate input changes direction to CCW (counterclockwise)

SHIFT: Functions as a transpose input. Sums with all stages I–V.

RESET: Trigger to reset the sequencer to A→I.

PENTA SEQUENCER is a versatile 5-step sequencer module, offering unique sequencing capabilities in a small footprint. The sequencer outputs all five of its notes simultaneously, can switch between any permutation of outputs, and has a computed slew that adjusts dynamically to the trigger input.

PENTA SEQUENCER

Usage

1. Knob Assignment: *Each of the five knobs (**I, II, III, IV, V**) is mapped to one of the five outputs. Advancing the sequencer rotates the mapping between output and knob, indicated by lights around each output. The knob corresponding to the bottom-most active output is indicated by a light.*

2. Mode Selection: *A gate to the **CIRC** input will switch between Circular (<=1V) and Star (>1V) mappings when held. Changing modes will change the mapping of outputs between star and circular relative to the output indicating a 1.*

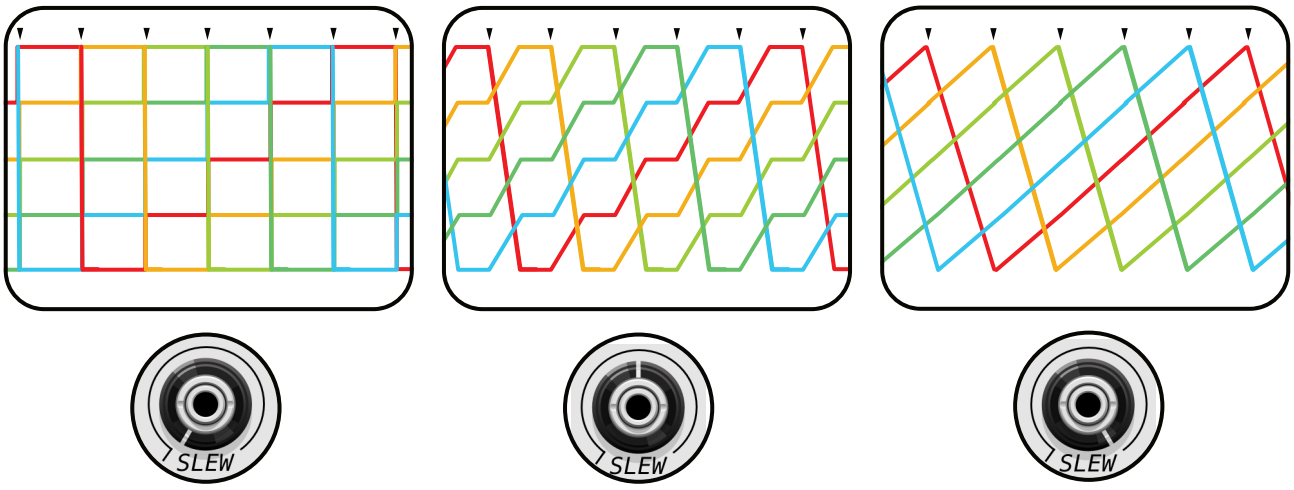
3. Direction Control: *A gate to the **CCW** input will switch between Clockwise (<=1V) and Counterclockwise (>1V) mappings when held. Changing direction will exchange the left and right outputs.*

4. Advancing the Sequence: *Send trigger signals or button press to the **TRIG** input to advance through the sequence according to the selected mode and direction.*

5. Resetting the Sequence: *Send a trigger signal to the **RESET** input to return the sequencer to the first step.*

6. Adjusting Slew: *Use the **SLEW** knob to control the transition smoothness between steps, the slew is synchronized to both the trigger timing and interval size, this means bigger octave jumps slew faster.*

(I=0V, II=1.25V, III=2.5V, IV=3.75V, V=5V)



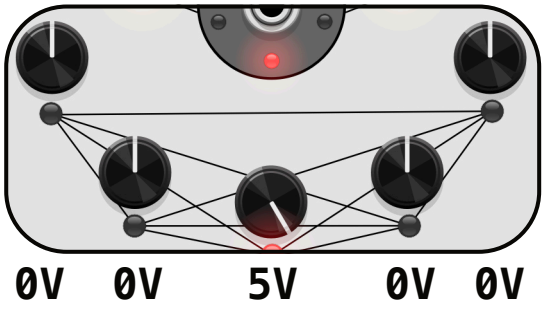
SLEW *allows continuous morphing between stepped and sloped Cvs.*

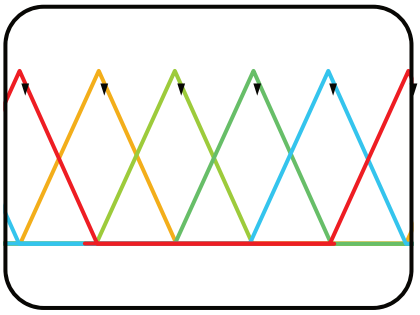
Patch Suggestions

Slewed Octaves: Set each of the five knobs to −2, −1, 0, 1, 2. Set the slew to 0.25 for smooth slewing. Patch each of the five outs to a WT-VCO, adjust each to have a slightly different timbre. With a second copy of the *PENTA SEQUENCER*, set five different notes, set the slew of this one to 0.0, and ideally quantize the outputs before patching to the transpose input of the other sequencer. Now the slew will be perfectly in tune.

LFO: Set a slow clock to the trigger input, set the slew to 1.0. You will have five slow LFOs. The slew interpolates using the time between the last two inputs (trigger/shape/direction) to compute the ramp.

Fixed Root Note: Reset the sequencer so that the bottom output is set to 1. Send gates to switch between **STAR/CIRCLE/CCW/CW,** the bottom output will always stay the same.





Five Channel Fader – Set the first knob I to +5, set all the other positions to 0. Patch each output to a channel of a mixer. Set the slew to 1. A slow trigger to the input will result in smooth transitioning between all five channels on the mixer. Useful to pan between different soundscapes.

Context Menu

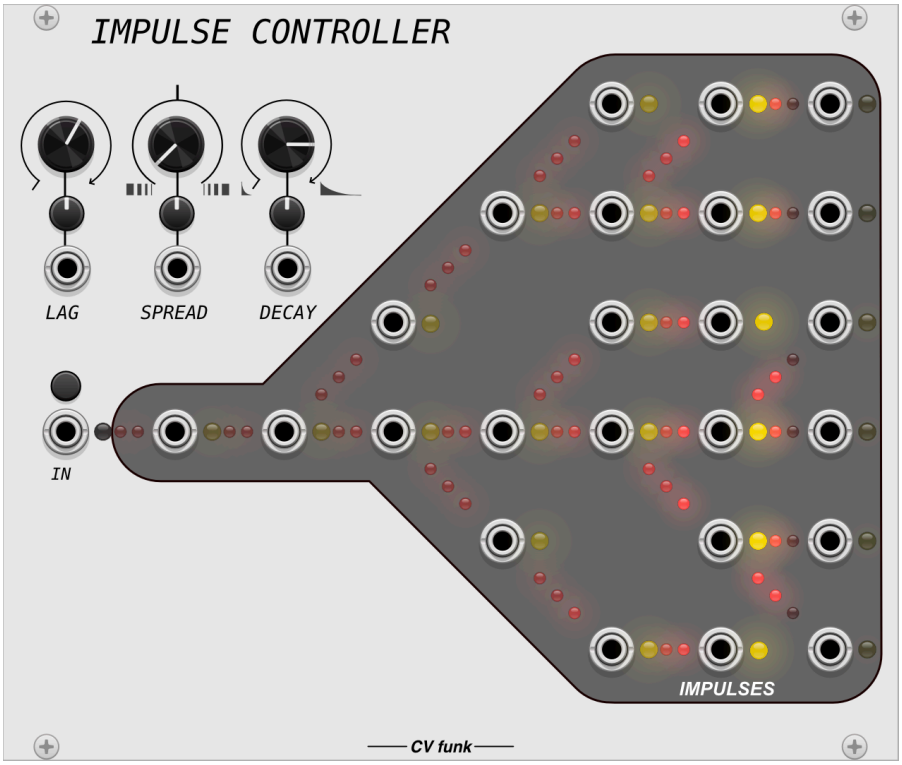
1. Enable Polyphonic Output to Channel A: Enabling this option will make Channel A output 6-channel polyphonic signals.

IMPULSE CONTROLLER

LAG: Determines the delay time for signals to pass between nodes.

SPREAD: Determines the synchronicity of the outputs, turning the knob left brings the nodes into unison, and right apart.

DECAY: Determines the decay time for nodes once activated.

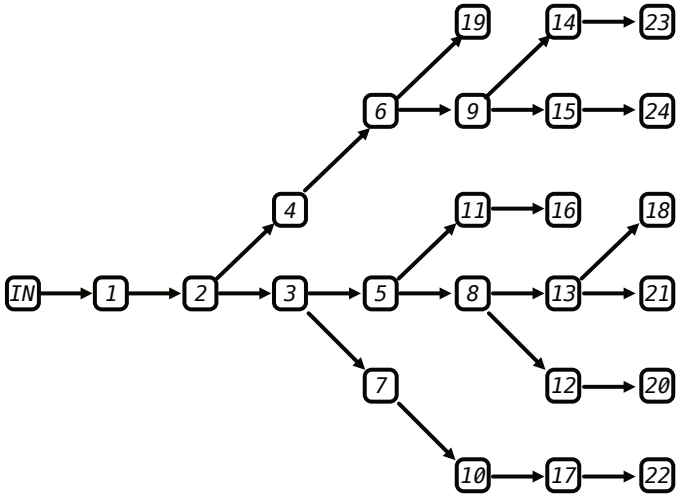


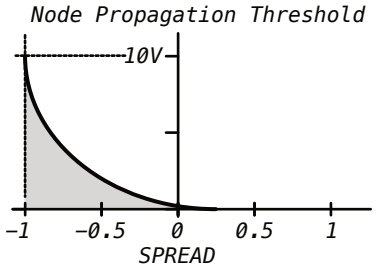
IN: A gate or trigger stimulates the first node, which propagates along the red lighted network.

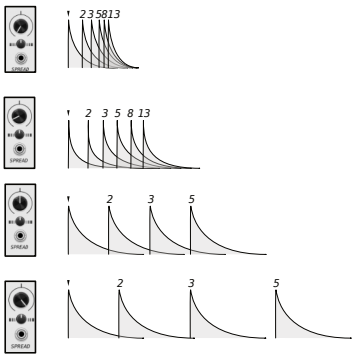
IMPULSES: The yellow light to the right of each output indicates the signal level. 24 outputs produce related decay envelopes in rhythm with the input signal.

IMPULSE CONTROLLER simulates the propagation of waves through a medium, offering unique visual and auditory feedback based on the interactions within a network of nodes. Each of the 24 nodes can generate a decay envelope when stimulated, allowing for long decay tails and rhythmic synchronized pulsations.

IMPULSE CONTROLLER







Usage

1. Initial Setup: Adjust the **SPAN, SPREAD,** and **DECAY** parameters to define the base characteristics of the wave propagation.

2. Signal Input: Introduce signals into the IN to initiate wave propagation across the network.

3. Button Interface: Manually trigger wave impulses with the button, useful for setup and tuning parameters.

4. Modulation: Utilize the dedicated **SPAN, SPREAD,** and **DECAY** inputs for real-time modulation of wave characteristics.

5. Output Utilization: Patch outputs from the 24 nodes into various destinations to explore spatial audio effects and dynamic modulation.

6. Self-Patching: Attenuverters on the inputs expand the self-patching possibilities with this module, and with 24 outputs, you have lots of options.

7. Lag: Adjust the timing for each node to awaken its child nodes.

8. Spread: Sets the voltage to which nodes must decay before they can propagate a signal. Setting the spread to the far left makes nodes fire in unison. **SPREAD** also changes the scaling of each nodes timing, negative spread makes the timing get shorter for each subsequent node activation, positive spread scales the timing from 1–2x longer at each node.

9. Decay: Adjust the decay rate for all nodes.

Patch Suggestions

– Spatial Audio Design: Use outputs to create immersive soundscapes, with *IMPULSE CONTROLLER* simulating movement across the stereo or surround field.

– Dynamic Modulation Source: Employ the module as a complex, evolving modulation source, with each node modulating different parameters in your patch.

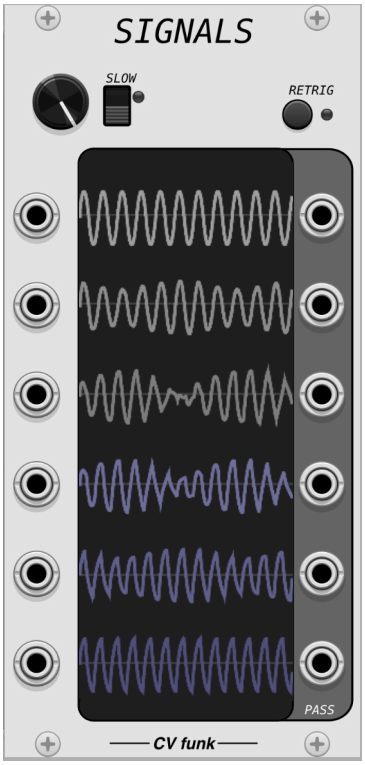
– Networks: Patch multiple Wave Propagation modules together. By patching inter-patching the outputs from different Wave modules to their inputs, and parameters, it is possible to build complex rhythmic networks that can be used to drive expressiveness in your patches. The manual trigger button will jump start the self-patched network, now watch the signal propagate in fascinating ways.

SIGNALS

RANGE: Knob sets the time range. In normal operation it scales up to 1 sec. In ‘SLOW’ mode it scales to 10sec.

SLOW: Switches between 1sec and 10sec scales.

IN: Six inputs and six signals are displayed



RETRIG: Retriggering mode aligns signals based on 1V rising slope detection.

OUT: Six passthrough outputs simplifies using *SIGNALS* in patches.

POLY: Polyphonic inputs will spread downwards until interrupted by a new input.

SIGNALS is handy to tune up your envelope and LFO shapes. Simultaneous viewing of six channels in a small module makes it possible to fit these into your signal chain without getting in the way. Range knob and trigger latch make it useful for observing envelopes or free flowing signals.

RANGES

TOP: Sets the voltage of the top output. Sums with the input/ attenuverter.

BOTTOM: Sets the voltage of the bottom active output. Sums with the input/ attenuverter.

DIVS: Sets the number of subdivisions (and active ports). New outputs become linearly interpolated between **TOP** and **BOTTOM.**

RANGES generates a range of voltages from TOP to BOTTOM, in 0–12 divisions (DIVS). The inputs have CV control, allowing you to patch them with other modules, and for the module to be used in many applications, such as attenuator, gate generator, or crossfader.

Patch Suggestions

12-tone Scale: Set **TOP** to 0. Set **BOTTOM** to 1. Set **DIVS** to 12. Each output is now a note on the 12-tone scale.

4ths Interval Scale: Set **TOP** to 0. Set **BOTTOM** to 5. Set **DIVS** to 12. Now the outputs correspond to a scale of perfect fifths.

Signal Blending: Path two different signals to **TOP** and **BOTTOM**, set the attenuverters both to 1. Set **DIVS** according to how many crossfading outputs you require. Patch each output into a Signals module to visualize the different crossmixes. Adjust the attenuverters to change the ratio of mixing.

Dynamic Panning: Set **TOP** and **BOTTOM** to 0, and set their attenuverters to 1. Patch -5V and +5V to a fader module such as the *VCV FADE*. Patch fader outputs to the **TOP** and **BOTTOM** inputs. Set **DIVS** to the number of mixer channels you have, and patch the outputs to corresponding mixer channels. Crossfading the FADE module will pan all the channels at once.

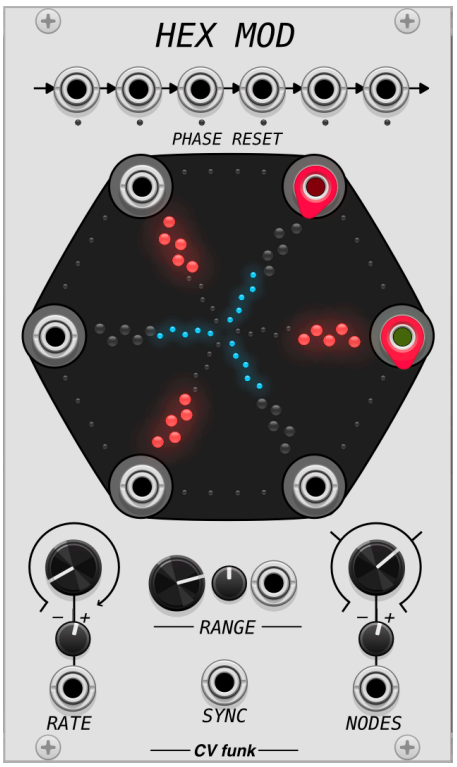
Gate Sequencer: Set **TOP** to 5. Set **BOTTOM** to 5. Set **DIVS** to 0. Patch the outputs numbers 3+ to gate inputs of other modules. A 5V sweeping voltage into **DIVS** will send 5V to all the outputs in sequential order.

HEX MOD

RATE: Sets the rate of the six oscillators. Ranges from 0.02Hz to 10Hz.

SYNC: By default an input to **SYNC** disables the **RATE** inputs. **SYNC** will synchronize the LFOs to an external clock or oscillator.

In the context menu an option is available to multiple **RATE** by **SYNC** to allow for more modulation options. In this mode **RATE**=1 will sync with the signal, **RATE**=2 will double the **SYNC** frequency.



PHASE RESET: Triggers reset each output to zero and zero phase. By default triggers normalize to the right, in a loop. Envelope inputs will cause the phase to more slowly transition back to their default **NODES** position. Gates lock the phases while active.

NODES: Determines the phase alignment of the outputs. 0=hexagonal, 1=unison, 2=binodal, 3=trinodal

LIGHTS: Each output has 10 lights, that indicate the value of the output. The red lights each represent +1V, and the blue lights are each −1V. *You can disable the lights in the context menu.*

RANGE: Sets the output voltage range of the LFO. CV input lets it function as a bipolar VCA.

HEX MOD consists six low frequency oscillators, and produces dynamic, phase-related evolving patterns. Its unique NODE clustering control morphs between distinct phase relationships—hexagonal, unison, bimodal, and trimodal distributions—enabling a spectrum of CV from harmonious alignment to complex polyrhythms. Envelope inputs per oscillator allow for expressive modulation, resetting phases at peak points for synchronized or staggered pulsations.

Usage

1. Rate and Clustering: Begin by setting the **RATE** knob to control the base frequency of the oscillators, use the **NODE** knob to define the initial phase relationship and clustering pattern among the six oscillators.

2. Trigger Inputs: Introduce envelope signals into the inputs along the top of the module to dynamically influence the phase reset as well as the relaxation of each oscillator back to their default phase relationships. Trigger inputs normalize to their right, in a loop.

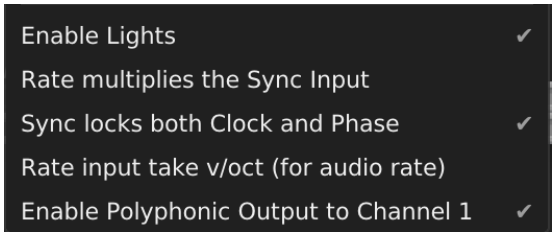
3. Rate CV and Node CV: Utilize **RATE** and **NODE** CV inputs for real-time modulation of the oscillators' frequency and clustering behavior, enabling responsive, evolving textures.

4. Output Exploration: Patch the LFO outputs to various destinations within your rack to modulate parameters with the evolving, complex rhythms generated by the *HEX MOD*.

5. Disable Light Blinking: Access the context menu to enable or disable the module's lights for performance or personal preference.

6. Sync Lock: By default the **SYNC** input locks the rate and disabled the **RATE** knob and CV. In the context menu, you can enable multiplying the synchronized rate by the **RATE** setting, allowing for CV control of FM of the synced rate or to multiply incoming clocks.

7. Range: Control the output range of the LFO like a bipolar VCA. Self-patching leads to interesting modulation potential.



Context Menu

1. Enable Lights: Lets you turn on/off the blinking lights on the front of the panel.

2. Rate multiplies the Sync Input: With this setting activated, the **SYNC** knob acts as a clock multiplier/divider for the incoming clock interval.

3. Sync locks both Clock and Phase: This setting is activated by default, clock pulses also reset the phase so that things are aligned to the clock signal. If you disable it the phases will be free-flowing, and can be synced individually by the top **PHASE RESET** inputs.

4. Rate input take v/oct: With this setting activated, the **RATE** input will take v/oct signals. The attenuvertor and **RATE** knob will both be disabled in this setting.

5. Enable Polyphonic Output to Channel 1: Yes.

Patch Suggestions

Phased Panning: Control the panning of six channels in a mixer. Set the **RATE** or optionally use the **SYNC** input to tempo-lock the LFO. **NODES** set to 0 will evenly space the channels. A trigger to any of the top inputs will cause the sounds group in space and then slowly spread out again. Experiment with different settings of **NODES** to group the channels in different arrangements.

Waveshaped Outputs: Patch one of the outputs into **RATE**, and set the attenuverter. Patch another output into **NODES**, adjust the attenuverter.

Audio Rate Timbres: Set the context menu into v/oct mode. Plug output LFO2 into the **NODE** input, with the attenuvertor set to 0.1. Plug output LFO4 into your mixer or VCA. Adjust the **NODE** to create interesting timbres. Try patching the **NODE** input to different outputs. Each of the six *HEX MOD* outputs will have a different sound, so explore them all.

COLLATZ

NUMBER: Sets the starting number for the Collatz sequence.

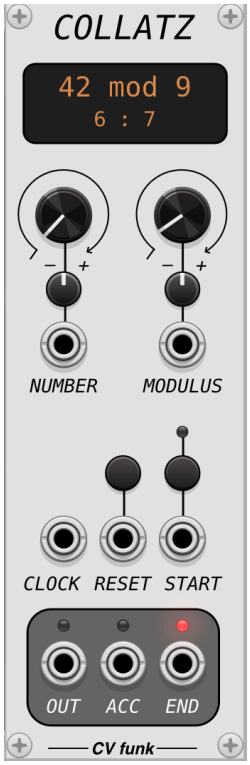
Even: /2

Odd: ∗3 + 2

Range 2–1000

CLOCK: The timing between pulses sets the clock interval for the polyrhythms. A **CLOCK** signal is needed for the module to output gates.

OUTS: The **OUT** and **ACC** outs are computed from the **MODULUS.** Each out is a gate signal that has a 50% pulse width.



MODULUS: Limits the number of pulses per clock interval. The remainder sets the main **OUT**, and the divisor sets the ACC out.

START: Triggers the start of the sequence. Once armed, the sequencer will wait for the next clock pulse before starting.

END: When the sequence reaches 1 it terminates and raises the **END** gate, rather than continue to 4–2–1 in a loop.

Patch **END** to **START** to make the sequencer cycle.

COLLATZ generates rhythmic triggers synced to a clock signal using numbers from Collatz sequences. You pick number, and if it's even divide by two, and if it's odd multiply by three and add one. This generates a sequence. According to the Collatz Conjecture, this series will eventually lead to one. When the module reaches 1, it terminates and outputs an end gate. Triggers are outputted as clock multiples of the number mod MODULUS, and the divisor is used to compute the accent output.

COLLATZ

Usage

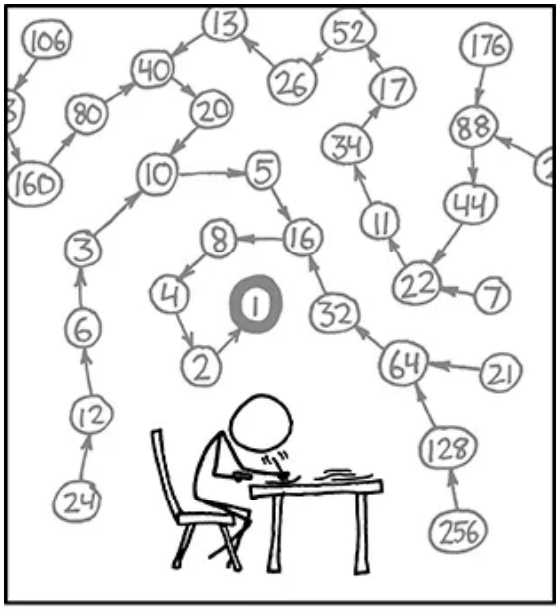
1. Number and Mod: Begin by setting **NUMBER** and **MODULUS.** The **MODULUS** sets the maximum number of pulses per clock interval, and is best set to a low number if you wish to use it for drum beats, but can potentially be faster up to audio rate depending on the setting.

2. Clock Input: This module requires a clock signal to work. If a clock is not patched, no output signals will go to **OUT** or **ACC.**

3. Start Input: Patch a trigger or gate to **START** to initiate the sequence. The value of **NUMBER** will be sampled and used as the starting number for the sequence, which will start on the next **CLOCK** pulse.

4. Reset: A trigger or gate to the **RESET** will stop the sequence and turn off outputs.

5. End Gate: When the sequence reaches 1, the **END** gate will go high. If you desire looping sequences, you can patch **END** into **START.**



THE COLLATZ CONJECTURE STATES THAT IF YOU PICK A NUMBER, AND IF IT'S EVEN DIVIDE IT BY TWO AND IF IT'S ODD MULTIPLY IT BY THREE AND ADD ONE, AND YOU REPEAT THIS PROCEDURE LONG ENOUGH, EVENTUALLY YOUR FRIENDS WILL STOP CALLING TO SEE IF YOU WANT TO HANG OUT.

Patch Suggestions

Drums: The snappy gates of this module can be used for snare drums or other percussive elements. Link **CLOCK** to your main clock, or a clock division, and patch **END** to **START** to cause the module to cycle.

Strumming: Use the clock multiplied outputs to activate the plucking of Karplus Strong strings.

Basic Rhythm Patterms: Set **NUMBER** to 4,8,16 or 32 to get a simple drum pattern similar to rotating clock divisions.

32→16→8→4→2→1

16→8→4→2→1

8→4→2→1

4→2→1

Patterns are often nested, so you can choose depending on the length you wish to use:

12→6→3→10→5→16→8→4→2→1

6→3→10→5→16→8→4→2→1

3→10→5→16→8→4→2→1

10→5→16→8→4→2→1

5→16→8→4→2→1

Low numbers can result in long patterns, so it's a bit hard to predict. But each **NUMBER** will always lead to the same sequence, leading eventually to 4→2→1.

9→28→14→7→22→11→34→17→52→26→13→40→20→10→5→16→8→4→2→1

The MODULUS input allows for a variety of different drum patterns to be produced from any Collatz sequence. Experiment with different combinations of **NUMBER** and **MODULUS**, and for sequences that go on for 100s of steps don't forget there is a **RESET** input! Explore and enjoy.

STRINGS

CHORD:

Selects the chord, spans 1–7.

ROW:

Selects the row of chords, spans 1–4.

CHORD BANK:

The two input combine to specify 1 of 4 chord banks. Manually select a bank with the buttons. Button latching inverts the gate operation, allowing you to pick which bank is selected by a high gate.

PITCH BEND:

Uses the absolute value of the input. A 10V envelope will result in a 2 semitone bend.

V/OCT OUT:

Six outputs, each correspond to one string. Muted strings output –10V, for logic uses in patching.

If only the leftmost input is patched, the module will output 6-channel poly signals.

MUTE:

Outputs a gate when a string is muted in a chord. Useful for emulating the guitar by muting the outputs of oscillators.

If only the leftmost input is patched, the module will output 6-channel poly signals.

TRIG:

Outputs a trigger signal anytime a **BUTTON** is pressed, or **CHORD**, **ROW**, **CHORD BANK** or **CAPO** setting is changed.

CAPO:

Transposes the chords. Inputs range from –12 to 12V, in 1 semitone intervals, or 12V/oct.

BUTTONS:

Manually trigger a new **CHORD**. The illuminated button indicates the **ROOT** note of the CHORD.

The chord type is indicated right of the buttons, and details of the chord are shown in the display.

WHAMMY:

Works like the **PITCH BEND** input, but applies to all inputs in addition to **PITCH BEND**.

ROOT:

Outputs the **ROOT** note of the current **CHORD**.

STRINGS produces six V/oct signals representing the strings of a guitar. Buttons and inputs select between different chord banks and voicing options, which are indicated dynamically on the panel and display. Pitch bend, whammy bar and capo are implemented allowing guitar-like effects to be intuitively produced.

STRINGS

Usage

1. Chord and Row: Begin by setting **CHORD** and **ROW.** The **CHORD** addresses the column, while **ROW** sets the row on the button grid.

Row 1:	B	E	A	D	G	C	F
Row 2:	A	D	G	C	F	Bb	Eb
Row 3:	E	A	D	G	C	Bb7	Abmaj
Row 4:	A	D	G	C	F	Bb	Eb

The arrangement of notes on the button panel are

2. Default Chord Bank: The two inputs **I** and **II** combine to select one of four chord banks.

(I,II)

(0,0) Bank 1: Dominant 7th, Major, Minor, Suspended 2nd

(1,0) Bank 2: Dominant 7th Barre, Major Barre, Minor Barre, 6th

(0,1) Bank 3: Suspended 4th, Major 7th, Minor 7th, Dominant 7 Suspended 4th

(1,1) Bank 4: Add 9, Augmented, Minor 6th, Minor 9th

Bank 1 contains the most essential chord types. Chords in the rows are arranged so that the relative major and minor chords are juxtaposed, allowing for easy transitions.

Bank 2 contains Barre chords, but also B and E major in the top row with the other Barre chord 7th variants. Major and minor Barre chord variants are available. In the Minor chord row, two exceptions, Bb7 and AbMaj, add more flavor.

Bank 3 features Major and Minor 7ths, which provide tension and harmony to chord progressions. In Row 3, the Ab7 offers a contrasting chord.

Bank 4 features more colorful chords, especially the Minor 9th chords in Row 4.

3. Mutes: Many guitar chord fingerings contain muted strings. In this case, the string will output −10V. The mute gates allow you to easily patch mutes to connected oscillators when the chord voicing requires.

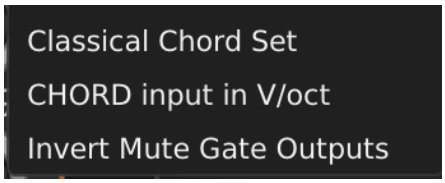
4. Pitch Bend and Whammy: PITCH BEND and **WHAMMY** inputs allow you to bend the notes positively, all inputs will be rectified before applying the bend, simulating string bending. A 10V input will result in a 2 semitone bend, making it easy to program bends with envelope outputs. **WHAMMY** applies the bend to all strings at once. **PITCH** and **WHAMMY** can be applied at the same time for extra bending.

5. Capo: The **CAPO** input simulates adding a capo to the guitar. Each 1V of input results in 1 semitone of offset. Try patching the VCV *OCT* module into **CAPO** for a nice interface. Negative values to **CAPO** will let you tune the guitar down.

6. Trigger Out: Every time the chord or fingering changes, or a **BUTTON** is pressed, a trigger is sent to the **TRIG** output. This allows you to trigger the strumming of the strings every time a new chord is selected, for example by patching **TRIG** into the IN of a module like *IMPULSE CONTROLLER*.

7. Root Out: The ROOT output send an extra v/oct signal that is the root note of the chord. This is useful if you want to have another instrument accompany the guitar sounds.

8. Polyphonic Patching: Patching to only the leftmost outputs of **V/OCT** and/or **MUTE** will activate polyphonic 6-channel outputs for ease of patching with other poly modules.



Context Menu

1. Classical Chord Set: Switches between the default and classical chord banks. The classical set features diminished chords instead of more contemporary suspended chords.

(I,II)

(0,0) Bank 1: Dominant 7th, Major, Minor, Diminished

(1,0) Bank 2: Dominant 7th Barre, Major Barre, Minor Barre, Diminished 7th

(0,1) Bank 3: 2nd, Major 7th, Minor 7th, 9th

(1,1) Bank 4: 6, 7+5, Minor 6th, Augmented

2. CHORD input in V/oct: Changes the input function for the CHORD input. In V/oct mode, rather than have the range 1-7 that map to the column of buttons, the module will detect the incoming note and map to the closet chord in that row (adding a +1 to the capo setting if necessary).

3. Invert Mute Gate Outputs: Inverts the **MUTE** Gates, which makes them function as normal Gate outputs. This can be useful in some situations, for example if you want to use the outputs to open a VCA.

Patch Suggestions

Guitar: Patch the six v/oct **OUT** signals into six Karplus Strong modules such as *Pluck by TyrannosaurusRu*. Patch the outputs of the MUTE gates to the DCY decay modulation input of *Pluck (set the mod amount to -1)*, patch the outputs into your mixer. Patch the **TRIG output** into the IN of CV funk *IMPULSE CONTROLLER*. Patch different outputs into the plucking input of the *Pluck*.

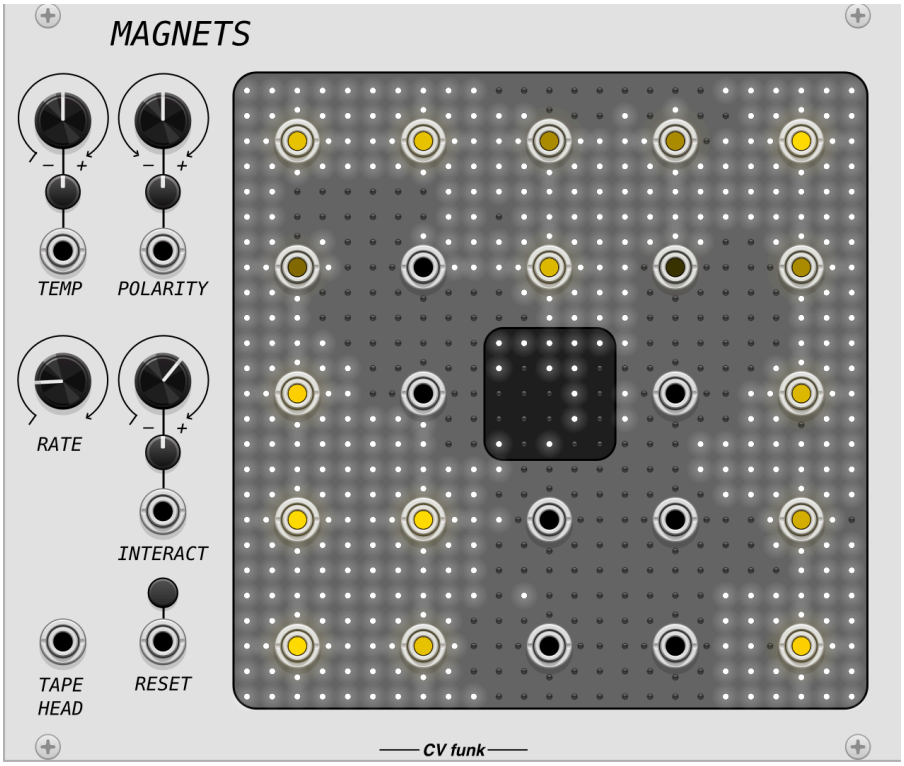
Note Bending: Patch the **TRIG** output into CV funk *ENVELOPE ARRAY* or other envelope generator. Patch an envelope output to the 5th string **PITCH BEND** input.

Neck Slide: Slide down the neck, patch a decay envelope from *ENVELOPE ARRAY* into the **CAPO** input. The quantizing will sound like sliding down the frets.

Glass Slide Effect: Patch Sine from VCV *LFO* to the **WHAMMY** input. Set the *LFO* module to 6Hz, and unipolar modulation. Patch **TRIG** out to the Reset of *LFO* to sync the oscillation to the chords.

Sequencing: Set the **CHORD** input mode to V/oct in the context menu. Set CHORD all the way down. Patch a keyboard or sequencer to the CHORD input. Now use **ROW**, **I** and **II** to select the chord type. For any root note provided, the module will find the closest guitar fingering and apply a **CAPO** offset if necessary.

MAGNETS



TEMP:

Temperature of the simulation.

POLARITY:

Changes the polarization of the array.

INTERACT:

Sets how much nodes interact with each other.

RATE:

Sets the delay between simulation updates. Faster updates requires more CPU.

TAPE HEAD:

Sets the up/down spins of the central square. Also sums with POLARITY to affect the whole array.

RESET:

Randomizes the spin state of all the nodes, based on the POLARITY.

MAGNETS, how do they work? This module allows you to interact with a magnetic spin lattice simulation. CV control over the simulation parameters and RATE allow for interesting interactions and self-patching possibilities. Each light is a spin state, and the outputs report the averaged value of all spins in the grid element.

Usage

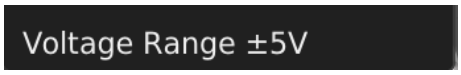
1. TEMP: Set the temperature of the simulation. A low temp can freeze the simulation, while a hot temp adds lots of randomness.

2. POLARITY: The polarization input allows you to influence all of the nodes at once, making them more likely to polarize when updated in the simulation.

3. RATE: Sets the update timing for the Metropolis/Monte Carlo simulation. Faster rates require more CPU.

4. RESET: A trigger or gate to the **RESET** will randomize the spin states of all lattice points according to the **POLARITY** setting.

5. INTERACT Sets how much neighboring lattice nodes interact with each other. This setting can induce phase changes in the array. Lower **INTERACT** settings allow the array to behave more fluid, while higher settings can cause some states to be trapped.



Context Menu

1. Voltage Range ±5V: Switches between the default ±10V to ±5V for the output voltage ranges.

OUROS

V/OCT: Sets the frequency of the oscillator, ranges 8 octaves.

FM: Exp FM input sums with V/oct.

SYNC: Hard-syncs the oscillator.

POLYPHONY: A polyphonic input to **V/OCT** will activate polyphony on the module and all other CV inputs.

FEEDBACK: Sets the amount of phase-feedback. Set to zero. the oscillator will output a perfect sine, and feedback related knobs POS, NODE and MULTIPLY will have no effect.

PHASE: Controls the phase of the oscillator relative to the nodes

SPREAD: Controls the spread of the L and R phases.

MULTIPLY: Multiplies the feedback phase, generating higher harmonics. The knob is non-linearly mapped so that it always maps close to an integer value.

POSITION: Sets the phase position of the feedback relative to the oscillator clock cycle.

NODE: Changes the number of repetition nodes in the phase channel relative to the oscillator channel.

OUROS is a stereo phase modulation oscillator inspired from the perpetual cycle of the ouroboros. The dual oscillators interplay on a circular display, capturing the essence of phase relationships evolving in an endless loop. The NODE control transitions between phase spaces – unison, bimodal, trimodal, and back, enabling intricate phase textures. FEEDBACK dynamics, inspired by the ouroboros consuming its tail, inject complexity by self-modulating NODE to evolve complex timbres.

Usage

1. RATE: Set the base frequency of the oscillators in v/oct. The knob sums with the **RATE** input.

2. Phase Mapping (PHASE and SPREAD): PHASE shifts both waveforms around the phase circle simultaneously, while **SPREAD** adjusts the phase difference between the left and right outputs, enhancing stereo width and movement.

3. Feedback Control: Use the **FEEDBACK** knob and input to control the intensity of the output fed back into the **NODE** modulation, adding depth and complexity through resonant and echoing effects.

4. Frequency Multiplier: The **MULTIPLY** knob emphasizes harmonic relationships by adjusting the frequency of the feedback loop, ideal for creating metallic timbres and harmonic textures.

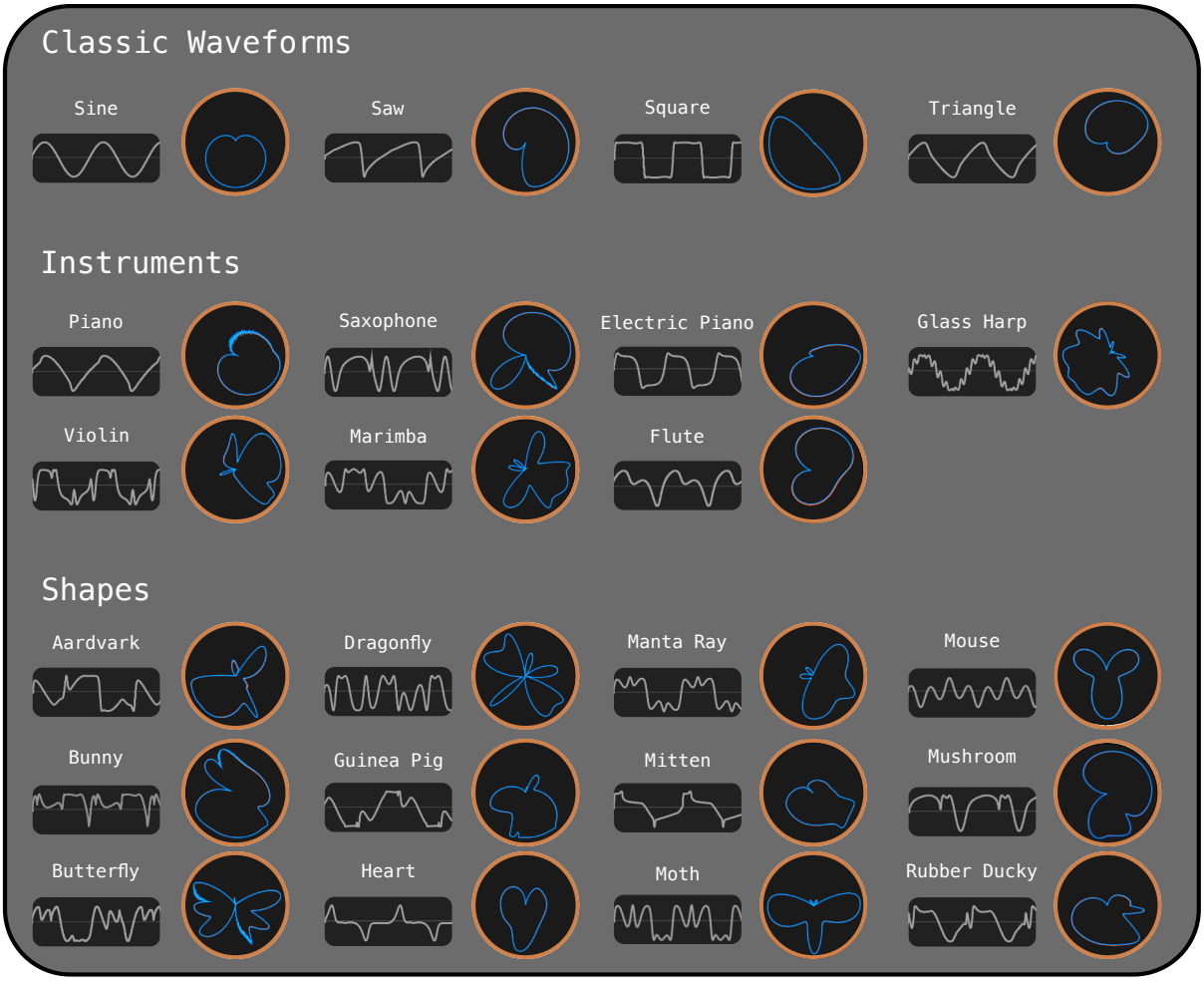
5. Phase Relationship (NODE Control): Adjust the **NODE** knob to transition between different phase distributions such as unison, bimodal, and trimodal, crafting rhythmic patterns and evolving textures.

6. Visualization: The circular display shows the interaction of waveforms in real time. The waveforms are displayed in polar coordinates, based on the fundamental frequency.

7. Reset Functionality: The **RESET** button and input synchronize oscillator phases to external signals or reset them when loading presets, crucial for rhythmic alignment and transient shaping

Context Menu

1. Presets: Access factory presets from the Context Menu > Presets submenu. Presets are divided into three categories: Classic waveforms, Instruments, and Shapes.



Presets Guide

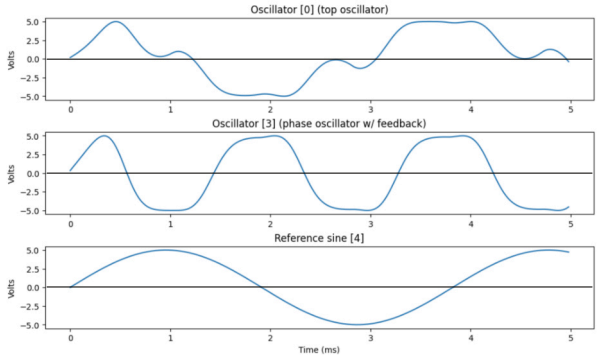
1. Classic Waveforms: The default waveform is Sine. A slightly rounded version of Saw, Square, and Triangle are possible. Since the waveforms are produced additively, they lack the higher harmonics, but also have the benefit to sound nice unfiltered.

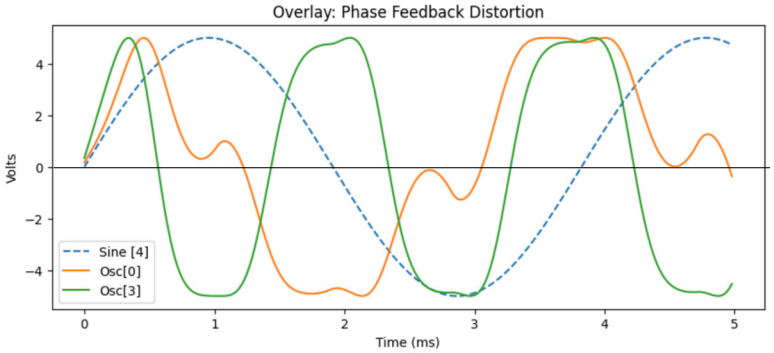
2. Instruments: Classic instrument waveforms can be approximated. Integer **MULTIPLY** inputs produce harmonically related timbres.

3. Shapes: A wide variety of abstract shapes are possible, and these presets only represent some of the possibilities. Each shapes is set to integer **MULTIPLY** and with **SPREAD** set to zero. Experiment with small offsets of these to produce animated timbres and stereo effects.

Technical Notes

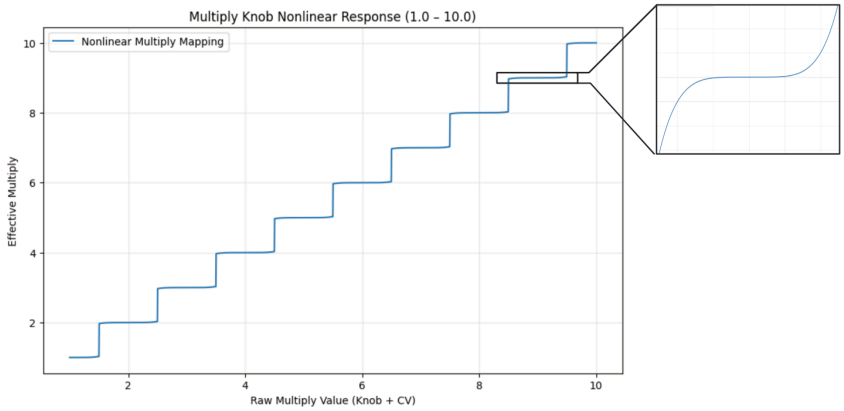
1. How does phase feedback distortion work? Phase-feedback distortion happens because the oscillator's phase position isn't fixed – instead, it is continuously perturbed by feeding back a portion of another oscillator's output to control the phase placement. In essence it works like the ouroboros, the snake that eats its own tail. This feedback loop shifts the oscillator slightly off its "ideal" phase each cycle, causing the waveform to bend and skew over time. The result is a sine-like signal whose harmonic content and shape depend on the feedback depth, giving a controllable distortion that grows as feedback increases.





Multiply = 2 in this example

2. Non-linear mapping of multiply knob. The multiply knob determines how much the phase oscillator is scaled relative to the main oscillator. The scaling effect is similar to the effect of an FM operator ratio, and sounds best at integer ratios. The knob maps with a set of steep 5th order polynomials, so that you can span the whole range, but most of the span is on regions very close to integer values.



PRESSED DUCK

SIDE:

Stereo input for the side-chain.

STEREO INPUTS:

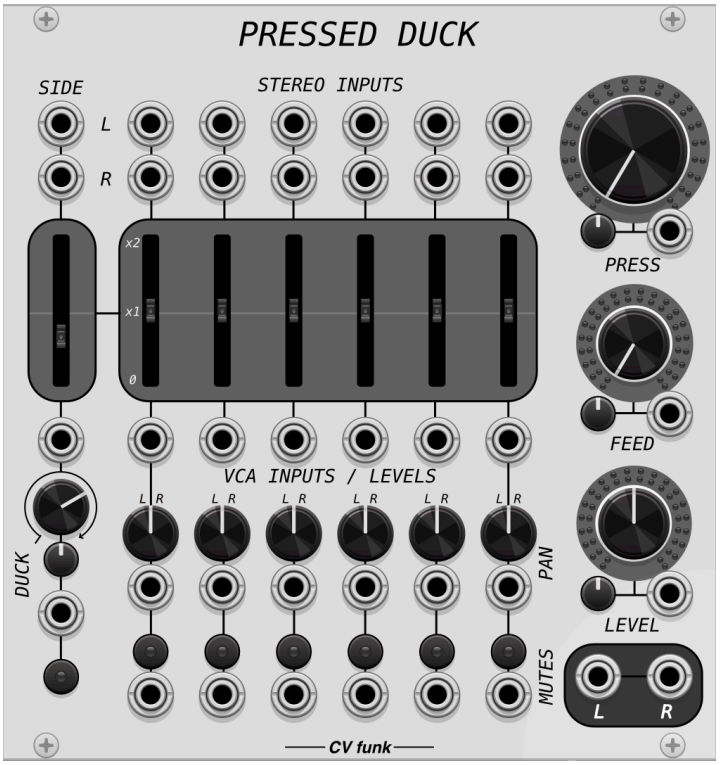
Six stereo inputs that are compressed together by the **PRESS** setting.

PRESS:

Sets the amount of compression applied to the main mix (excluding **SIDE**).

LEVELS:

Sliders set the input levels. VCA inputs multiply with the slider input. The range is from 0 to 2x gain, with the unity gain midpoint marked.



FEED:

Sets the amount of feedback in the mixer. Can be used to boost the saturation effect to more extreme levels of distortion.

DUCK:

Sets the amount that the **SIDE** signal ducks into the main mix.

LEVEL:

Sets the master output volume. The range goes up to 2x gain. 1x saturates at 5V, while 2x saturates at 10V.

MUTES:

Buttons allow for clickless muting of the main channels. CV inputs override the buttons, which indicate the mute status of the channels.

Shift-click will **SOLO** the selected channel.

PAN:

Sets the panning of each channel L/R. The **SIDE** channel does not pan, and is defaulted to center.

L/R OUTPUTS:

Stereo outputs.

PRESSED DUCK will compress and duck your sound into a deliciously crunchy soundscape. Side-chain ducking of the six main channels allows for intense bass lines. Envelope followers on all channels allow you to compress to the point that incoming signals fill the entire bandwidth. Full CV control over all features. Antiderivative antialiasing DSP results in a cleaner mix with low CPU usage.

PRESSED DUCK

Usage

1. SIDE: Stereo inputs for the side-chain channel of the mixer. This channel can duck into the rest of the mix.

2. INPUTS: Six channels of stereo inputs are compressed together by the **PRESS** parameter. Fully compressing the mix will fill the full voltage range set by the **LEVEL** with tanh saturation.

3. Faders: The faders set the input gain, ranging from 0 to 1x in the center, to 2x at the top.

4. VCA INPUTS: Linear VCA inputs are multiplied by the Fader setting.

5. PRESS: Sets the compression level of the mix. The indicator lights show the amount of compression applied.

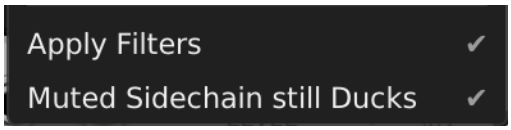
6. FEED: The feedback control sets how much additional gain (up to 11x) is added to the mix after the compression is applied. This can increase the amount of saturation, to the point of full distortion. The indicator lights show how much clipping is being applied to the signal before tanh saturation is applied.

7. LEVEL: Sets the voltage range of the final mix.

8. Filtering: By default a 30Hz high pass filter is applied to all inputs to remove DC offsets (and make the saturation cleaner). You can disable this feature in the context menu.

9. Anti-alisaing: This module applies first-order antiderivative anti-alising to the saturation to reduce aliasing, helping you to make a clean sounding mix. However, at maximum levels of distortion the module will still audibly alias.

10. Polyphonic Inputs: Poly inputs to the the first column of the main mixer will spread the inputs to the 6 channels.



Context Menu

1. Apply Filters: Switches the DC-offset filtering on/off.

2. Muted Sidechain still Ducks: In this mode you can subtract out the sidechain signal and just use the envelope follower of this channel for ducking the main mix.

Patch Suggestions

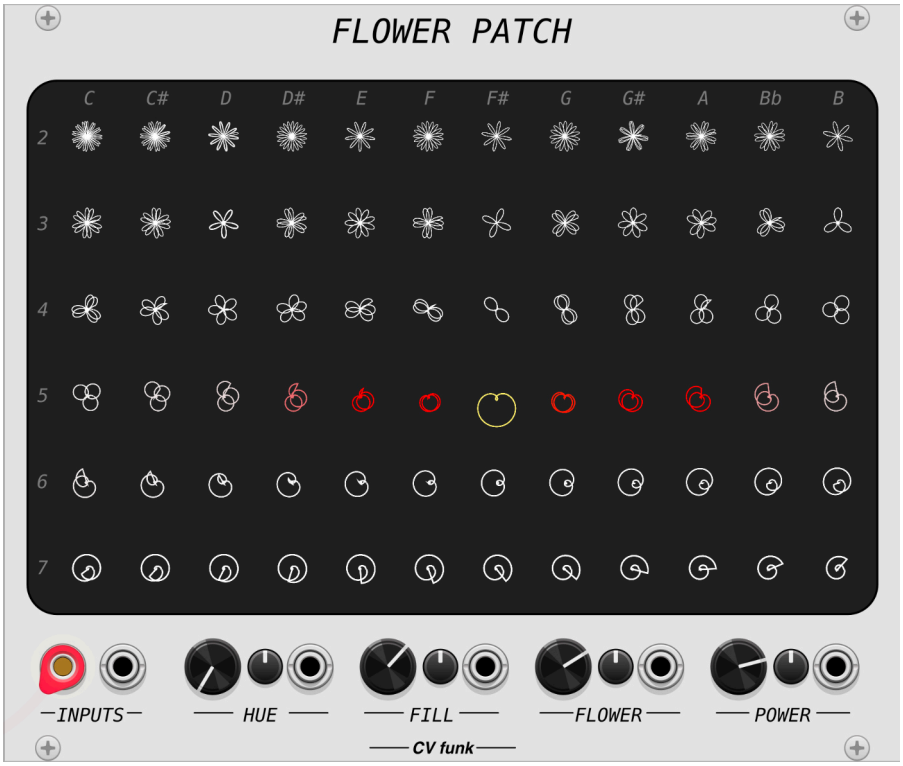
1. Mixer: Use it as a regular mixer. Patch the 6 stereo inputs, leave **PRESS** and **FEED** set to zero.

2. Ducking: Patch a side-chain signal to the **SIDE** inputs, and your main signals into the other inputs. Either use an envelope patched to the **DUCK** VCA input, or send a pre-shaped signal and use ***PRESSED DUCK*'s** internal envelope follower. Set the **DUCK** knob and input to the desired level of ducking.

3. Chaining: Chain up multiple copies of ***PRESSED DUCK***. Patch the outputs of one mixer into the **SIDE** input of the next. Set the **DUCK** levels carefully to balance the mixes. Use the first mixer for ducking the kick into the snare, and the second mixer for ducking the drum mix into the main mix.

4. Muting: Use the clickless mutes during performance to turn on and off channels with smooth 5ms tanh-based transition. The built-in compression can keep the total output volume constant while channels are added and subtracted from the mix.

FLOWER PATCH



INPUTS:

Stereo inputs are averaged together.

Signals are displayed in polar coordinates, with the period defined by the 12-tone scale

HUE:

Sets the color of the display.

FILL:

Sets the FILL amount.

Left: monotoned and desaturated colors.

Middle: White, with FFT peaks in color.

Right: Background in Hue, and Peaks highlighted.

FLOWER:

Scale the waves to transition between ring-shapes and flower shapes.

POWER:

Scale the shapes based on FFT results, either positively or negatively.

FLOWER PATCH converts your audio signals into a beautiful and responsive display of flower shapes. CV control over all parameters allows intuitive visualization of CV signals. FFT analysis of the input tells you the spectral breakdown of your signal in terms of the 12-tone musical scale.

SYNCRO

CLOCK:

Clock CV control allows you to precisely modulate the clock in BPM. 1V at max attenuation will add 10BPM to the clock.

FILL:

When FILL buttons or gates are activated, FILL adds to the numerator of the ratio.

EXT CLOCK:

Patching an external clock disables the CLOCK controls. The last two pulses to this input is used to compute the BPM.

ON/OFF:

Turns the sequencer on/off. Gate inputs reverse the state of the button.

RESET:

Resets and re-syncs all clocks and channels.

ROTATE:

Rotates the clock-ratios for the different clocks. The arrow on the display indicates the current position of Row 1.

WIDTH:

Sets the pulse width of the output gate. Default is 50% width.

OUT and INV

Gate and inverted gate outputs. The top outputs correspond to the master clock and do not rotate.

SYNCRO is an eight channel rotating clock multiplier and divider that is able to generate fractional clock ratios. The SWING setting applies to the master clock, controlling all channels. FILL and ROTATE allow for endless self-patching of new rhythms.

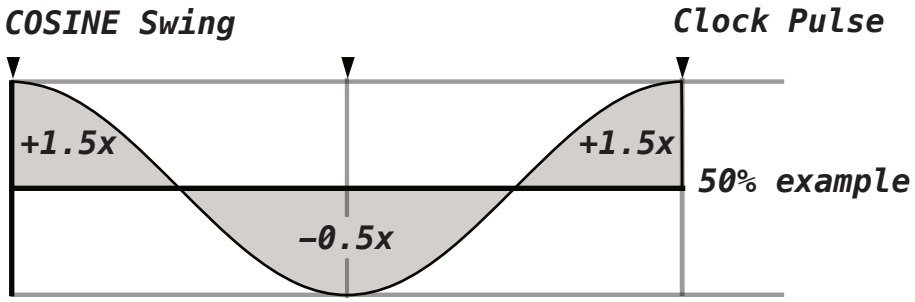
SYNCRO

Usage

1. CLOCK and Ratio: Set the clock rate in BPM. The display shows 0.1bpm of precision. The input is default to 1V/10BPM linear CV scaling. In the context menu v/oct can be selected. In V/oct mode, the **CLOCK** knob and attenuvertor are disabled. Set **X** and **1/Y** to select a clock ratio for each channel.

2. FILL: The current setting is indicated by lights, up to 8 beats can be added to the numerator of any channel. The **FILL** button and input add the set number of beats at the start of a clock cycle.

3. SWING: Swing applies to all clocks, and is fixed to 2x the master clock length. The swing applies a cosine to speed up and slow down the internal clock, and the **SWING** knob sets the amount that the swing clock effects the main clock. Set to 50% the swing oscillates between a speed increase of 1.5x and a decrease of 50%.



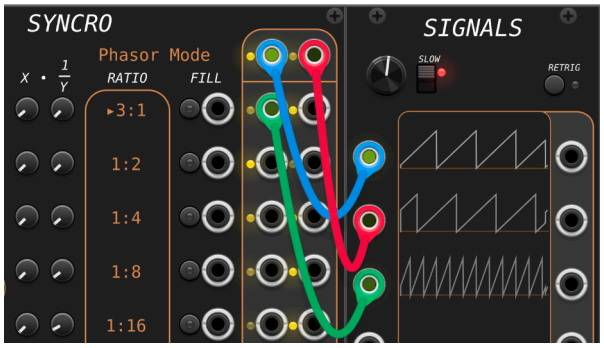
Note that this swing is quite atypical and more of a *rubato* effect in actuality, and for some applications you may need to set your main clock at /2 tempo and use a x2 output.

4. ROTATE: Rotates the clock ratios relative to the outputs. The outputs that correspond to the top row of controls is marked with a triangle symbol. The clock multiplication and division knobs map to the rotated position, while the **FILL** inputs map to the row.

The triangle symbol represents channel 1.

5. WIDTH: Represents the level where the phasor is compared to to produce the output gates. With no **SWING** setting, this sets the pulse-width of the output. **SWING** will result in non-linear phasors that get processed into unequal pulse widths, making the interaction with **WIDTH** more interesting. In the *Phasor* context menu mode, the **WIDTH** sets the phase offset of the two output channels instead.

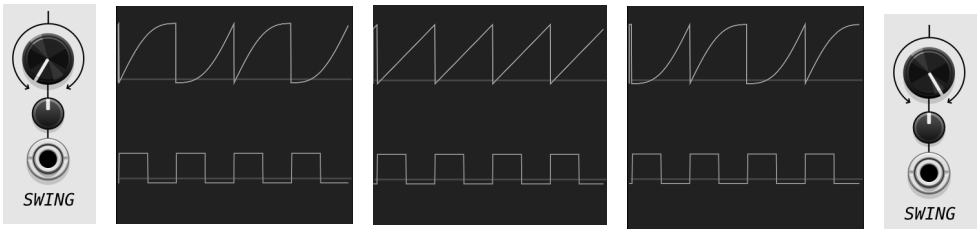
SYNCRO



PHASOR MODE:

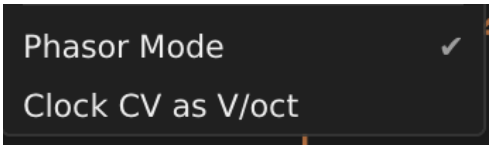
Rotates the clock-ratios for the different clocks. The arrow on the display indicates the current position of Row 1.

6. PHASOR MODE: In the context menu you can enable *Phasor Mode*, which outputs a pair of phasors (0–10V ramp) for each clock. The **WIDTH** setting is repurposed in this mode to change the phase relationship between the two outputs, defaulting to 50% phase.



SWING and PHASORS:

SWING continuously modulates the rate of the master clock, and all associated phases. In normal Gate Mode operation, the phasor is internally used to compute the gates. Without **SWING**, the **WIDTH** modulates the pulse-width, but with **SWING** enabled, the resulting gates will be non-equal. The **OUT** and **INV** out will provide different rhythms as a result of this.



V/oct Mode Indication

Context Menu

1. Phasor Mode: Enables phasors instead of gates + inverted gates.

2. Clock CV as V/oct: Disables the **CLOCK** knob and attenuvertor, reads the input CV in V/oct with 0V = 120 BPM.

Patch Suggestions

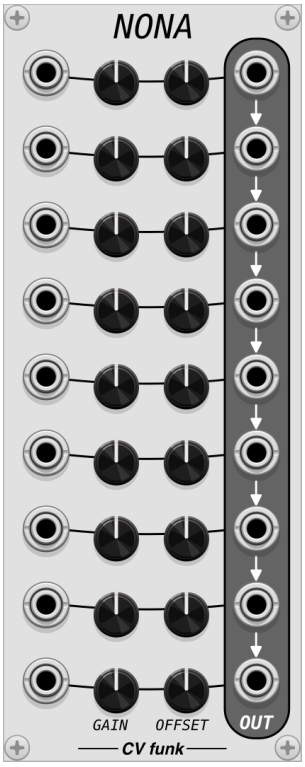
1. Tap Tempo: Patch the *VCV Push* module to the **EXT CLOCK** input. The pushbutton will function as a tap tempo.

2. Fills: Use one of the bottom channels to set a longer clock division. Patch the **INV** gate output to the **FILL** input of one of your drums. Use another longer division, and patch that to the **FILL** parameter input, to change the **FILL** pattern periodically.

3. Synth Pad: In the context menu set the module to V/oct mode. Patch a V/oct signal to the **CLOCK** CV input. Set each of the clock ratios carefully to harmonic ratios. For example, 1:1, 2:1, 3:1, 4:1, 6:1, 8:1. Patch the outputs to a mixer that can handle DC offset inputs such as *PRESSED DUCK*. Use a multi-channel envelope generator such as *ENVELOPE ARRAY* to control the VCAs of the mixer.

4. Mute Channels: Set the X of some rows to 0. Rotating the clock rotation with **ROTATE** will then turn off different rows of the sequencer is it rotates.

NONA



GAIN:

Knob scales from -2 to +2, allowing you do upscale weak signals.

OFFSET:

Knob ranges from -10V to +10V, allowing you to produce DC offsets and DC voltages.

OUT:

Each output normals downward, with an output cable interrupting the signal chain. Use this to create sub-mixes, or as a pallet for making CV signals.

NONA is a CV utility for scaling, offsetting, and mixing your signals. Use it to interface between different module voltage ranges, and to mix CV signals.

Usage

1. INPUTS: Nine inputs allow for a lot of CV mixing capability.

2. GAIN: Apply up to 2X gain to the **INPUT.** Negative gain inverts the signal.

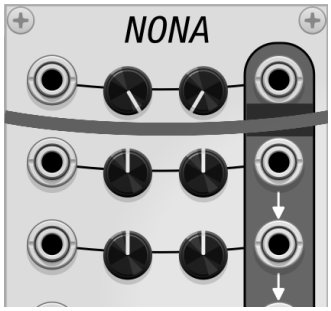
3. OFFSET: Applies -5 to 5V offset to the **INPUT.** With no **INPUT** present you can use to to create a DC offset signal.

4. OUT: Outputs normalize and mix downwards on the module. A cable patched to an **OUT** will break the chain. You can use this as 9 separate CV offset/gain channels, or as a 9-channel mixer, or anything in between.

First row acts as a master VCA for all channels

Context Menu

1. First row acts as a master VCA for all channels: When this mode is active, a curved separator appears on the module to show that the top channel is now a master VCA for the other 8 channels. The other 8 channels will function as normal, but have their output voltages multiplied by the top channel **OUT.**



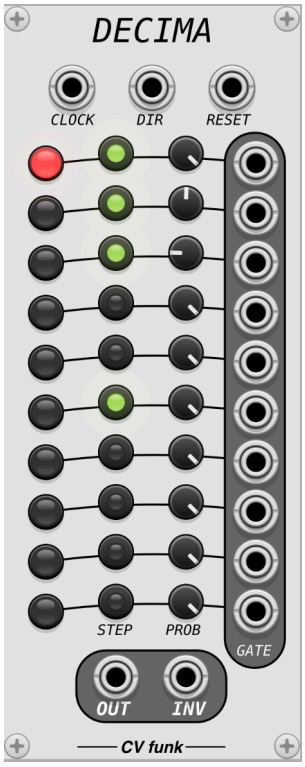
DECIMA

CLOCK:

Clock input advances the sequencer. The time between the previous two clock impulses is used to set the 50% gate length.

DIR:

A positive voltage to this input reverses the sequencer direction.



RESET:

Resets the sequencer to the first stage.

PROB:

Sets the gate probability per step.

STEP INDICATOR:

Indicates the active step. Doubles as a push button to jump to any step.

OUT:

50% pulse width gates are produces for each sequenced step.

INV:

Produces a 50% pulse width gate when a step doesn't get a pulse.

DECIMA is a 10-step gate sequencer with an intuitive interface. Button interface allows you to set your gate sequence and jump to any step. Per-step probabilities and CV control of direction unlock musical possibilities. Step gate outputs allow self-patching of shorter sequences.

Usage

1. CLOCK: Advance the sequencer with gates or triggers. The time between clock pulses is used to set the main output gate pulses at 50% cycle length. The individual stage outputs are the full step length, unless set differently in the context menu.

2. DIR: A high gate will reverse the direction of the sequencer.

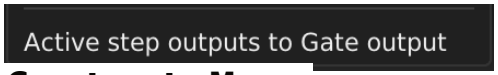
3. RESET: Resets the sequencer to the first stage.

4. PROB: Sets the probability per stage.

5. OUT: 50% pulse width gate output when a stage is activated.

6. INV: 50% pulse width when a stage is inactive.

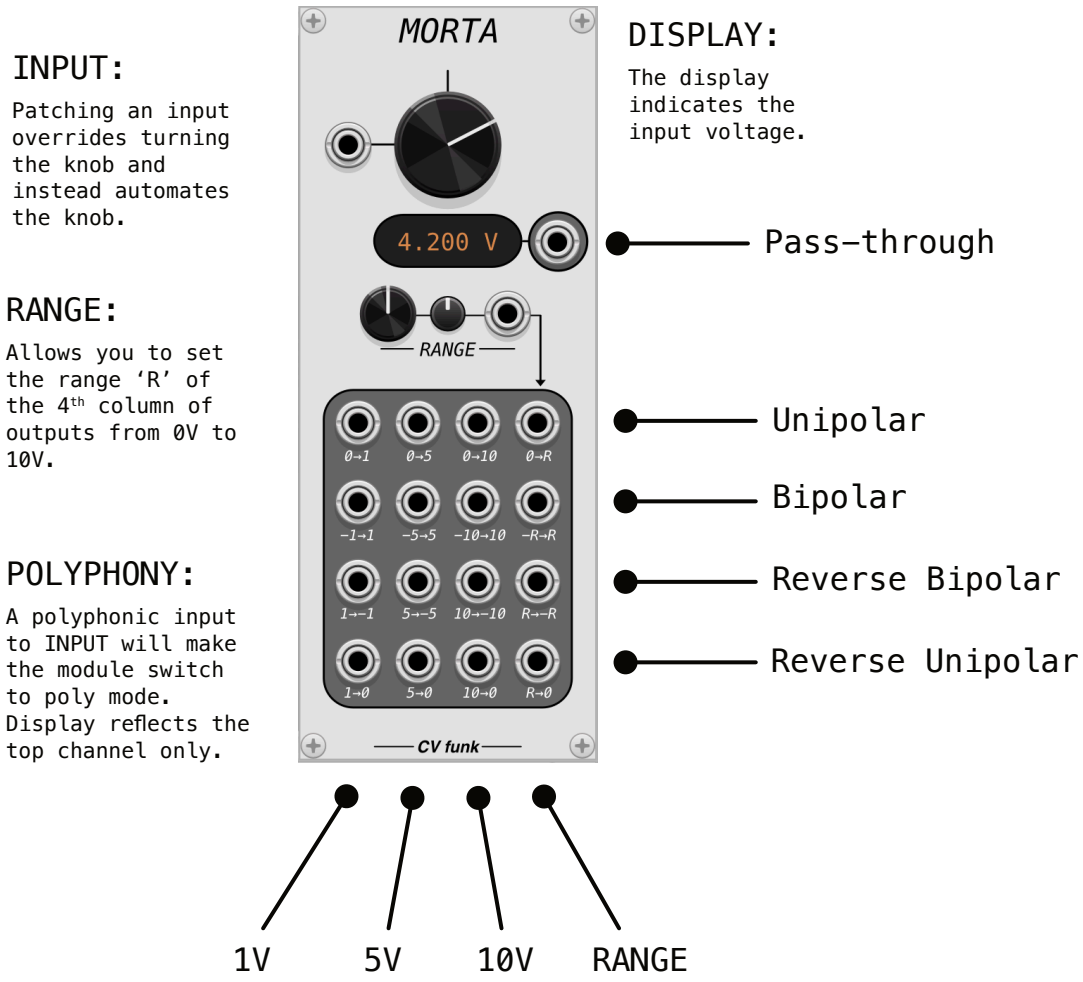
7. GATE: Outputs 10V when a stage is active. Patch a stage to **RESET** to program shorter sequence lengths.



Context Menu

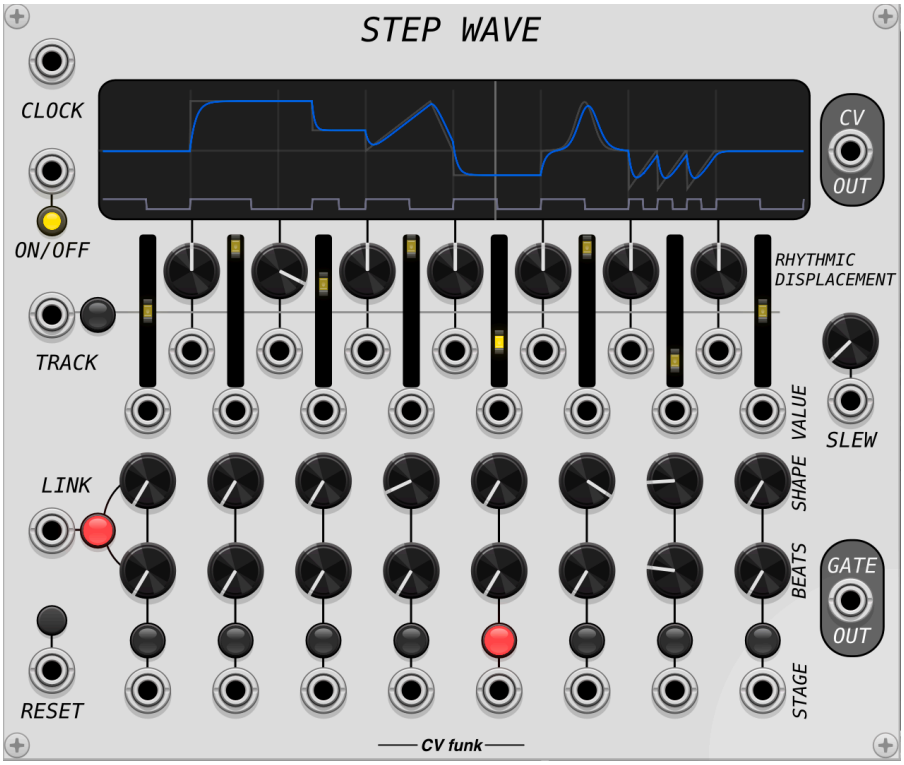
1. Active step outputs to Gate output: By default the **GATE** outputs a signal when any gate is active. This option allows you to have the **GATE** output reflect the main **OUT** for the specific stage.

MORTA



MORTA is a single-knob macro controller with 16 outputs. The input allows you to automate the knob turning, and the module displays the voltage of the knob/input. Outputs are arranged into unipolar and bipolar signals in 1V, 5V, 10V and CV controllable ranges. Useful for measuring and rescaling signals, reversed outputs make this a useful crossfading controller as well.

STEP WAVE



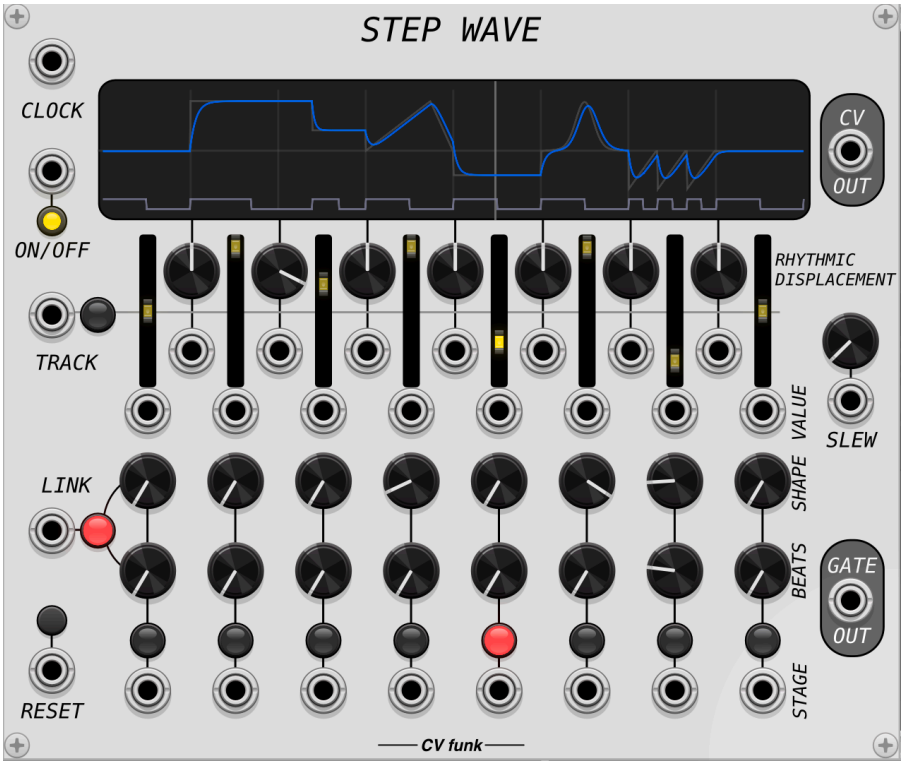
STEP WAVE is an 8-step wave sequencer with rhythmic displacement and real-time display. Control not only the VALUE of each stage, but the boundaries between stages by CV. Knobs let you set the number of BEATS per stage, and the SHAPE controller can morph between 12 different preset shapes. SLEW of the final output can smooth over any discontinuities in the resulting waveform.

STEP WAVE

CLOCK: Responds to gates or triggers. This timing translates to one grid-line on the sequencer.

ON/OFF: Button toggles the sequencer on/off. A gate to the CV pauses/runs the sequencer. The button can also invert the action of the CV.

DISPLAY: The blue line displays the outputted voltages. The grey line (when **SLEW** is set to 0) displays the inputted waveform. At the bottom the **GATE** output with **BEATS** is displayed.



TRACK:

Sequencer tracks VALUE inputs. When off, the sequencer samples VALUE at the start of the stage.

LINK:

When active, SHAPE repeats over the stage based on the number of BEATS.

RESET:

Resets the sequencer to the first stage.

CV OUT:

CV output of the sequencer

SLEW:

Sets the slew amount, normalized by the stage length.

GATE OUT:

Gate output of the sequencer

STAGE:

Click buttons to jump to any stage. In **OFF** mode, you can use this as well.

VALUE:

Use the slider to set the height of each stage. CV inputs below override and animate the slider.

RHYTHMIC DISPLACEMENT:

Control the boundaries between each stage of the sequencer. Range is -5 to 5, corresponding to 50% of a step length max. This input can be modulated by CV.

SHAPE:

Morph between 12 different shapes for each stage of the sequencer.

BEATS:

Set the number of beat multiples for any stage, range 1-10

STEP WAVE

Usage

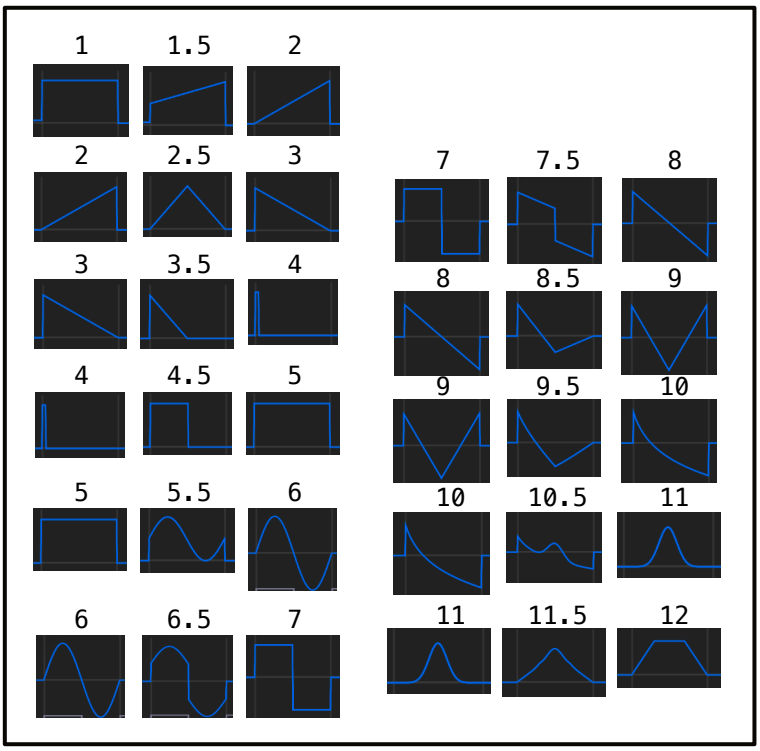
1. CLOCK: An external clock sets the per-step tempo, otherwise it defaults to 120bpm.

2. ON/OFF: Defaults to ON. A gate to the CV input will momentarily pause the sequencer. Clicking the button will invert the CV operation.

3. VALUE: Set the value of each sequencer stage. These sliders will be overridden by a CV input and animate to show the value. However, a context menu option is available to re-map these CV to the **SHAPE** if you want!

4. CV OUT: The main sequencer output.

5. SHAPE: Morphs continuously between 12 different shapes for each stage of the sequencer.



6. BEATS: Sets a number of subdivisions per sequencer stage. Can range from 1 to 10.

7. LINK: When engaged the number of **BEATS** links with the **SHAPE** setting to repeat the shape a number of times within the current stage.

8. SLEW: Applies slew to the final CV output, the resulting shape is shown in the display.

9. RHYTHMIC DISPLACEMENT: Allows you to offset the edges of each stage relative to the timing grid.

10. TRACK: The **VALUE** CV can modulate the individual stage values at audio rates. By default the stage samples **VALUE** at the start of the stage. With **TRACK** enabled, each stage will track their respective **VALUE** CV.

11. GATE OUT: Outputs 10V signal corresponding to pattern displayed at the bottom of the display. The number of **BEATS** per stage will be reflected here.

12. STAGE: Outputs a 10V gate at each stage output for the duration of that stage.

13. RESET: Resets the sequencer to the start of the first stage. This is useful for synchronizing to the master **CLOCK** signal, as the clock is only used to set the stage length and not to advance the stage.

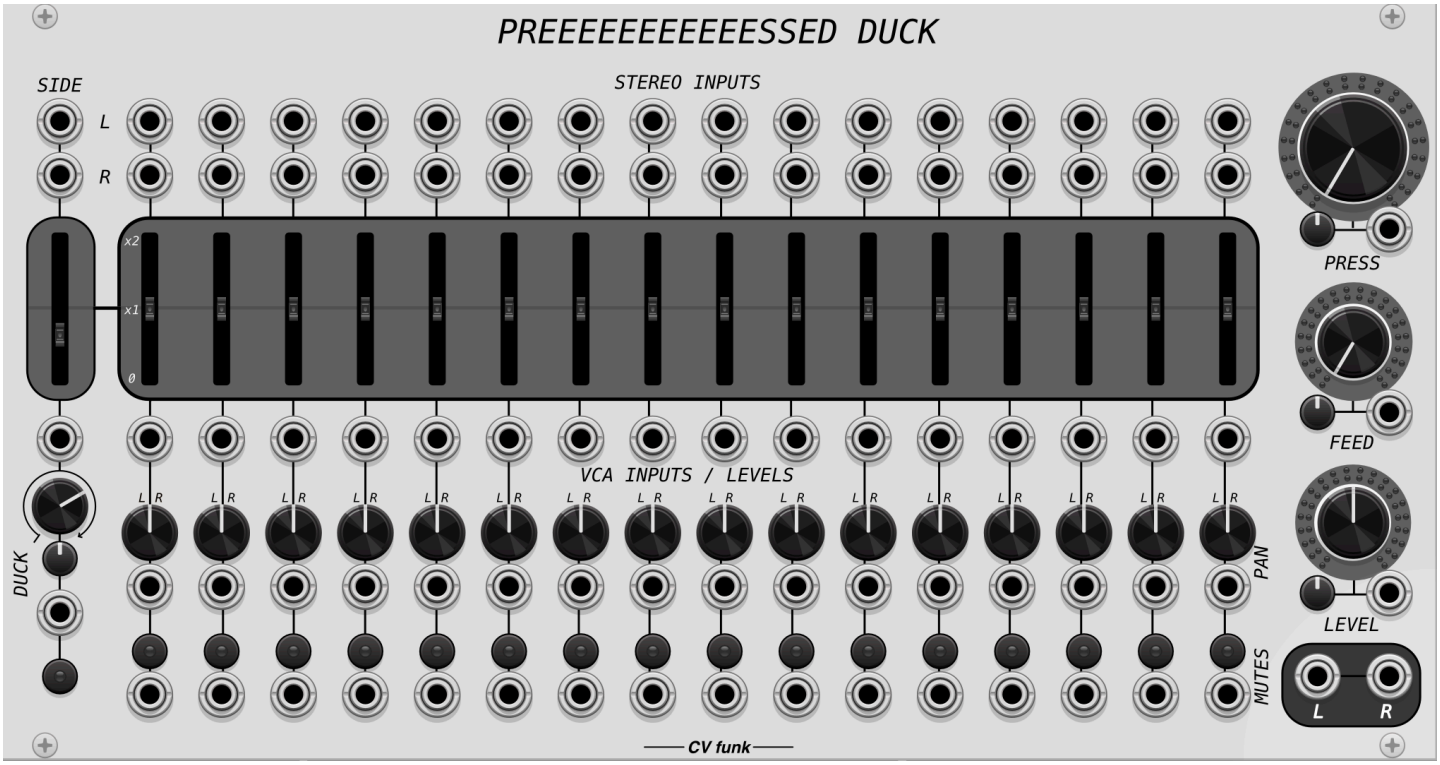
Context Menu

1. Stage Value CV Modulates Shape: Instead of controlling the individual stage value faders, with this option enabled you can use the **VALUE** CV port to modulate **SHAPE** instead.

PREEEEEEEEEEESSED DUCK

STEREO INPUTS:

Sixteen stereo inputs that are compressed together by the **PRESS** setting. **SIDE** allows you to duck into the main mixer.



PRESSED DUCK:

Refer to the *PRESSED DUCK* module for operation instructions.

PREEEEEEEEEEESSED DUCK will satisfy your hunger and craving for more channels. With 34 inputs in 17 channels, this mixer will allow you to patch a fully loaded polyphonic signal to the left-most channel and duck into it with a SIDE-chain signal.

ARRANGE

STAGE:

Selects the step of the sequencer.

REC:

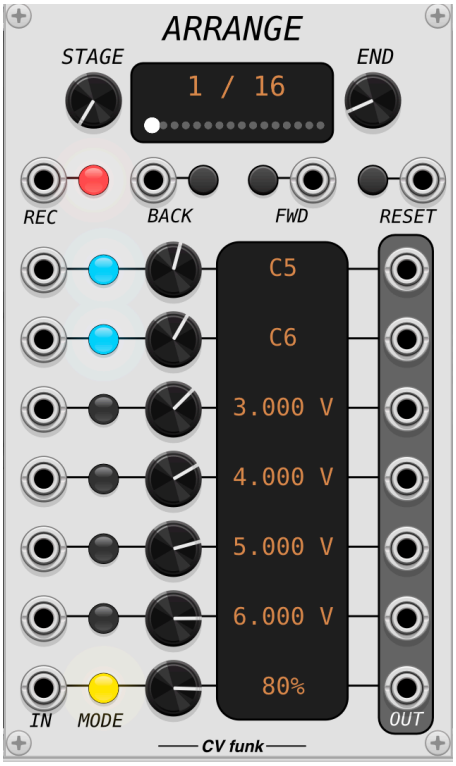
Turn on/off recording mode. When active it saves the state of the active stage.

IN:

Overrides the knob and program Cvs with external inputs. A polyphonic input to IN will distribute the inputs downwards.

MODE BUTTON:

Switch between Voltage (off), Semitone quantizer (blue) and Probability Triggers (yellow).



DISPLAY

Top: Displays the current stage and number of steps. A white dot indicates the sequence progress.

Bottom: Displays the outputted voltage, note, or trigger probability.

END:

Selects the length of the sequence, up to 128 steps.

BACK:

Moves the sequencer stage back one step.

FWD:

Moves the sequencer stage forward one step.

RESET:

Moves the sequencer stage back to the first stage.

ARRANGE is a simple 7-stage sequencer with adjustable number of steps. It can sample input Cvs to play back. Each channels can be set into one of three modes: Voltage, Quantized, and Trigger with probability. Switches between record and playback for intuitive control over your sequences.

Usage

1. END: Select the total number of sequencer stages. Changing this setting will reset the sequencer to the start and change the scaling of the **STAGE** knob.

2. STAGE: Select the current sequencer stage.

3. REC: Toggle button or CV arms the record, indicated by a red light. Record CV value samples to the active stage.

4. IN: Inputs for each stage override the knob setting for that stage. Polyphonic inputs spread downwards.

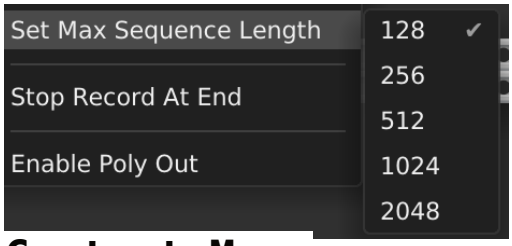
5. MODE: Each stage can be in one of three modes: Voltage, V/OCT CV, and Probability. In probability mode a −10V input sets 0% and a 10V input sets 100% – when the stage is triggered this sets the probability of outputting a trigger.

6. FWD/BACK: Advances the stage forwards or backwards.

7. RESET: Resets the sequencer to the first stage.

8. OUT: Outputs the current stage voltage. When **REC** is off, the parameter knob for that stage can be changed and its output value will change (without writing to the sequence). When **REC** is on the knob is ignored and the CV passes from the input.

9. Apply to all: Shift-click a knob in record mode will apply the selected voltage to all channels of the sequencer.



Context Menu

1. Set Max Sequence Length: Option menu allows you to set the sequence length to much longer. This is useful if you want to quantize to 16th notes etc for a longer composition.

2. Stop Record At End: This option allows you to engage **REC**, and when the sequencer reaches the end it will automatically disengage **REC**, allowing you to record a complete loop more easily.

3. Enable Poly Out: Enables a 7-channel polyphony out from the top channel.

TRI DELAY

DELAY:

Set the master delay in msec. The buffer is 3.6sec long, allowing up to 3600 msec delays. Per tap trimpots can add or subtract from this value.

PAN:

Set the master pan left to right. There are 2 delay channels, one for each stereo output, and each tap can output in stereo to these two buffers. Per tap trimpots add or subtract from the master.

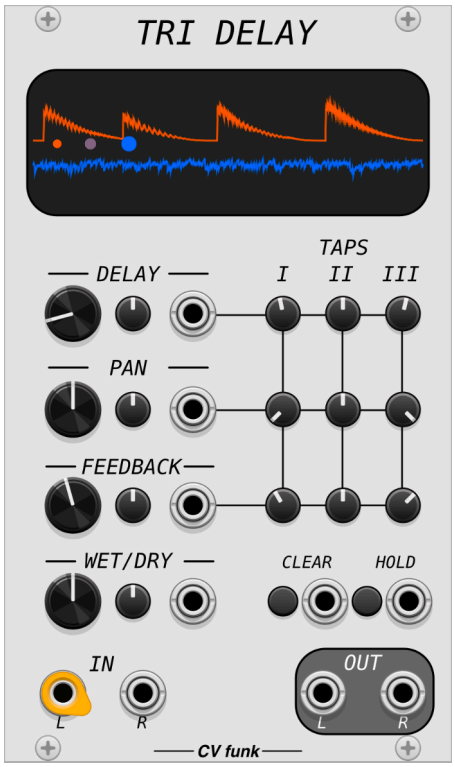
FEEDBACK:

Sets the master feedback level. Per tap trimpots add or subtract from the master value.

Tanh saturation and anti-derivative anti-aliasing is implemented to reduce harsh feedback tones.

IN:

Stereo inputs. Mono inputs will distribute to both channels.



DISPLAY

Envelope followers on the dry input signal and wet output signal are shown in orange and blue, respectively.

The delay time of each tap (0-3.6sec) is indicated by dots for each tap. The relative size of the dots indicates the feedback amount for each tap. The color indicates the panning (red = left, blue = right).

CLEAR:

Clears the feedback buffer.

HOLD:

Loops the current buffer while button or gate is high.

OUT:

Stereo outputs are 8x oversampled and anti-aliased to reduce harsh feedback noise.

TRI DELAY is a 3-tap delay effect with intuitive visual user interface. Envelope followers on the dry and wet signal make it easy to see what's going on in the delay, while colored dots indicate the delay time, feedback and panning of the individual taps. Gently tanh saturation with anti-derivative anti-alising, and 8x supersampling anti-aliasing on the outputs prevents harsh feedback noises.

TATAMI

IN:

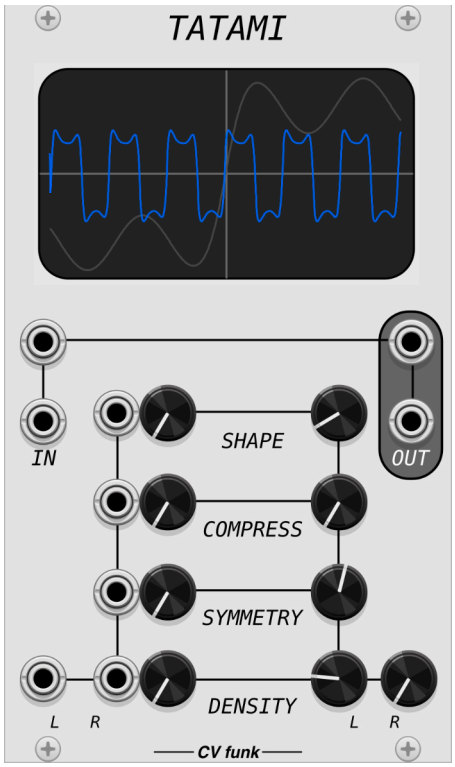
Stereo inputs can support up to 16 channel polyphony.

SHAPE:

Sets the wavefolding shape, morphing smoothly from a saturating Tanh shape at 0, to a Sine at 1, an exponential Sine at 2, and back to Tanh at 3.

COMPRESS:

Compresses the IN signal before wavefolding, and then uncompresses the resulting wave by the same amount. This allows you to wavefold dynamic signals.



OUT:

Stereo outputs.

SYMMETRY:

Applies a DC offset to the IN signal before wavefolding, resulting in interesting timbres.

DENSITY:

Controls the intensity of the wavefolding. Separate CV controls for the left and right channels allow for interesting stereo imaging effects.

TATAMI is a stereo polyphonic wavefolder effect module. The smooth morphing between wavefolding shapes gives you access to a wide palette of sonic timbres. Employs advanced antiderivitave antialising of signals, gently weaving waveforms into new shapes rather than creasing them.

CARTESIA

SLICE PANEL:

Knobs have tunable ranges. The color indicates the active z-slice. Buttons on each position can turn on/off that step of the sequence.

GATE:

Gate and Inverted Gate outputs the button state of the selected sequencer stage. In POLY modes, these inputs are also polyphonic.

GATE:

Gate and Inverted Gate outputs the button state of the selected sequencer stage. In POLY modes, these inputs are also polyphonic.

XYZ:

Control the X Y Z position of the sequence by CV or triggers or button presses.

SCAN:

Scans a sequencer Z layer in X-Y.

MIN/RANGE:

Sets the range of the knobs in the knob panel. CV control dynamically updates to the panel and outputs.

QUANTIZE:

Switches between quantized notes and voltages.

POLY:

Sets the number of polyphonic outputs (up to 4). Outputs the other z-layers, starting with the selected z-slice.

RANDOM:

Moves to a random xyz position.

OFFSET:

Adds to the final output voltage.

CARTESIA is a 4x4x4 sequencer with a interactive z-slice interface. A LED display shows exactly what is going on in the 3D sequencer grid, and dynamically mapped knobs and buttons update continuously. CV control over knob ranges adds a unique twist to the sequencer.

JUNK DNA

REV:

Moves the sequence backwards. The gene is 2056nts long, and going past the end loops around.

FWD:

Scan forward in the sequence.

RESET:

Resets the index of the position on the sequece back to 0.

REPEAT PATTERN:

Enter a DNA sequence pattern using letter codes: A,T,C,G encode the four nucleotides. Other letters (RYSWDHBV) represent combinations (as indicated by the Venn diagram).

DNA:

Outputs a signal (0–3V) corresponding to the DNA sequence as it is read out. (A=0V, T=1V, C=2V, G=3V).

A,T,C,G:

Outputs a high gate when on that nucleotide.

R,Y,S,W:

Outputs a high gate when on one of two nucleotide types (as indicated by the Venn diagram on the panel)

B,V,D,H:

Outputs a high gate when NOT on the corresponding nucleotide type.

JUNK DNA is a gate sequencer that generates and reads DNA sequence variants. Text pattern input can define anything from short repetitive motifs to full genes. Letter code can indicate fixed sequences as well as partially and fully randomized positions.

Usage

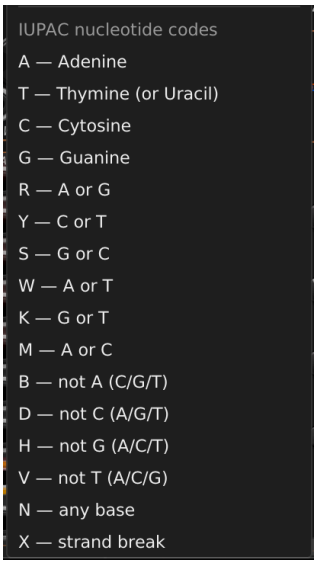
1. TEXT INPUT: Enter a DNA sequence repeat pattern using letter codes: A,T,C,G encode the four nucleotides. Additional letters represent OR logic of the four nucleotide types: R (A or G), Y (T or C) S (C or G), W (A or T), K (G or T), M(A or C). D (NOT C), H (NOT G), B (NOT A) and V (NOT T) represent positions that exclude a certain nucleotide type. The encoded pattern is repeated to fill up a gene of 2056nts, with degenerate positions varying each repeat. For example an R in the pattern will have a 50% chance to be either A or G, while a D in the pattern will have a 33% chance to be G, T or A.

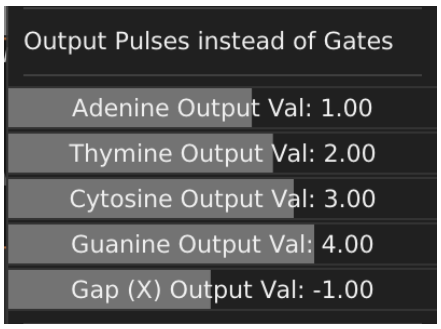
2. FWD and REV: Scan through the circular buffer of DNA sequence.

3. Gate Outputs: Gates activate at each position on the DNA when the sequence corresponds to their ATCG code. The central N outputs a trigger at every position. Gates stay high when a sequence is repeated, for example AAA. More interestingly, patterns also do the same for pattern outputs, a pattern like CGCGCG will output a constant gate at the S output.

4. DNA Output: Outputs a voltage pattern corresponding to the DNA sequence. In the context menu it is possible to change the voltages.

5. Reset Input: Resets the sequence back to position 0 out of 2056, allowing you to replay the randomly generated sequence (as long as the DNA pattern input remains unchanged).



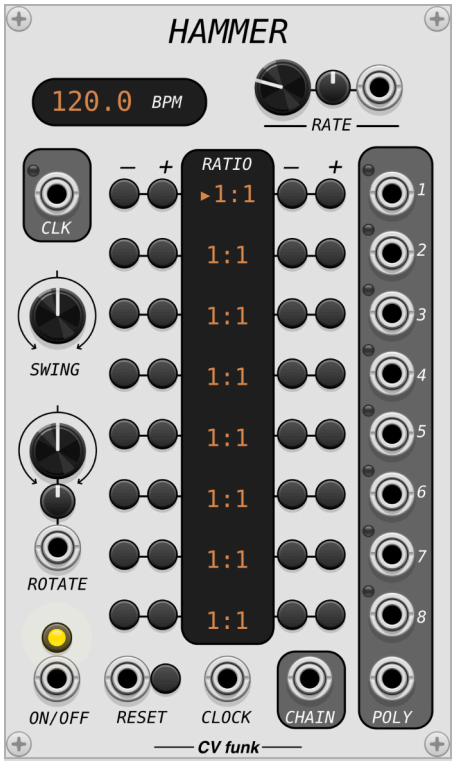


Context Menu

1. Output Pulses instead of Gates: Outputs a trigger pulse instead of gate.

2. ATCG Output Val: Customize the output values for the DNA output.

HAMMER



CLOCK OUT

Outputs the main clock signal.

SWING

Sets the swing amount. Clock multiples will get

ROTATE

Rotates the clock ratio channels. The arrow indicates the rotated position of Channel 1.

ON/OFF RESET

Turn the clock outputs on/off, or reset the clock divider.

RATE:

Sets the clock rate in BPM.

RATIO:

Set the clock multiplier/ divider ratios by pressing the buttons.

OUTPUTS:

Gate outputs are 50% pulse width based on the set clock ratios.

ON/OFF RESET

Turn the clock outputs on/off, or reset the clock divider.

PHASORS

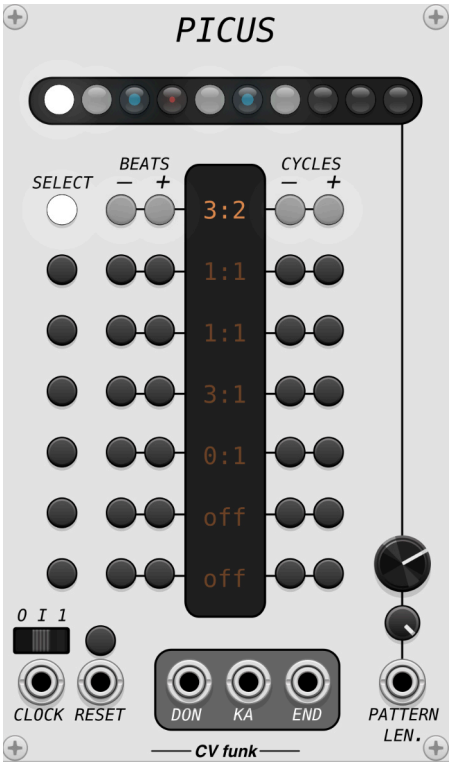
Optional phasor mode in the context menu.

CHAIN

Clock-chaining function combines the ON/OFF, RESET and internal unswung master clock for other Hammer or Picus modules. This allows you to have one copy with swing and one without, or one in Phasor mode etc.

HAMMER is a sample-accurate clock with ability to chain to other Hammer and Picus modules. Each of the 8 channels can multiply and divide clock signals to produce any beat ratio or polyrhythm.

PICUS



SELECT:

Stage select. The sequencer will go to the selected stage at the end of the current stage.

BEATS:

Set the number of beats to play per stage. Setting BEATS to 0 will mute the stage and no drum beats will be produced for the duration of that stage.

CYCLES:

Set the length of the stage in number of clock cycles. Setting CYCLES to 0 will turn the stage 'off', causing it to be skipped.

CLOCK:

Select between OFF (0), ON (I), and 1-shot (1) modes. In 1-shot mode the mode switches to OFF at the end of a cycle.

CHAIN:

Additionally the CLOCK input accepts the CHAIN signal from Hammer modules.

RESET:

Resets both the stage position and the pattern position to 0.

PATTERN

Up to ten steps can be programmed. Pushing the buttons alternates between DON (large white), KA (medium blue), and OFF (small red) modes. DON or KA sends the beat to the respective output.

PATTERN LENGTH:

Set the pattern length 1-10 steps. CV control allows for variations. Context menu option sets if the pattern resets, or not.

OUTPUTS

Two drum outputs DON and KA, output trigger pulses, as programmed by the pattern. END can be set to pulse at either the end of each stage or loop via context menu option.

PICUS is a two channel trigger burst generator. Program up to seven stages of clock ratios. A variable-length beat pattern overlays the different clocked beats to produce complex rhythms from a simple interface.

NODE

XFADE

Crossfader allows you to blend between two stereo signals. CV input on the crossfader overrides and animates the panel control for visual feedback of the mix. Responds to -5…5V range.

MUTE

Clickless mutes smoothly transition on and off over 10ms-2sec. Set fade intervals in the context menu. Bright red indicates the channel is muted.

GAIN:

The VCA is set to have up to 5X gain, allowing you to amplify weak signals.

SATURATION:

At higher gain levels, the signal will gently saturate using tanh saturation.

MIX

Mono or Poly inputs get mixed down to a single channel stereo mix. If a polyphonic output is desired you can switch to poly mode in the context menu.

ANTIALIASING

Antiderivative antialiasing is applied to reduce the aliasing effects of non-linear distortion.

NODE is a compact two channel stereo mixer and crossfader with clickless mutes.

HUB

ATTENUVERT/OFFSET

Set the input gain up to 2x, invert signals, and offset up to 10V.

INPUT

Two channels of polyphonic inputs.

VCA

Sets the maximal signal width of the animated knob, and the output.

DISPLAY:

Displays the voltage of the top output channel

CORN COB:

The corncob display shows the outputted voltage of the 16 polyphonic channels. Small white indicates negative voltage and large yellow indicates positive voltage.

HUB is a macrocontroller CV signal processing hub. Each of the two polyphonic inputs has gain, offset and VCA control. The displays give live readout of the output voltage, while the animated knob allows you to interrupt the input signal and manually set the CV. Corn cob displays show the CV of all channels when connected to an output.

WEAVE

TRIGGER

Triggers the next WEAVE output arrangement.

RESET

Resets the order of the chord outputs to the default.

NOTE

Sets the root note of the chord. The + − buttons allow you to move up and down by an octave.

CHORD

Set the chord type. Input is v/oct, where every semitone advances one setting, wrapping. CV control excludes the Oct setting.

SHIFT

Directly adds to the output chord voltage, allowing you to transpose the different chord voicings.

DISPLAY:

Displays the note value of the 6 outputs. Each line shows the next permutations that will happen when triggered.

WEAVE

Switch between different output rotation patterns.

WEAVE is chord quantizer with unique chord voicings reminiscent of guitar chords. The module is designed with the idea that you will strum the output voices like a guitar chord, or spatialize the polyphonic layers. Weave the strings into new permutations and move around in chord space in a new interactive way.

WONK

CLOCK

Sync the oscillators to external clock. Defaults to 30 BPM.

RESET

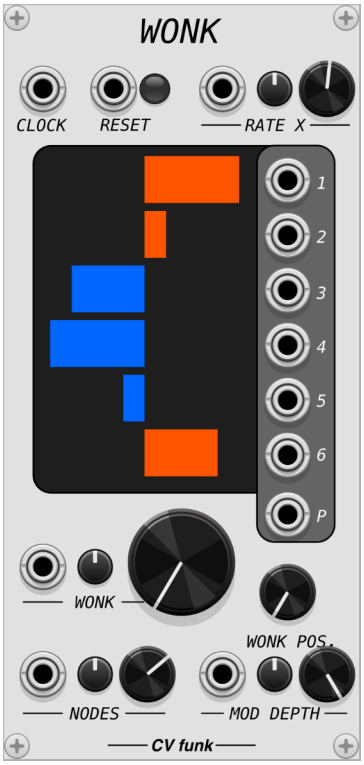
Resets the oscillators.

WONK

Set the amount of phase-feedback.As wonk increases, the range of nodes is narrowed, and the outputs morph between unison and chaos

NODES

Set the phase spacing between oscillators.



RATE X:

Sets the rate multiplier of the clock. Positive numbers multiply the clock. Negative numbers divide the clock. The range -1…1 sets the clock to 1x.

OUTPUTS

Individual outputs for the six oscillators and a polyphonic output (P).

WONK POS.

Sets the channel for Wonk feedback

MOD DEPTH

Set the modulation depth.

WONK is a six-channel low frequency oscillator with built in phase-feedback distortion designed to morph synchronous oscillator signals into more chaotic ones, but that still remain locked to the clock bpm.