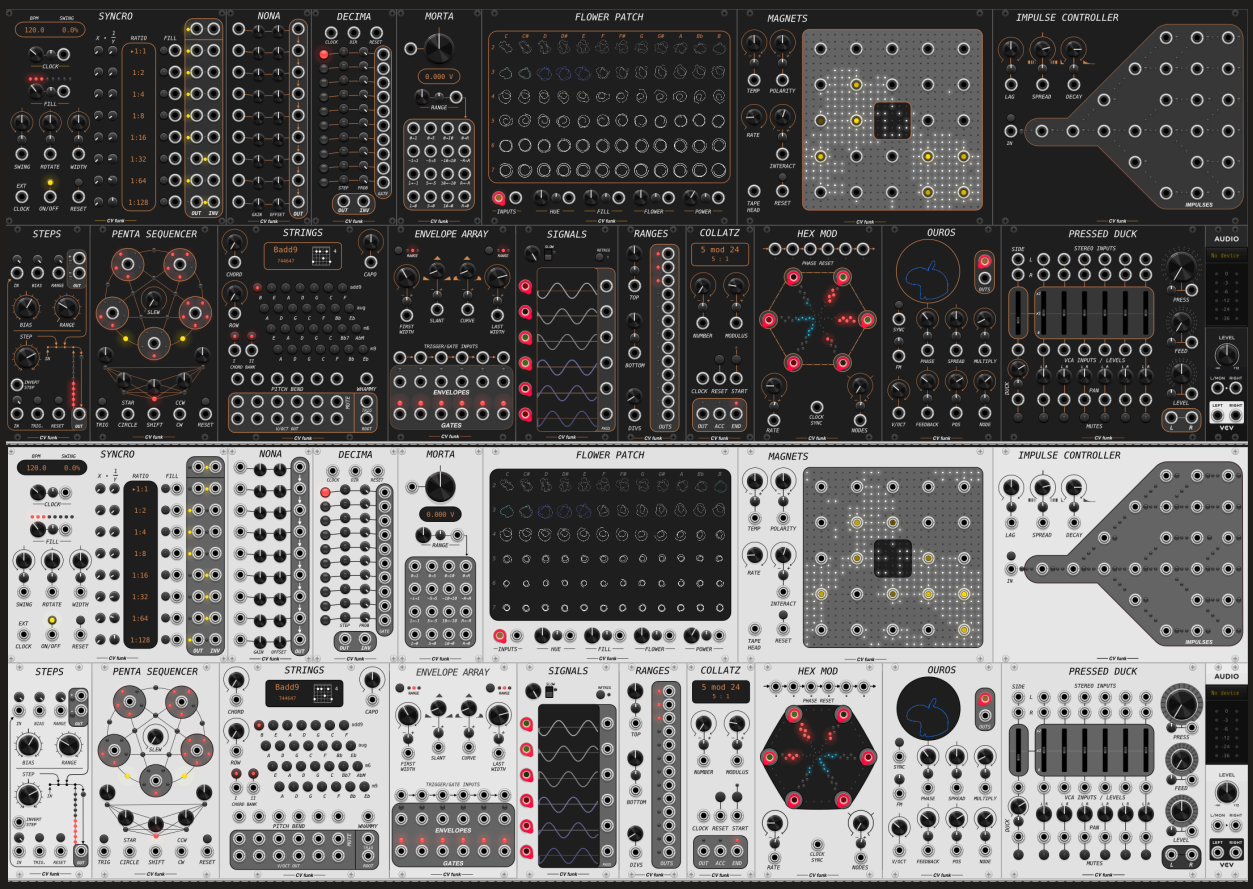
CV funk

CV funk Module Collection for VCV Rack



User Manual

Version 2.0.7

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

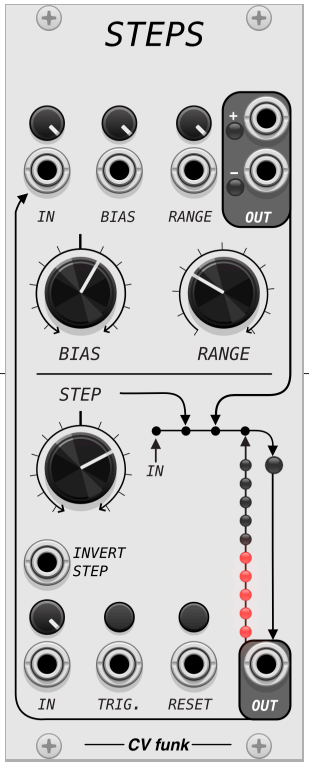
STEPS

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 5V gate outputs indicate if **IN** is above or below the window.

OUT is scaled by **RANGE** and normalled 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**.

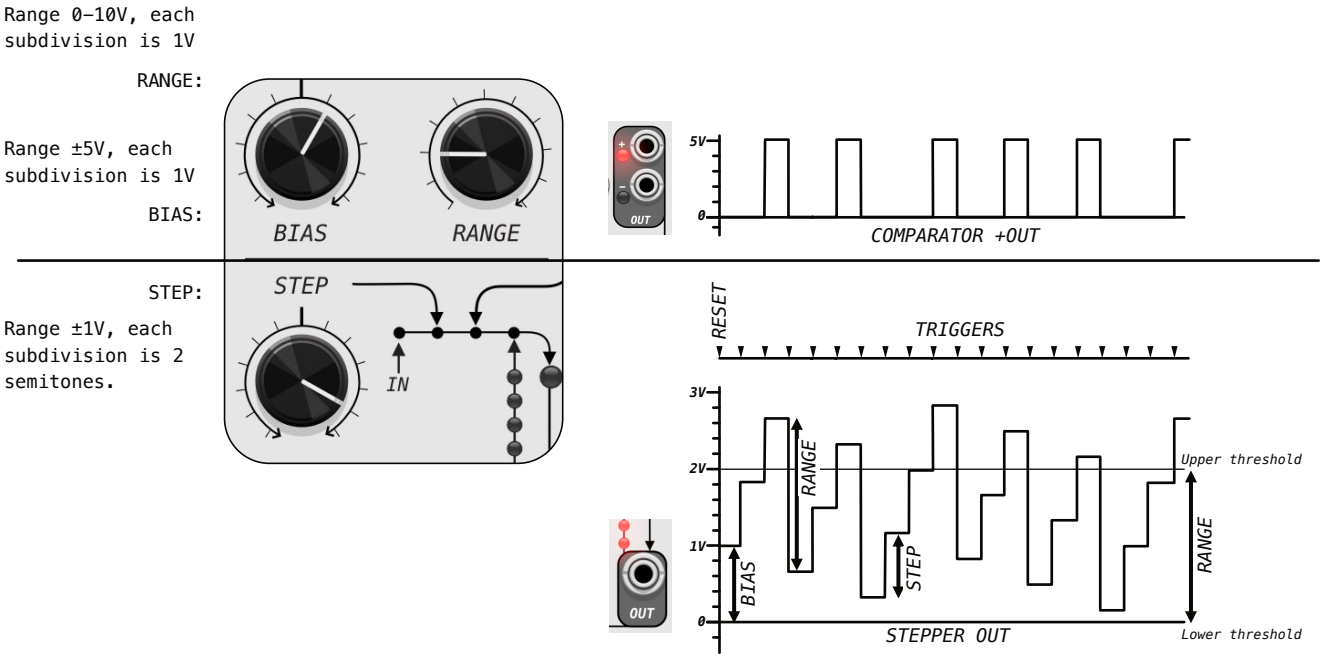
BUTTONS: Manual trigger inputs for **TRIG** and **RESET**

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. Normalled Connections: Using the comparator input breaks the normalization to the stepper section, allowing both sections to be used independently. When normalled, 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**

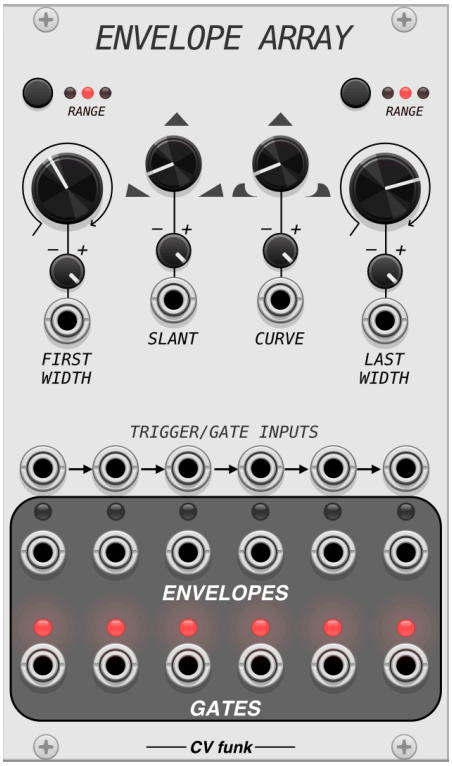
ENVELOPE ARRAY

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.

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**.

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



SLANT: Sets the slant of all related envelopes.

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

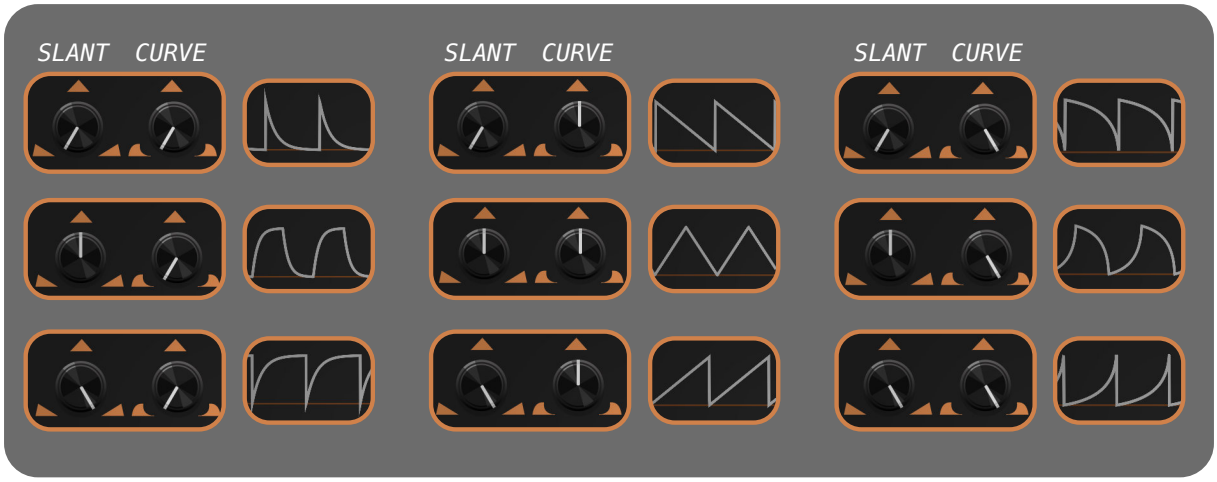
Note: **SLANT** and **CURVE** will slightly influence the WIDTH.

ENVELOPES: Six related envelope outputs.

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

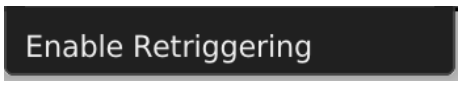
1. Set Envelope Stages: Adjust **FIRST** and **LAST** width knobs to define the width of initial and final stages of the envelope array, the other outputs will take intermediate values.

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



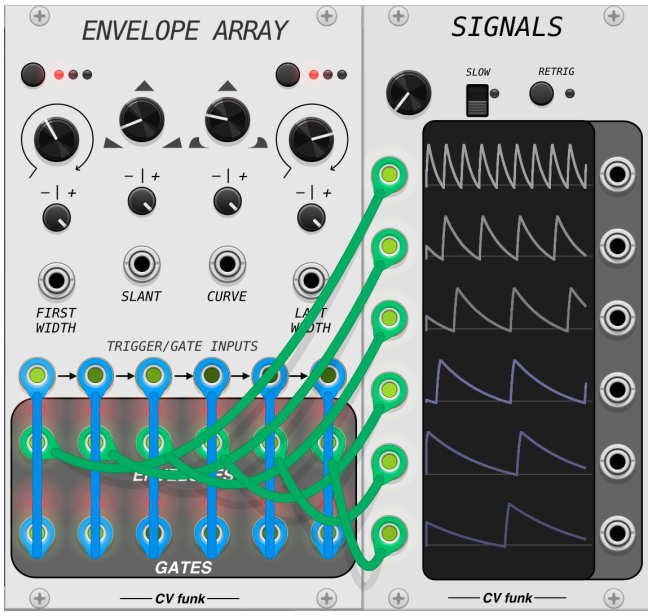
Context Menu

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).

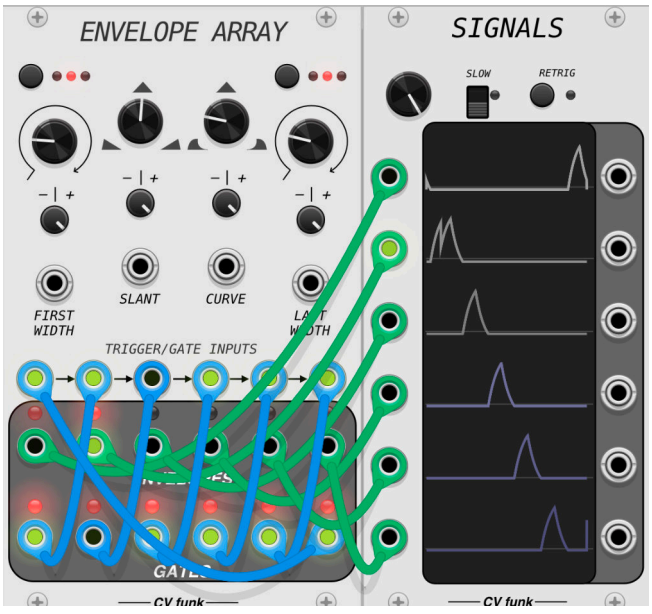
Patch Suggestions

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.

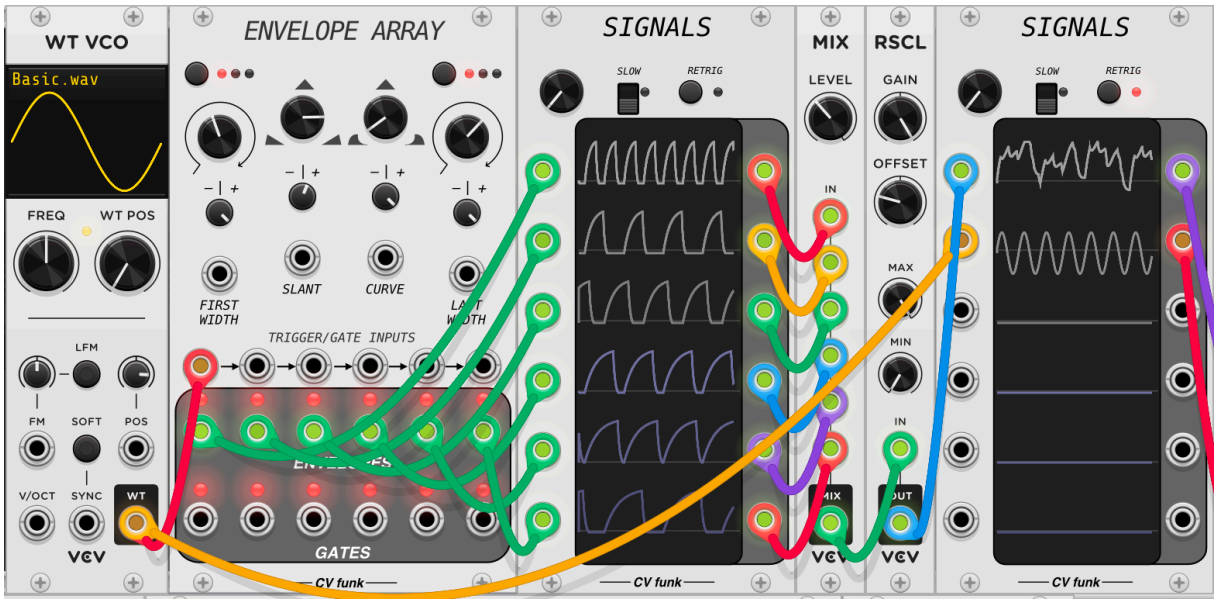


Six Oscillators: Self-patch each channels **GATE** to **IN.** The **GATE** will trigger a gate at the end of each cycle, starting a new cycle. The oscillators will not be in phase.



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



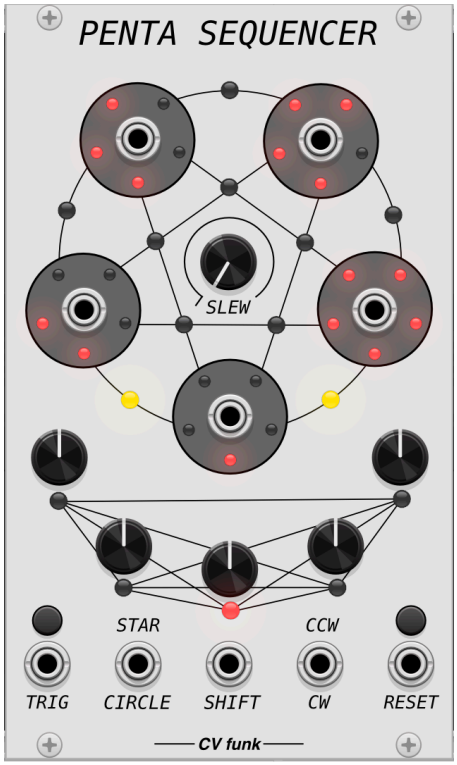
Sub Harmonics: Set both ranges to audio rate. Patch the output from another oscillator into Channel 1 **IN**, and adjust the **FIRST** range to be shorter than the wavelength (use *SIGNALS* to help you adjust the range). Patch all 6 envelope outputs to a mixer. Use *VCV RSCL* to DC offset the envelopes 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.

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.*

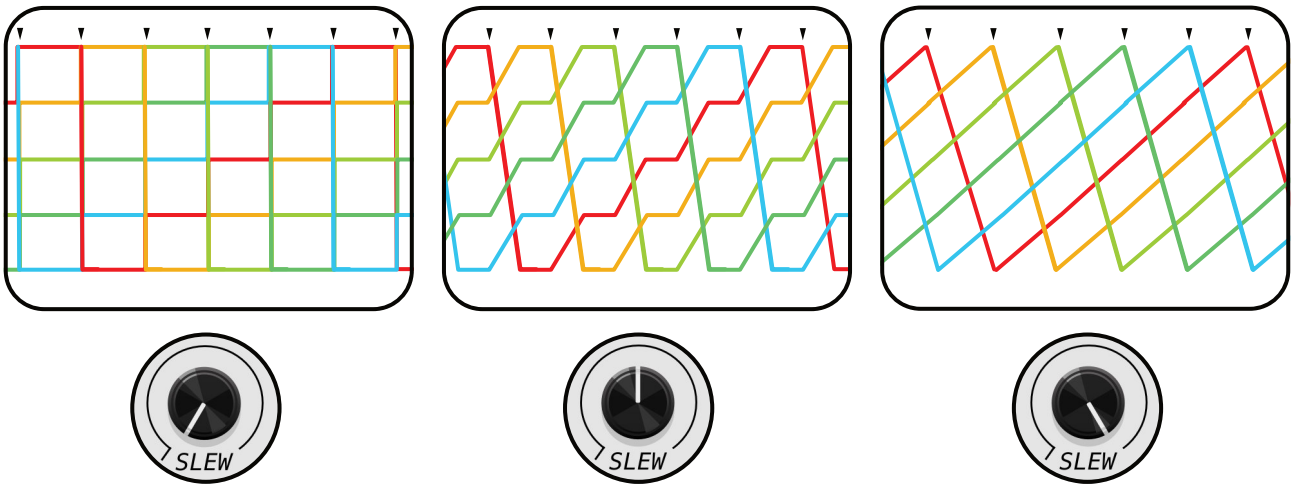
3. Direction Control: *A gate to the **CCW** input will switch between Clockwise (<=1V) and Counterclockwise (>1V) mappings when held. Changing direction will exchange the left and right outputs.*

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)



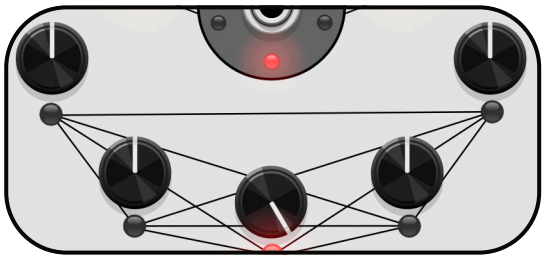
SLEW *allows continuous morphing between stepped and sloped Cvs.*

Patch Suggestions

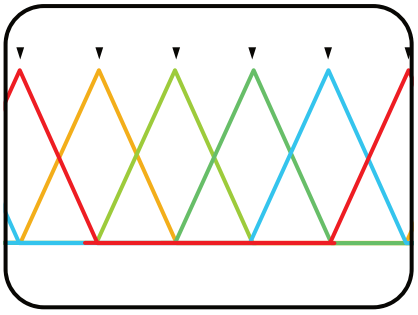
Slewed Octaves: Set each of the five knobs to −2, −1, 0, 1, 2. Set the slew to 0.25 for smooth slewing. Patch each of the five outs to a WT-VCO, adjust each to have a slightly different timbre. With a second copy of the *PENTA SEQUENCER*, set five different notes, set the slew of this one to 0.0, and 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.

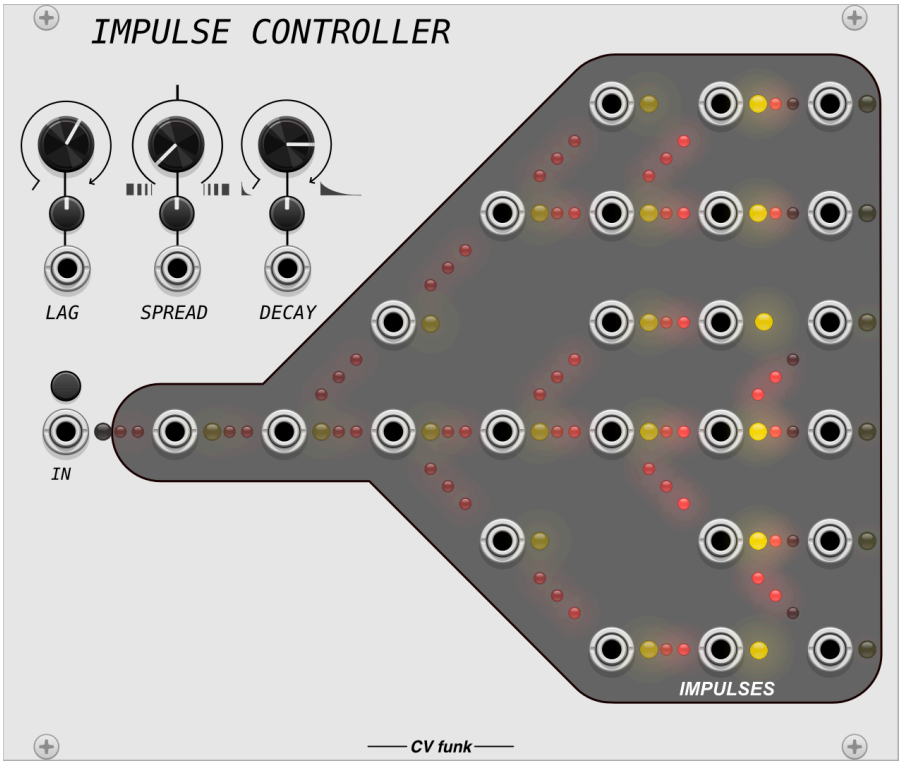


IMPULSE CONTROLLER

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.

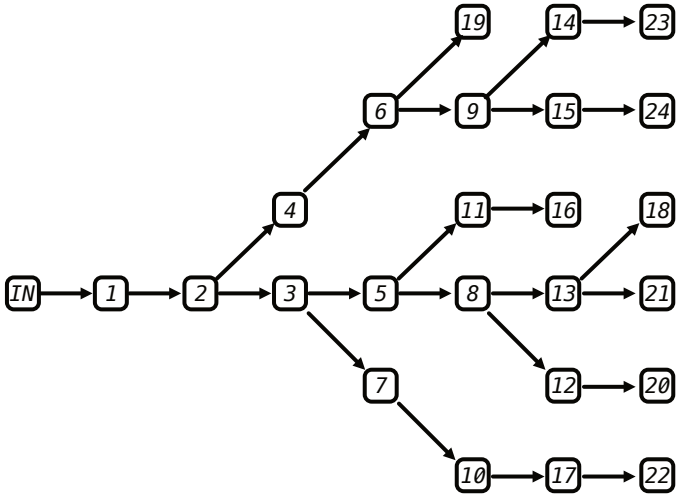


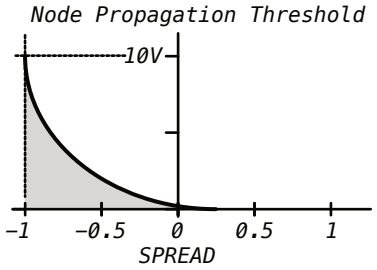
IN: A gate or trigger stimulates the first node, which propagates along the red lighted network.

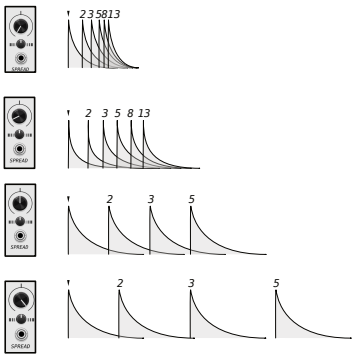
IMPULSES: The yellow light to the right of each output indicates the signal level. 24 outputs produce related decay envelopes in rhythm with the input signal.

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.

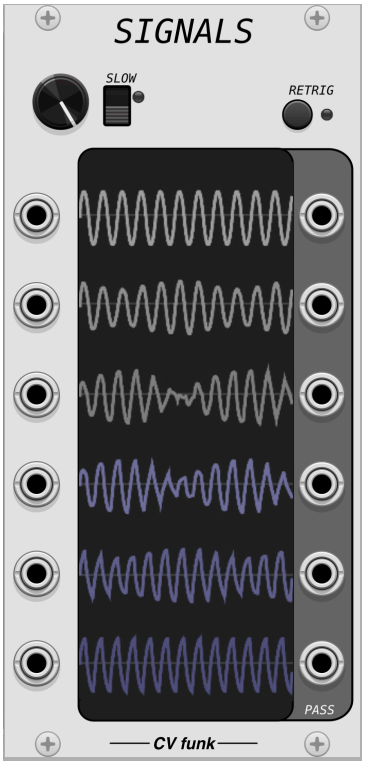
– Networks: Patch multiple Wave Propagation modules together. By patching inter-patching the outputs from different Wave modules to their inputs, and parameters, it is possible to build complex rhythmic networks that can be used to drive expressiveness in your patches. The manual trigger button will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

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.

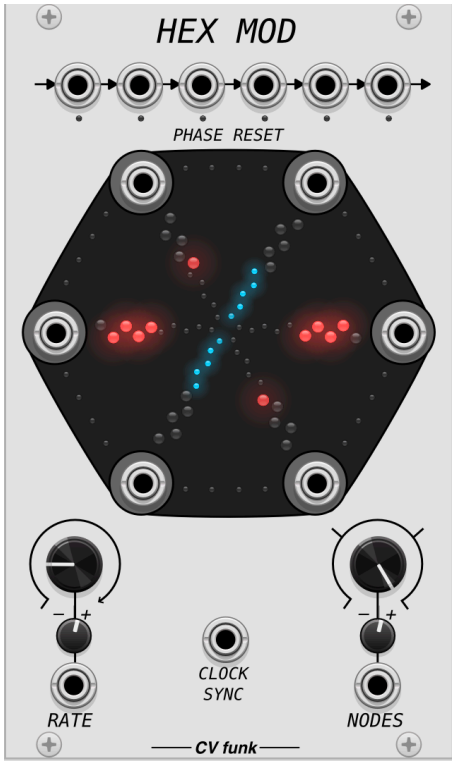
Gate Sequencer: Set **TOP** to 5. Set **BOTTOM** to 5. Set **DIVS** to 0. Patch the outputs numbers 3+ to gate inputs of other modules. A 5V sweeping voltage into **DIVS** will send 5V to all the outputs in sequential order.

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.

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.*

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.

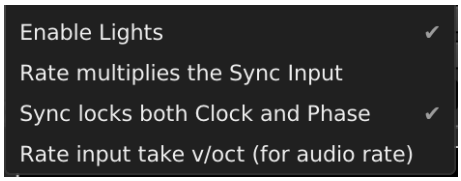
2. Trigger Inputs: Introduce envelope signals into the inputs along the top of the module to dynamically influence the phase reset as well as the relaxation of each oscillator back to their default phase relationships. Trigger inputs normalize to their right, in a loop.

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.



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.

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.

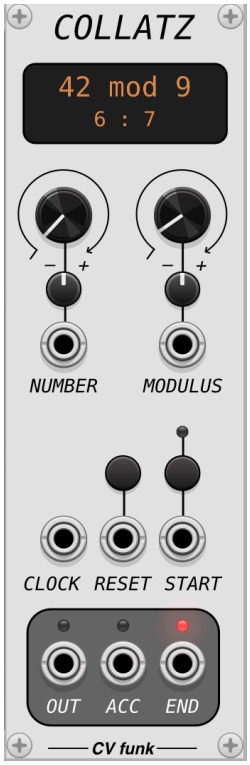
Even: /2

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.

Usage

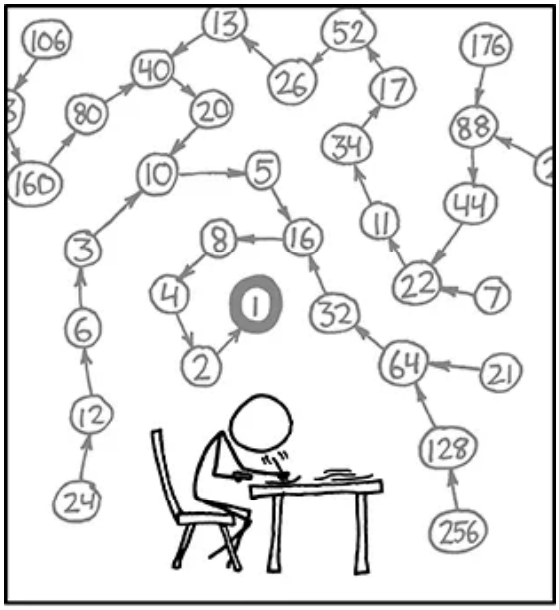
1. Number and Mod: Begin by setting **NUMBER** and **MODULUS.** The **MODULUS** sets the maximum number of pulses per clock interval, and is best set to a low number if you wish to use it for drum beats, but can potentially be faster up to audio rate depending on the setting.

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.

MUTE:

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

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.

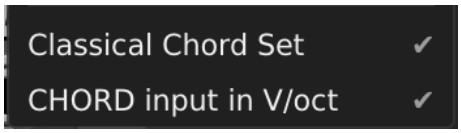
3. Mutes: Many guitar chord fingerings contain muted strings. In this case, the string will output −10V. The mute gates allow you to easily patch mutes to connected oscillators when the chord voicing requires.

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.



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)

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*.

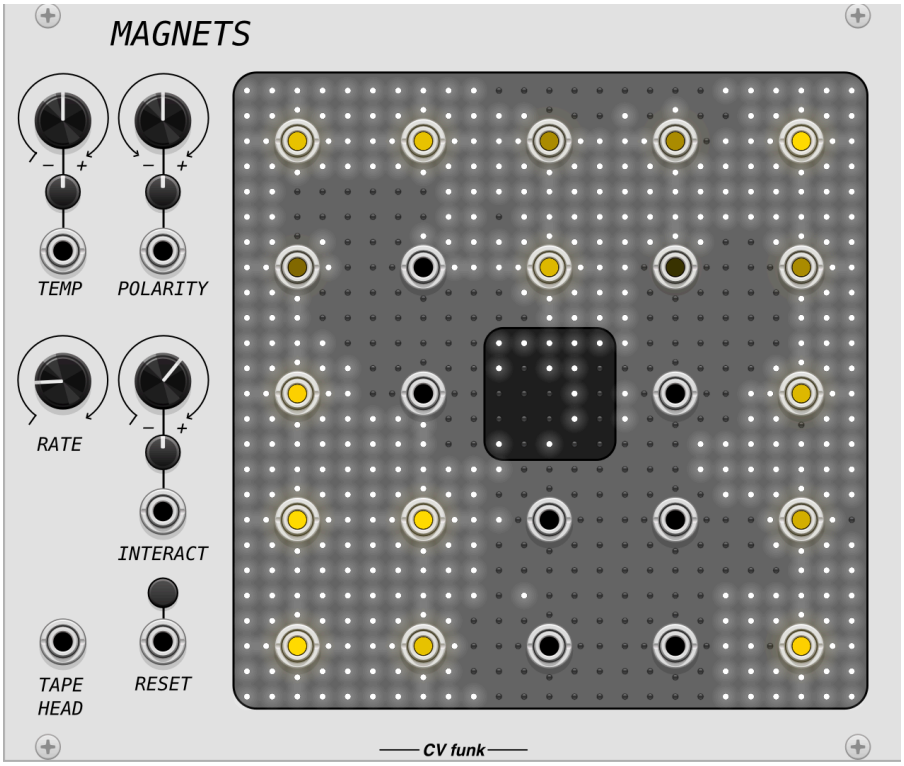
Note Bending: Patch the **TRIG** output into CV funk *ENVELOPE ARRAY* or other envelope generator. Patch an envelope output to the 5th string **PITCH BEND** input.

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

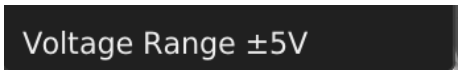
1. TEMP: Set the temperature of the simulation. A low temp can freeze the simulation, while a hot temp adds lots of randomness.

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

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.

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.*

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 (ROTATE and SPREAD): ROTATE 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.

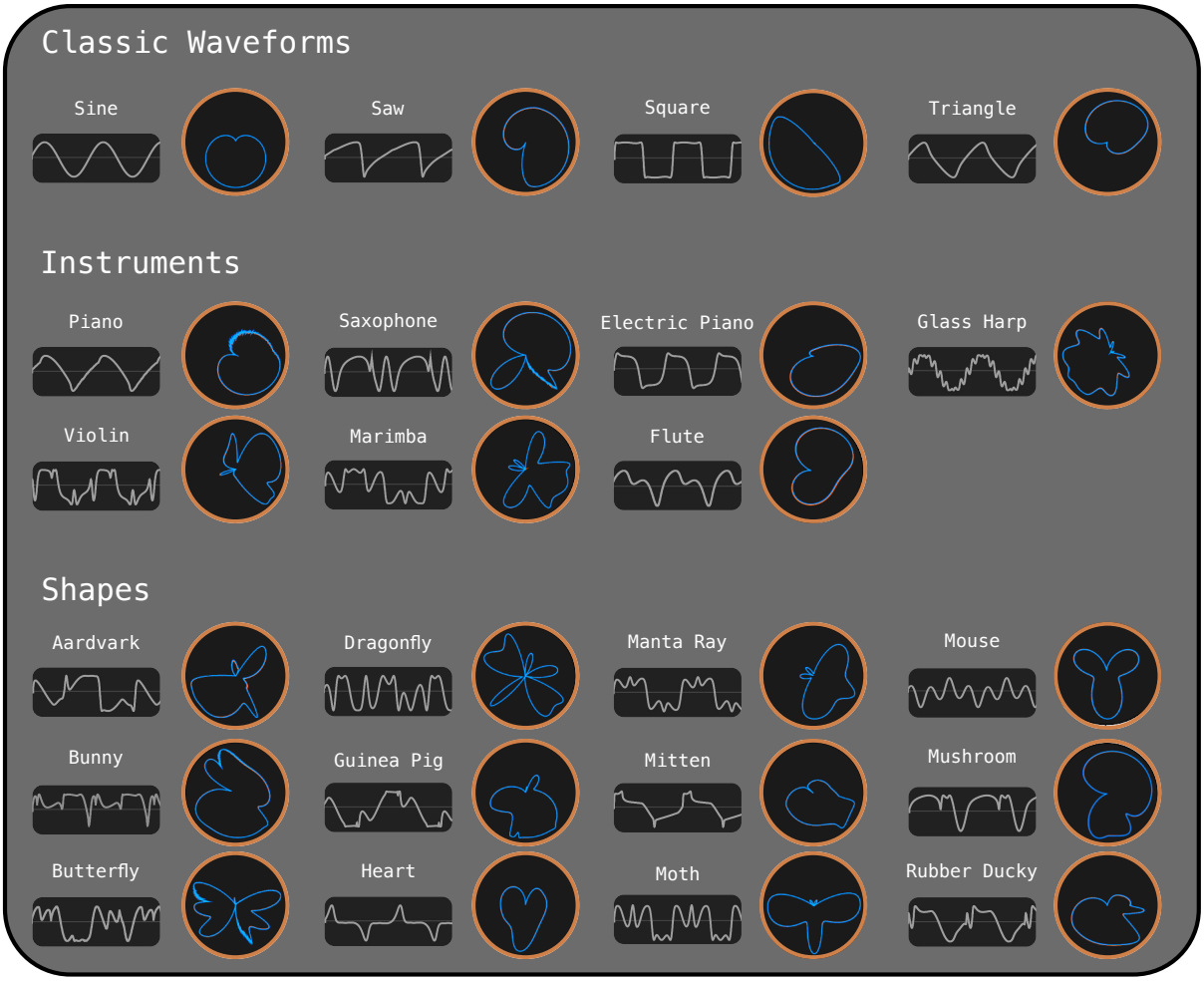
5. Phase Relationship (NODE Control): Adjust the **NODE** knob to transition between different phase distributions such as unison, bimodal, and trimodal, crafting rhythmic patterns and evolving textures.

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.

PRESSED DUCK

SIDE:

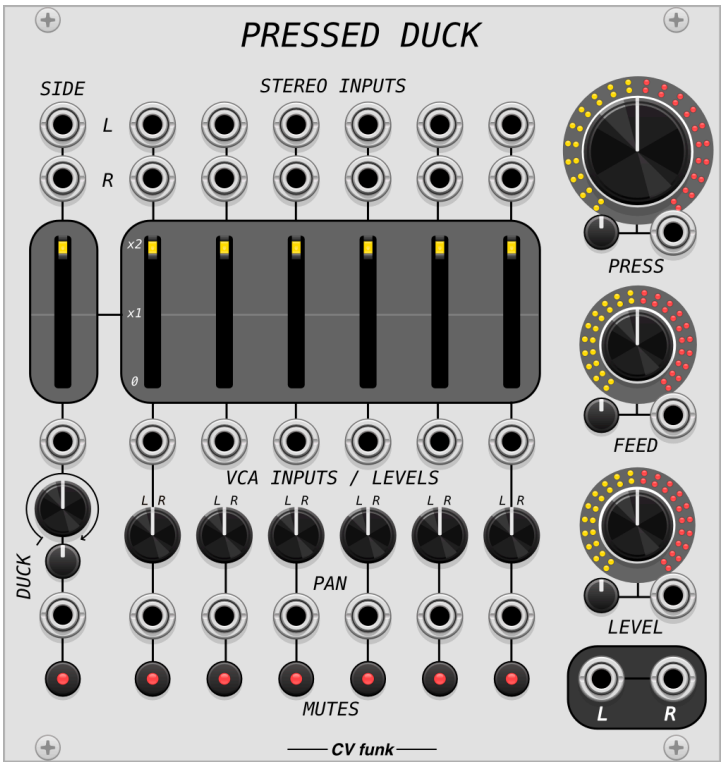
Stereo input for the side-chain.

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.

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.

Patch Suggestions

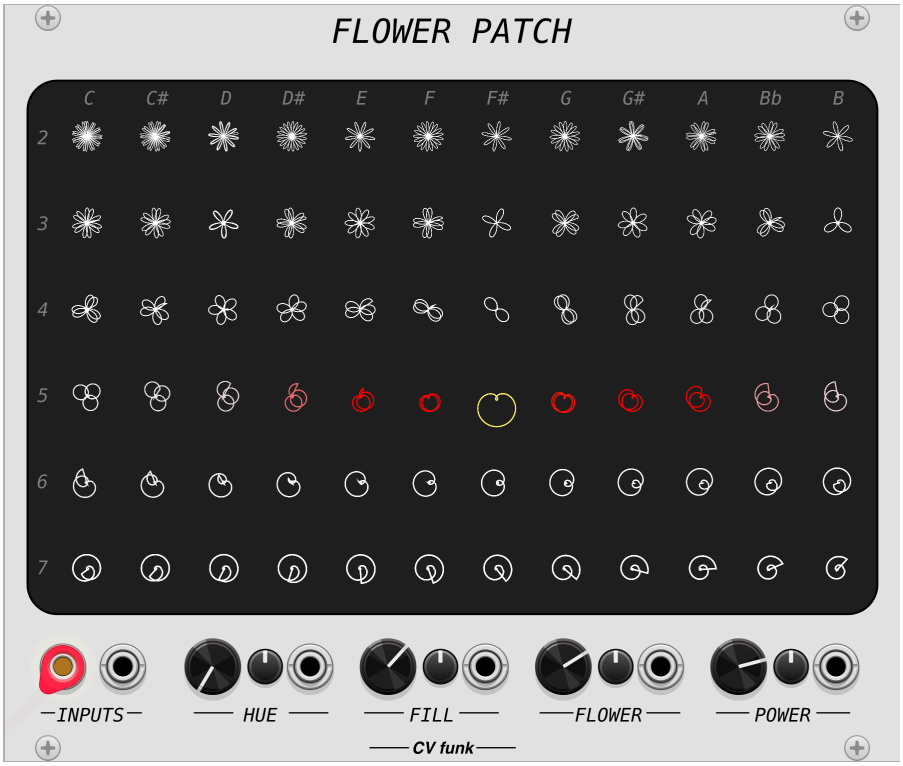
1. Mixer: Use it as a regular mixer. Patch the 6 stereo inputs, leave **PRESS** and **FEED** set to zero.

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.

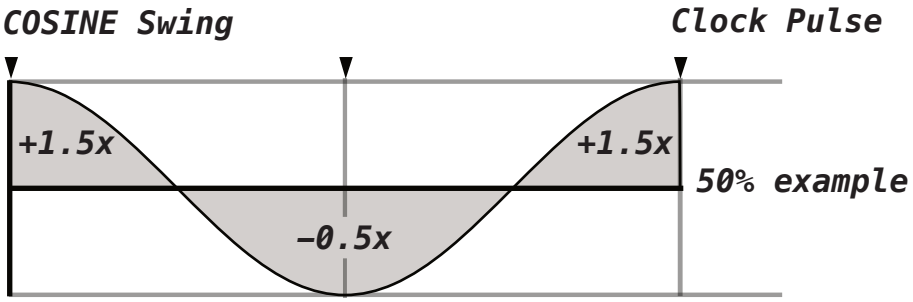
SYNCRO is an eight channel rotating clock multiplier and divider that is able to generate fractional clock ratios. The SWING setting applies to the master clock, controlling all channels. FILL and ROTATE allow for endless self-patching of new rhythms.

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.

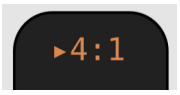
2. FILL: The current setting is indicated by lights, up to 8 beats can be added to the numerator of any channel. The **FILL** button and input add the set number of beats at the start of a clock cycle.

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%.



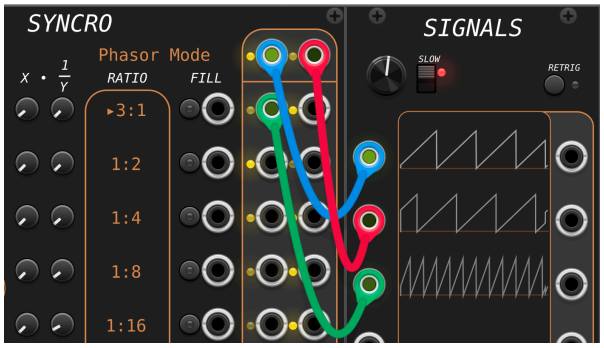
4. ROTATE: Rotates the clock ratios relative to the outputs. The outputs that correspond to the top row of controls is marked with a triangle symbol. The clock multiplication and division knobs map to the rotated position, while the **FILL** inputs map to the row.

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.

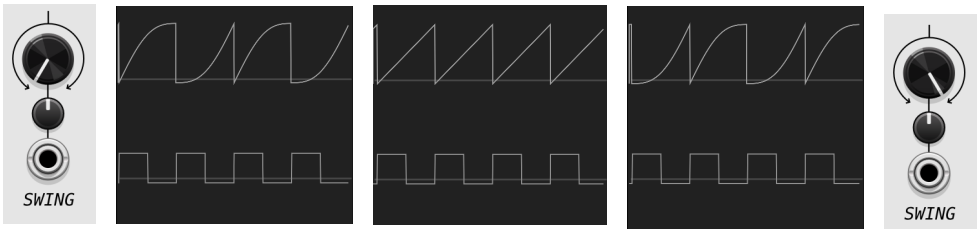
SYNCRO



PHASOR MODE:

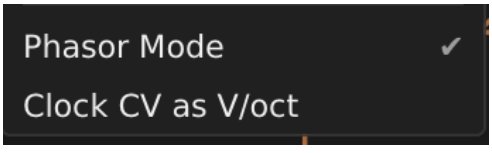
Rotates the clock-ratios for the different clocks. The arrow on the display indicates the current position of Row 1.

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.

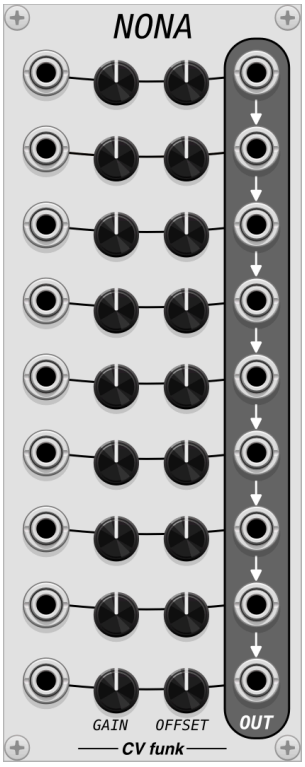
Patch Suggestions

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.

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.

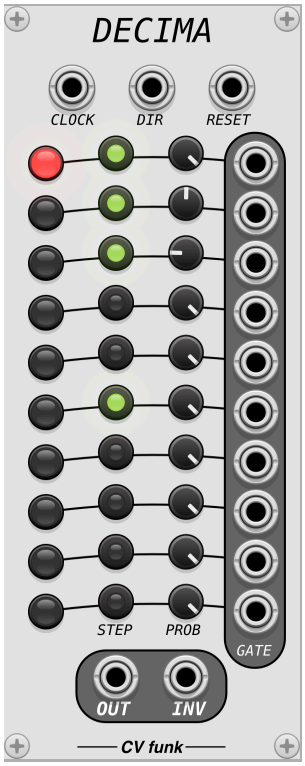
DECIMA

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.

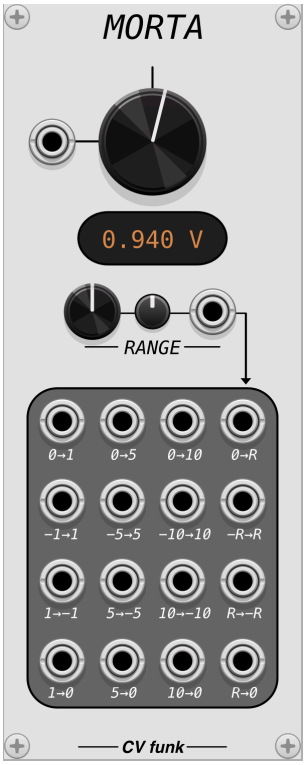
MORTA

INPUT:

Patching an input overrides turning the knob and instead automates the knob.

RANGE:

Allows you to set the range ‘R’ of the 4th column of outputs from 0V to 10V.



DISPLAY:

The display indicates the input voltage.

Unipolar

Bipolar

Reverse Bipolar

Reverse Unipolar

1V 5V 10V RANGE

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.