

# BRANEBENDER



## LICENCE AND TECHNICAL INFORMATION

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Branebender is a virtual instrument for Native Instruments Kontakt sampler, you need full version of Kontakt 6.6.1 or newer to run it.

Instrument interface takes 1000x780 pixels inside Kontakt. Make sure your screen resolution can accommodate it.

You are licensed to use this device and samples which come with it, in the creation of a recorded or live sound performance, free or commercial, without paying any additional licence fees or providing source attribution.

Please DO NOT: include provided scripts and samples in any music library or sample library; sell, re-package or re-distribute the samples or sampler programs.

USE AT YOUR OWN RISK! This device is provided 'as is' and there is no warranty of any kind.

## INTRODUCTION

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Branebender is experimental wavetable synthesizer. It doesn't use any samples apart from wavetable files. It is based entirely on Kontakt's wavetable engine, which technically can be considered a sampler, but I will insist to call it a synthesizer.

The idea behind this instrument was to create a sort of living sound machine, something with many animated part moving in an inevident, yet not random manner. Also I wanted to move away from traditional user interface look, towards something more abstract, being more of interactive sculpture than an utilitarian tool.

It's a blend of several wild ideas I've been tinkering with for a long time. Wavetables are used to shape-shift waveforms as you play. Kinematics is a two dimensional modulator, based on "particle in a box" game, with several twists and spins. Here it is used to animate different basic engine parameters, with set of XY-pads to produce morphing and evolving waveforms. The arpeggiator is an attempt to create building blocks environment, where you can sequence and combine different pattern creating algorithms. Then there's modulation hub which can be used to freely modulate any parameter from effect section.

Expect a different kind of experience with this instrument, possibly brain bending, hopefully exciting.

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# USER INTERFACE LAYOUT

User interface is divided into 8 pages listed at the bottom of instrument’s window. Click on page name to switch. The page names are:

BENDER – oscillator control: waveform bending and mixing, filters, volume envelopes.

KINEMATICS – animation system for XY pads that control key engine parameters.

WAVES – waveform bank: select waveforms, attach oscillators to specific busses.

PATTERNS – the arpeggiator.

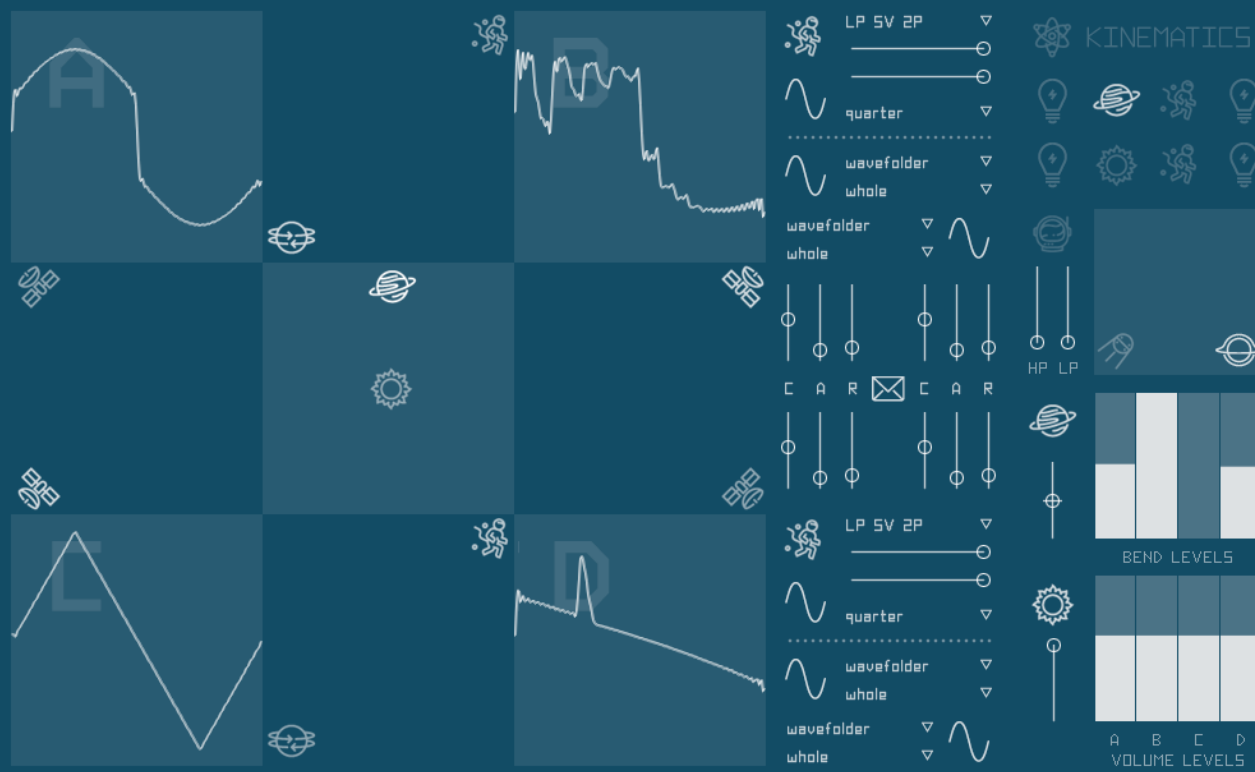
SHAPES – modulation hub: LFOs and step sequencers to control effects, volume and pitch.

EFFECTS – insert effects.

SPACE – send effects.

SETUP (satellite dish icon) – UI and general settings.

If you’d rather explore the instrument than read this manual, every controller should give you a text feedback, explaining what it does. Messages will appear at the bottom line of the interface, below page switches. For aesthetic reasons, or if you prefer to solve the mystery on your own, the messages can be turned off with “book icon” button.



Waveform bender. H: waveforms A and D. V: waveforms B and C. (A: 50% B: 100% C: 0% B: 49%)

message area

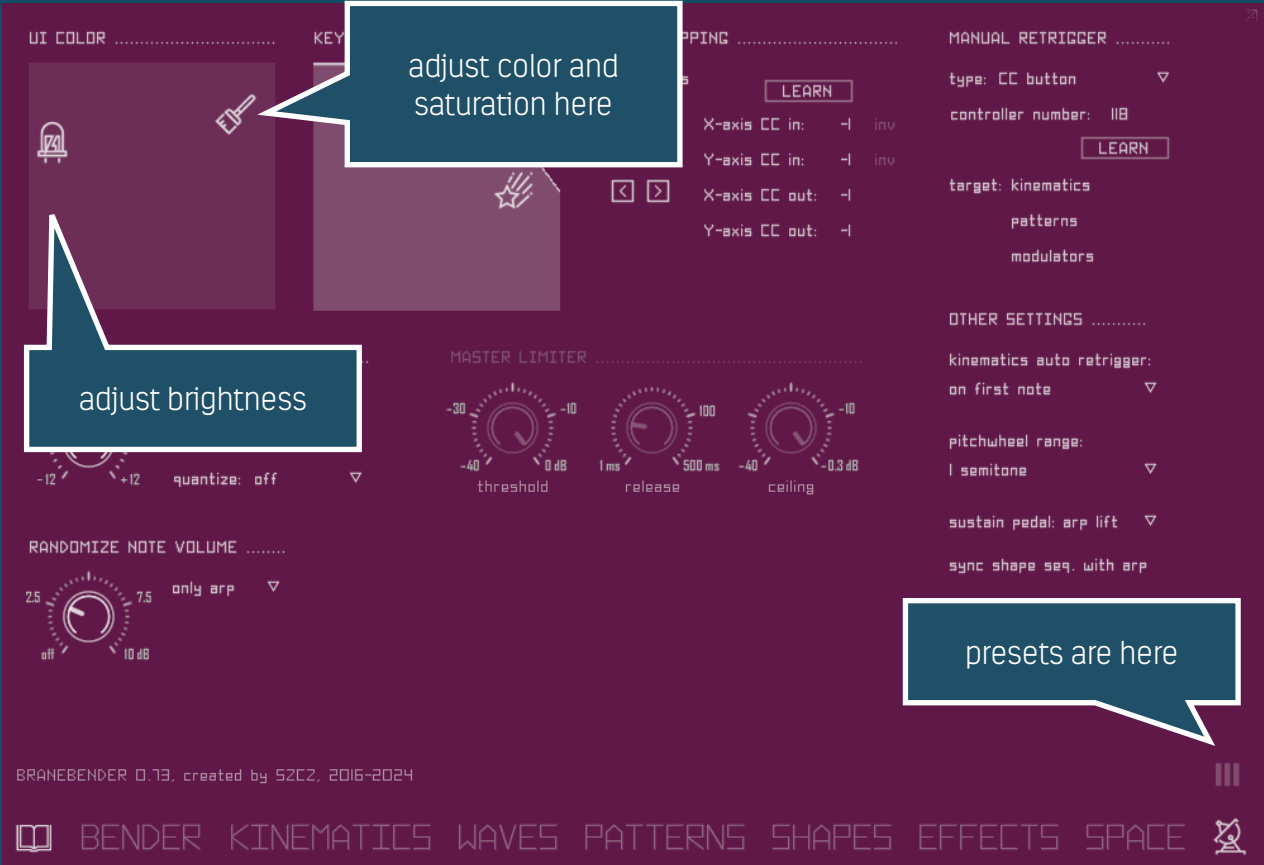
section switches

# USER INTERFACE COLOUR

Branebender’s user interface is monochromatic, with white elements on dark background. Graphical style is a nod to vector videogames of the 80’s. A glimpse of my childhood. The colour palette is restricted to two, but you can adjust background colour freely. Use colour mixer pad on Setup page. If you are old school you can move down “lightness” icon and set background to pure black.

UI colour is saved in patch/project, but not in snapshots. You can also save different themes using setup presets.

Here’s Branebender in full eye-sore magenta mode.



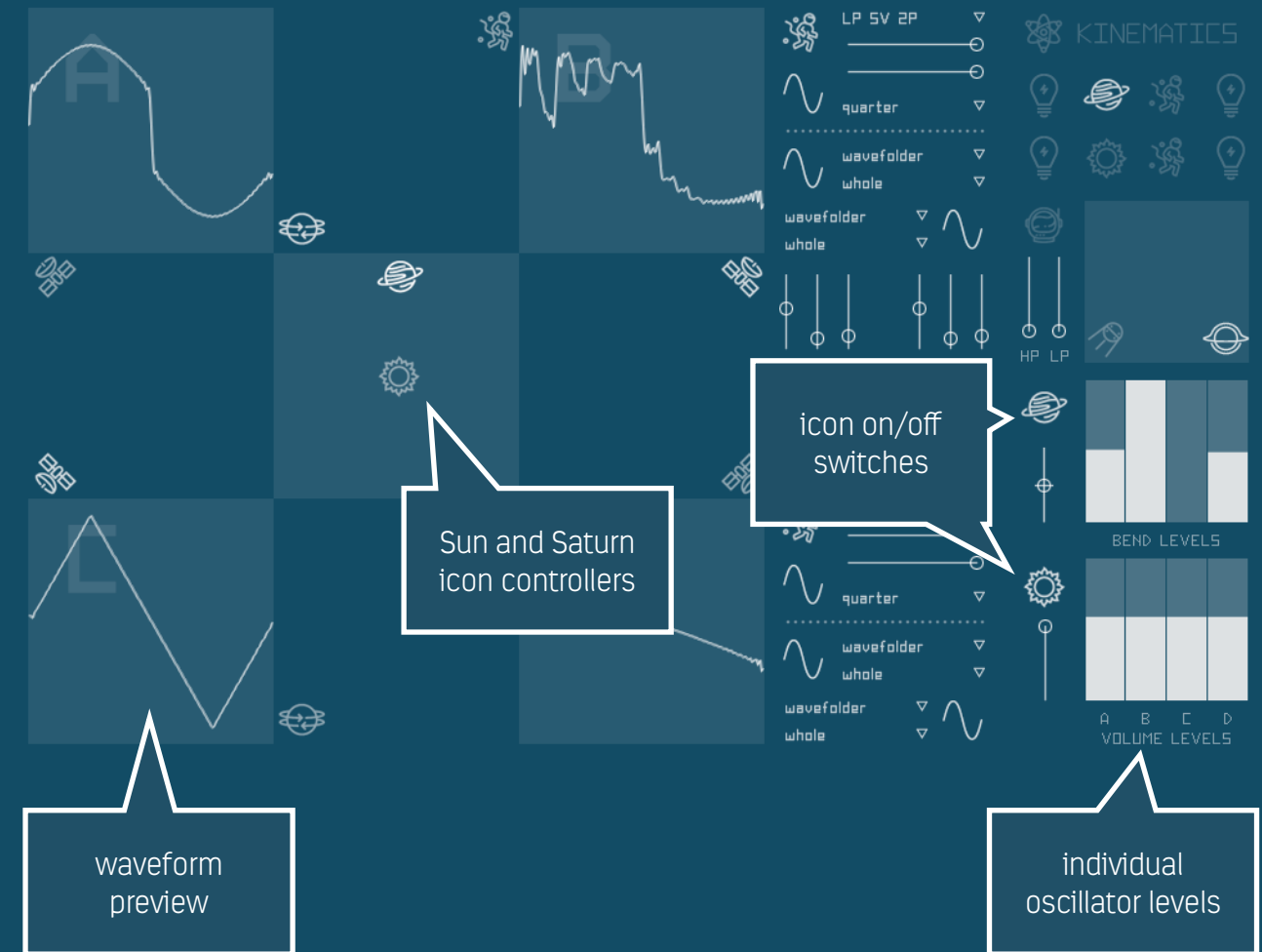
## WAVE BENDER

There are four wavetable oscillators in the instrument. Each wavetable is a transition between two waveforms. On the left side of bender page, you will find graphical representation of four waveforms and five XY pads that control key engine parameters. Pads can be automated using Kinematics animation.

Oscillators/waveforms are named A, B, C and D and will be referred to in such manner in the instrument. You can keep oscillator letters on top of waveform graphic or hide them for slicker look in Setup section: “show wave letters”, under “other settings”.

Move “Saturn” icon in central pad to control morph position between wavetable shapes. On the right side of the window you can see how the movement affect individual waveforms. Look at the set of vertical bars named “bend levels”. You can adjust the bars directly, but moving the pad icon will override that adjustment, unless you disable the pad controller using “Saturn” icon placed next to control bars. You can also use vertical slider under the icon to adjust pad behaviour.

In similar manner “Sun” icon controls oscillators volume levels. Closer the icon gets to given oscillator, the more prominent it becomes in the mix, while keeping overall loudness on the same level. So, as you move “Sun” icon around you “morph” the sound between different oscillators. Hold “control” key and click on the icon to reset it to default position, which is the centre of the pad area (this works for all pads). As for bend levels, you have set of bar controller for oscillators volume on the right side of the page. Also you can disable the icon or adjust it's behaviour with the vertical slider (which adjusts it's 'strength').



# WAVESHAPER

Each oscillator has it's own waveshaper which can transform the waveform using one of several functions. Functions are applied to the shape defined by wave bender. Also each waveshaper has an LFO which can be used to adjust the amount of waveshaping effect rhythmically.

Move "satellite" icons to adjust amount of waveshaping and LFO depth individually for each oscillator. Horizontal movement sets effect amount and vertical movement sets LFO depth.

For each waveshaper you can set function type, LFO rate and LFO shape, set these using drop-down menus located right to pad area.

Available functions are:

Bend in, bend out, superbend – variants of symmetrical stretching.

Wavefolder – repeating/multiplying the waveform.

Fade folder, superfade folder – variants of wavefolder with fade-in and fade-out.

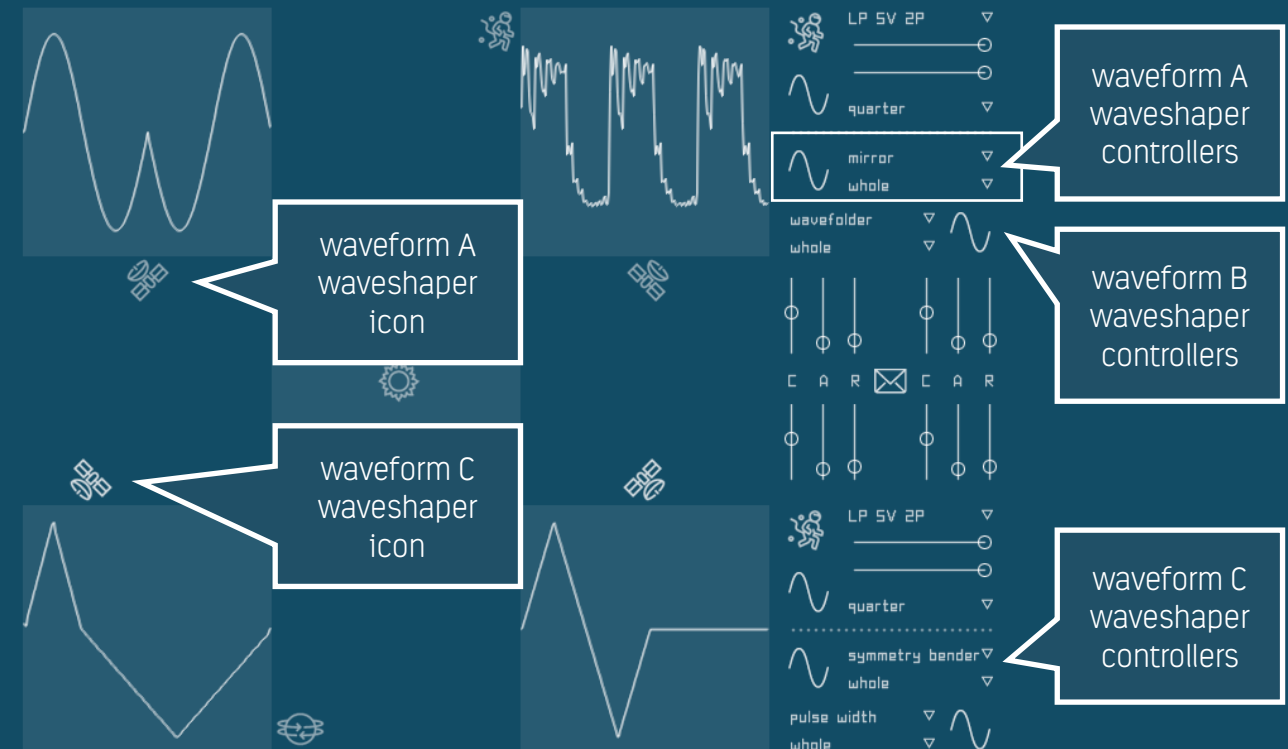
Pulse width – squeeze the waveform.

Symmetry bender – asymmetric squeeze/stretch (squeeze one half, stretch the other).

Flipper – flip phase on part of the waveform.

Mirror – repeat the waveform while flipping the phase.

Bitcrush – reduce vertical resolution.



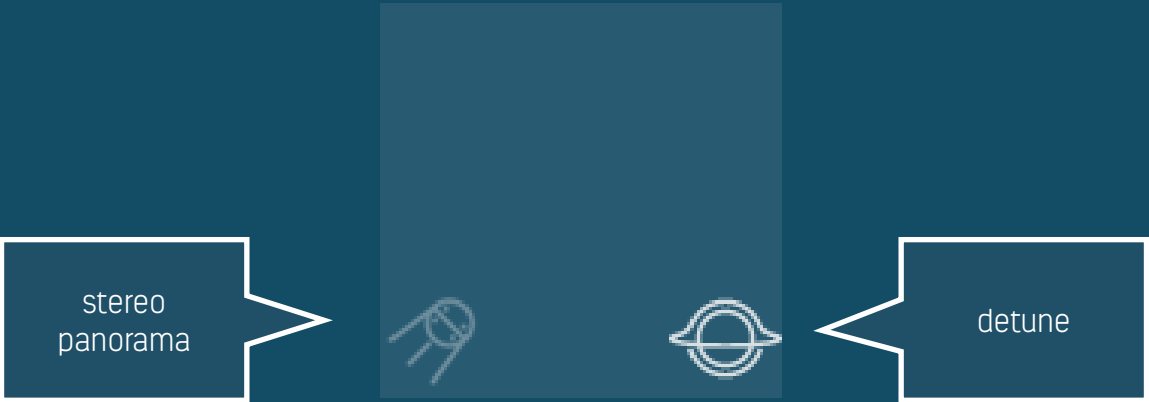
# OSCILLATOR CONTROL

When moving mouse cursor over waveform graphic area, you will find that it is divided into four switches: lock, mute and octave +/- . Octave switches, obviously, change oscillator tuning. Lock switch will bypass wave bender – moving “Saturn” icon no longer affects the oscillator (though you can still modify the waveform using bend level bars).

Mute switch turns oscillator off. However the arpeggiator function has an option to “ignore” that setting, which can be exploited to create oscillator split between arpeggiated and non-arpeggiated sounds.

On the right side of the page, above bend levels block you will find “sputnik” icon and “black hole” icon. Move “sputnik” vertically to spread oscillators A and B in stereo panorama. Horizontal movement affects oscillators C and D.

Move “black hole” icon to detune oscillators. Detuning function is dynamic – it will also add pitch drift, as well as random waveform phase. Playing notes with random oscillator phase means that playback of the waveform starts at random point, hence it doesn’t start from zero-line. To avoid clicks, add some volume envelope attack when using detune function.





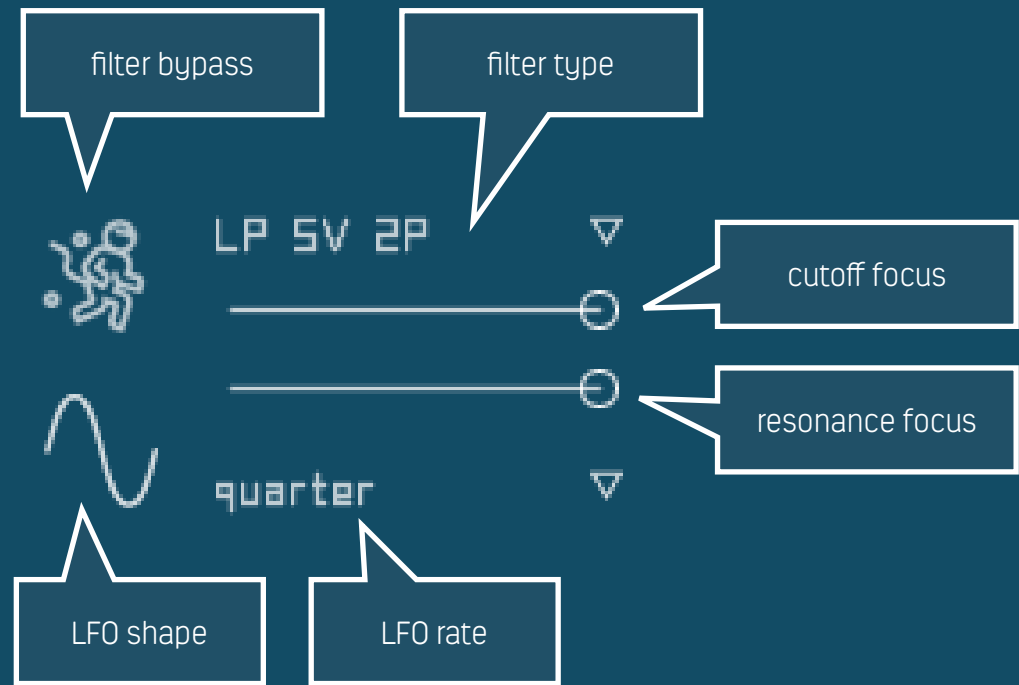
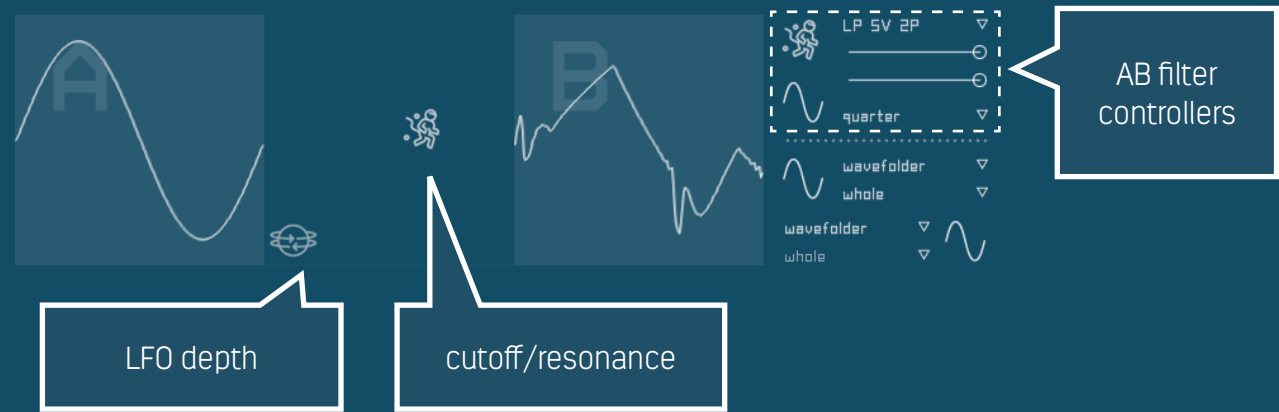
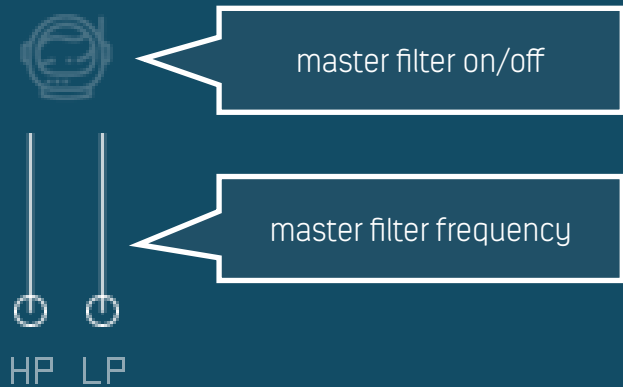
# OSCILLATOR FILTERS

There are two filters at oscillator level and a master filter which can be controlled on Bender page. First oscillator filter is connected to oscillators A and B, and second to oscillators C and D. Use "astronaut" icon to control cutoff frequency (horizontal movement) and resonance (vertical movement). Then "rotator" icon controls filter LFO levels independently for each oscillator.

On the right side of pad area you will find further filter controllers for selecting filter type, LFO shape and LFO frequency. Also there are two sliders for adjusting cutoff and resonance range for "astronaut" icon, these can be useful to set narrower scope when automating icon movement. You can also bypass filter by switching "astronaut" button next to these controllers.

Note that you can add additional filters on Effects page.

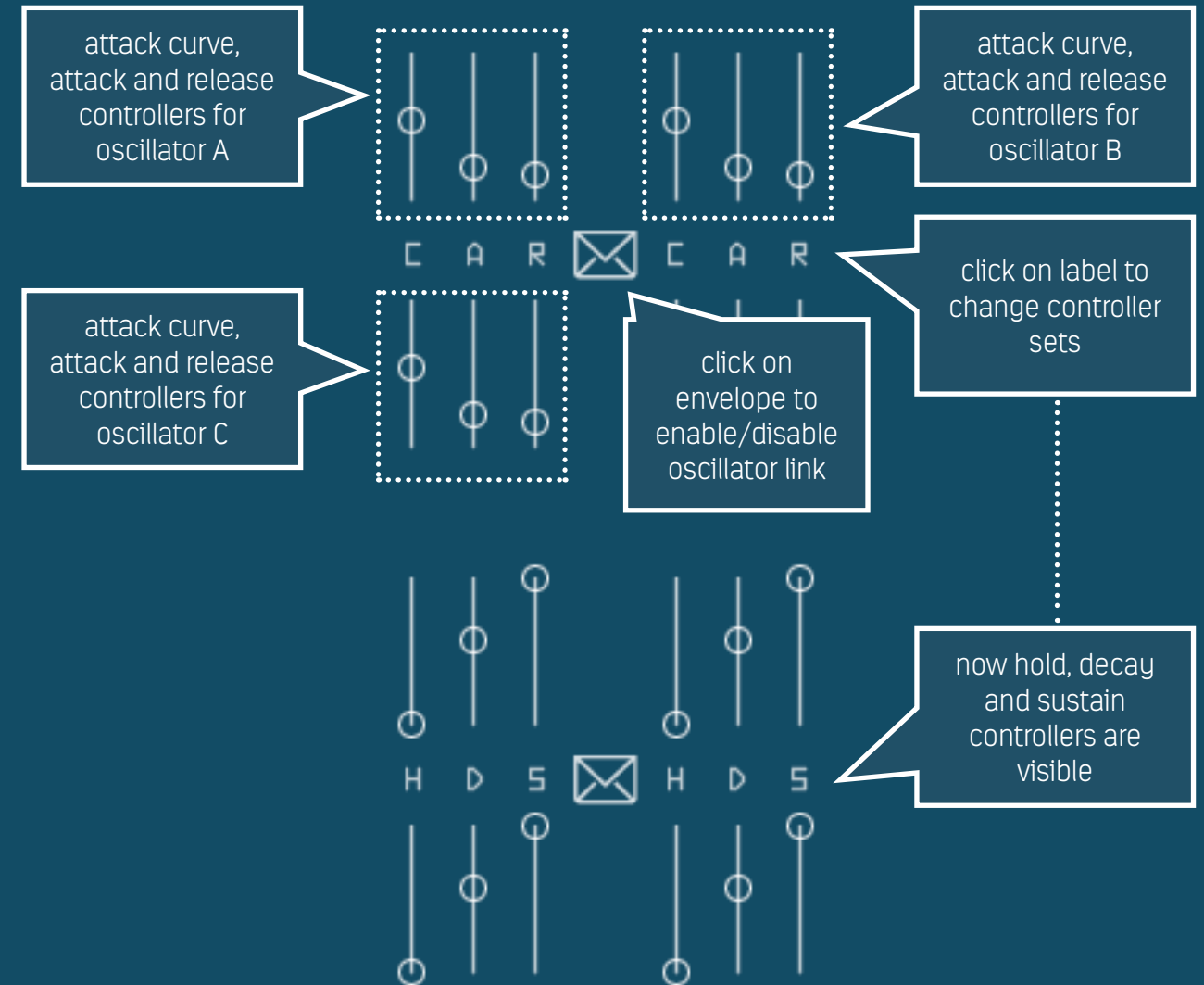
There is also a master filter, which is simply high pass and low pass, with no resonance control. It is located at the very end of the signal chain (after effects, before master limiter). Use it to tame border frequencies build-up which can occur when applying certain effects.



## VOLUME ENVELOPES

In Branebender I used standard AHDSR five stage envelopes to shape volume. Envelope controllers are located on Bender page, around “envelope” icon. There are separate controller sets for each oscillator. In “initialize” patch the controllers are linked, so if you change one oscillator envelope the same change will be applied to the remaining three. Click on “envelope” icon switch to disable the link, then you will be able to set envelopes individually for each oscillator.

Envelope controllers are split into two sets. First contains attack curve, attack and release, labelled as “CAR”. Second contains hold, decay and sustain, labelled as “HDS”. Click on CAR/HDS label to switch between sets.





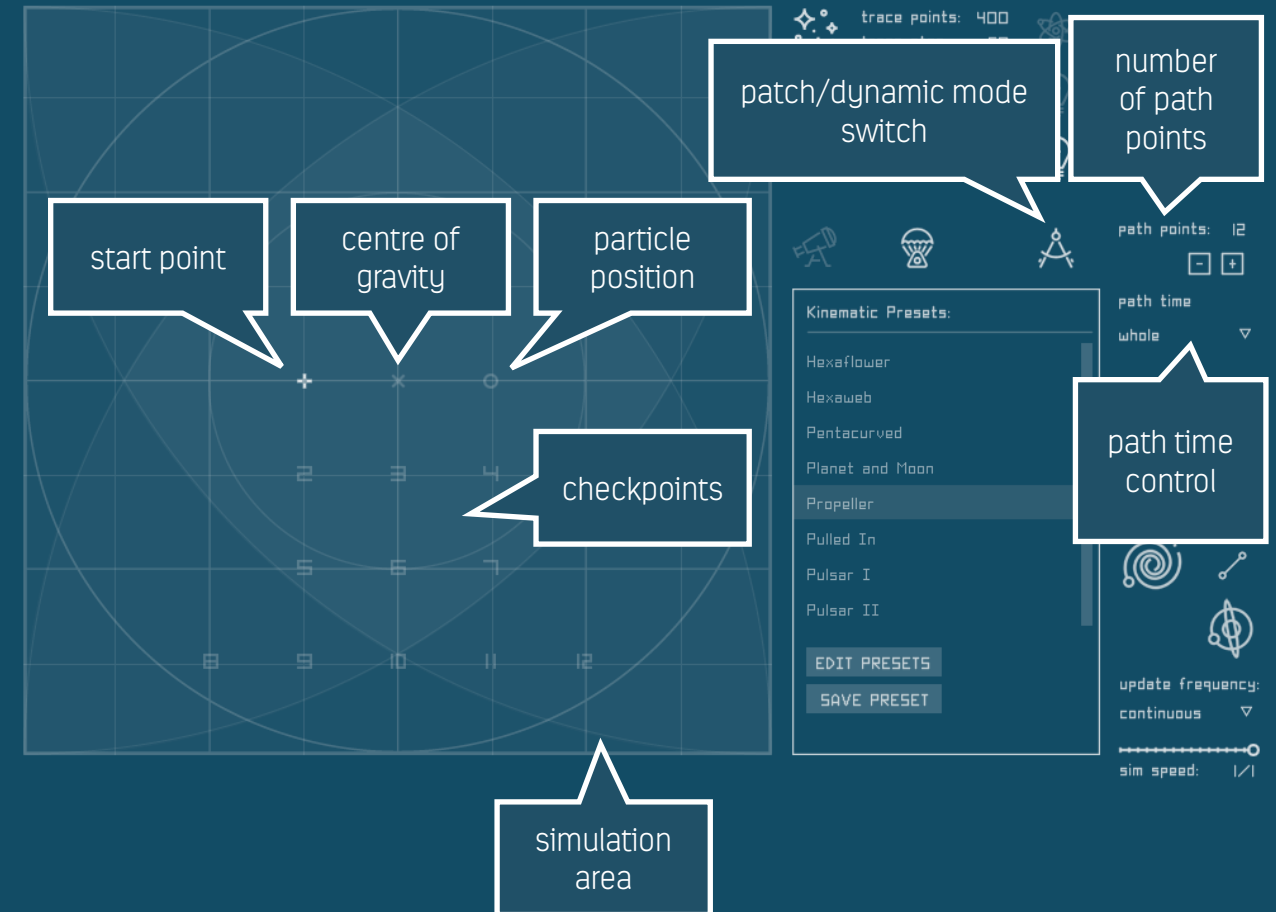
## KINEMATICS: PATH MODE

There are two simulation modes, path mode and dynamic mode. Use “compass” button to switch between modes. Path mode is ‘draw by numbers’ game, you position checkpoints on simulation area, define travel time and the cursor will move in linear fashion from one checkpoint to the next.

There are four cursor types in the simulation box, click and drag to position them. Hold control key to make them snap to grid. “o” is the particle, it will move between checkpoints once simulation is started. In path mode it doesn’t matter where you place it. Its only function is to show you movement of animated icon. “+” is the starting point, restarting the simulation will move the particle back to this position. Numbers stand for following checkpoints. Finally “x” is the centre of gravity, a reference point for pulsar function and rotate function.

You can use up to 12 path points, use +/- buttons, type in the number or drag the number to define how many points you want to use.

Kinematics engine is synchronized with host’s tempo, it’s smallest step is equal to 1 midi tick. You define speed of simulation using note fractions. You have two options of setting the time: “path time” and “section time”. Switch between modes using button below path points controller. Then pick simulation time from drop-down menu below. In “path time” mode you define how long it takes for the particle to travel through all checkpoints and back to start point. In “section mode” you define how long it takes the particle to travel from one point to the next, so depending of distances between points, the particle will speed up or slow down at different section to match section distance and time.

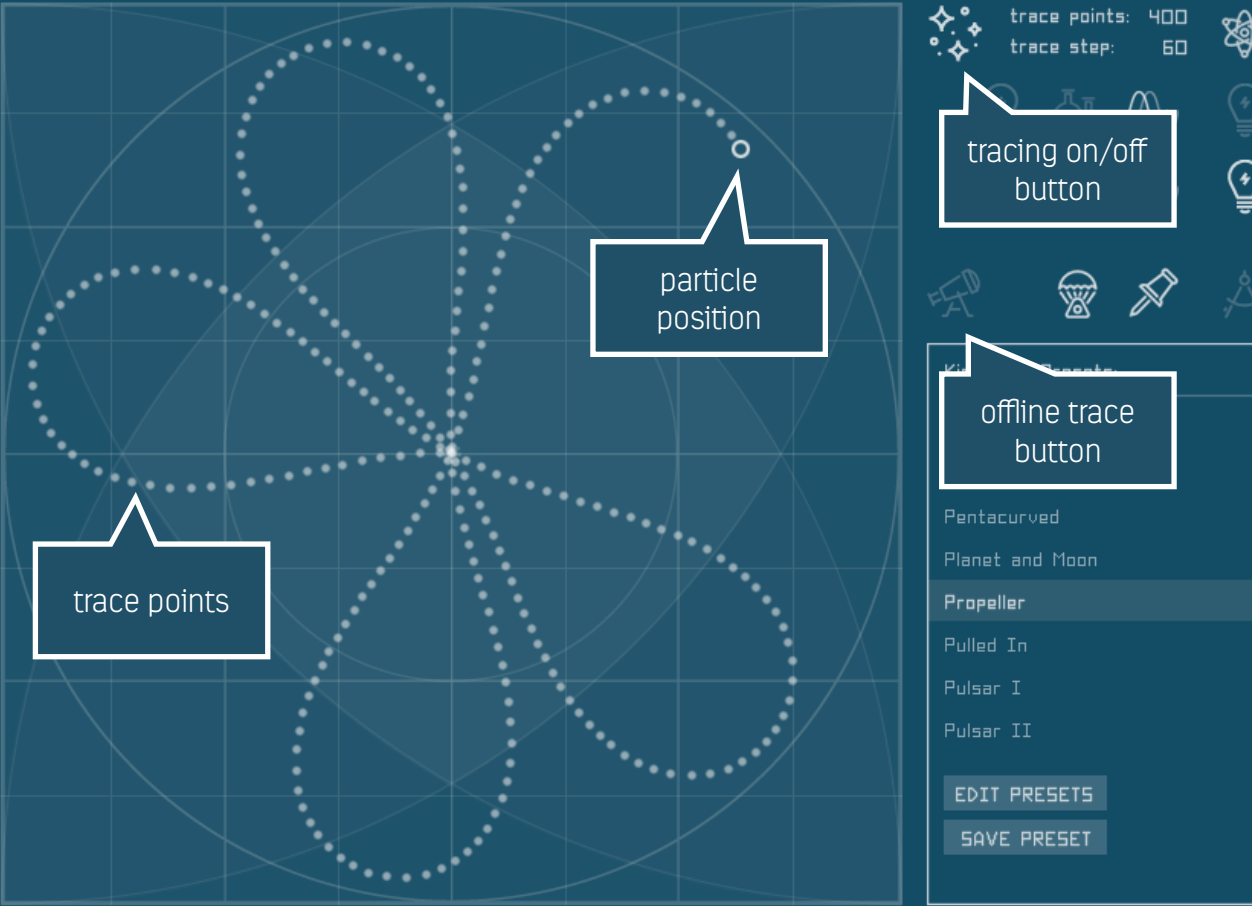


# KINEMATICS: TRACING

So far we know exactly where will particle go, but things are about to get more complicated. Before we dive into it, I want to explain “tracing”. This is function which will visualize particle path, so you get a better understanding of how it is going to behave. When you enable tracing (starmap button), as the simulation progresses, the particle will leave marks on its path, called trace points in the UI. You can define maximum number of trace point and distance between them. (I had to define Kontakt’s UI elements for each trance point, hence the number is limited).

There is also “offline trace” mode, which you can activate using “telescope” button. This function will attempt to draw the whole particle path, by running the simulation steps without any delays, until all trace points are placed (or until it runs out of reasonable step limit). It is available only when Kinematics engine is off and it will create short full CPU load, so don’t use it while playing sounds, as it will likely cause audio glitches. With “offline trace” enabled you can visualize how changing simulation parameters affects particle path.

Enable offline trace when browsing presets to see what kind of path selected preset produces.



# KINEMATICS: ROTATING CHECKPOINTS

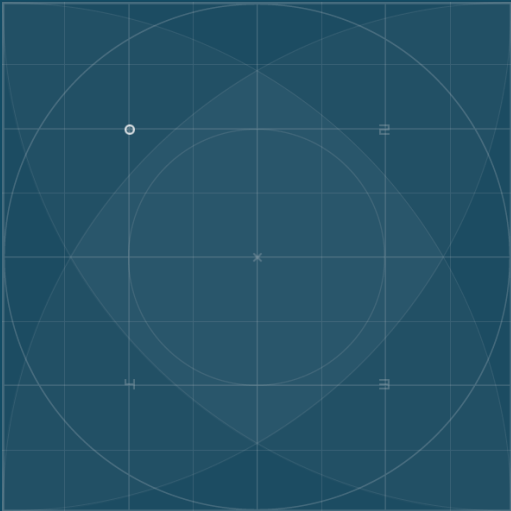
Thus far path mode is literally straightforward, but what if checkpoints were on the move? In Kinematics you can rotate path checkpoints dynamically, that is make them move around as the simulation progresses. You can rotate checkpoints around starting point, or around centre of gravity, or both at the same time. You can set rotation speed using “planet” controller set.

Rotation speed is defined as “degrees per half note” (forgive me making such nerdy scale). So for example, setting rotation to 180° means that it will take whole note time to make a full turn. Alternatively, you can set variable speed mode, where speed depends on “orbit”, making lower orbit objects move faster. “Orbit” here means the distance from the centre of simulation area, so objects in the middle of the box move faster than those further away.

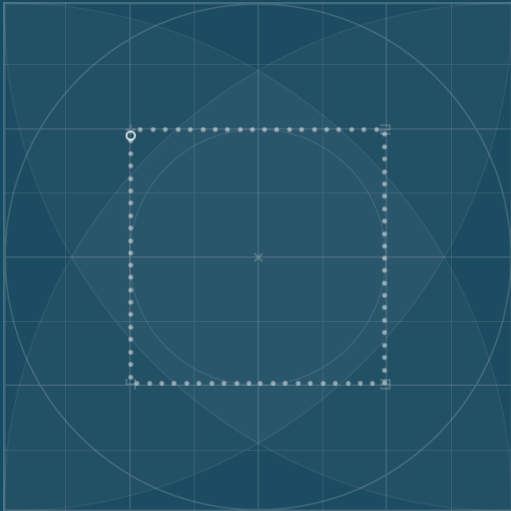
Turning rotation speed controller to the right makes it rotate clockwise, turning it to the left makes it move counter-clockwise. Hold control key to set it to default middle position, where rotation speed is zero, turning the function off.



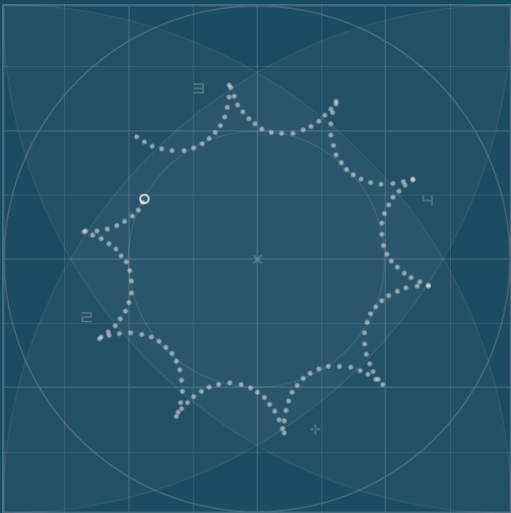
example: starting point state



particle path without rotation



path with counter-clockwise rotation



Note that with rotation function it is quite easy to move the objects out of simulation area. In such case their position will be calculated as if they were out of sight, while on-screen position will be clipped to the edge of the simulation box. So, the objects will appear as they were sliding on the edge of the box, as they move outside of it, they will resume they proper path as they move back in scope.

# KINEMATICS: RETRIGGER

You can restart selected simulation any time by pressing “parachute” button. In path mode, every time you move a checkpoint manually with mouse, position of all path points is memorized as “initial state”. When you hit restart button, all path points will be re-positioned to their initial state and particle will be placed at starting point. This way even though path points may be moved around by rotating functions, you can recall the initial setup.



To make Kinematics musically usable, we need a way of restarting all simulations at an appropriate moment – a retrigger. There are two ways to retrigger Kinematics, manually by MIDI key or MIDI button and automatic at specified type of event. You can define both methods in Setup section.

For manual retrigger you can assign a MIDI note (press specified key on your keyboard), or use MIDI CC. For MIDI CC you can choose between button mode and pedal mode. In button mode, retrigger will be executed every time a message is received fro specified CC, which is suitable of buttons on a MIDI controller. For pedal mode a threshold is set in the middle of controller value range. Retrigger is executed when controller value moves over the threshold, then next retrigger will be called only when value falls below the threshold and crosses it again. This mode will be suitable for MIDI pedals or sliders. Manual retrigger can be set to affect Kinematics, arpeggiator and/or modulators. If you want to use it for Kinematics make sure Kinematics button is switched on.

You can also make Kinematics automatically retrigger, using one of three conditions. Transport start – retrigger every time you press “play” in DAW. First note – retrigger after transport has started, when first note is played. Every first note – retrigger when all MIDI keys are released and a new note is being played. In this mode every time you release all keys and press a new key Kinematics will be restarted.

UI COLOR

KEY VELOCITY RESPONSE

MANUAL RETRIGGER

type: CC button

controller number: 118

LEARN

TRANSPOSE

target: all notes

mode: bipolar

quantize: off

MASTER LIMITER

threshold

RANDOMIZE NOTE VOLUME

only arp

OTHER SETTINGS

kinematics auto retrigger: on first note

pitchwheel range: 1 semitone

sustain pedal: arp lift

sync shape seq. with arp

arp flashing keys

show volume meters

show wave letters

BRANEBENDER 0.73, created by SZCZ, 2016-2024

BENDER

KINEMATICS

WAVES

PATTERNS

SHAPES

EFFECTS

SPACE

manual retrigger button definition

make sure it applies to Kinematics

define automatic retrigger here

setup section



# KINEMATICS: DYNAMIC MODE

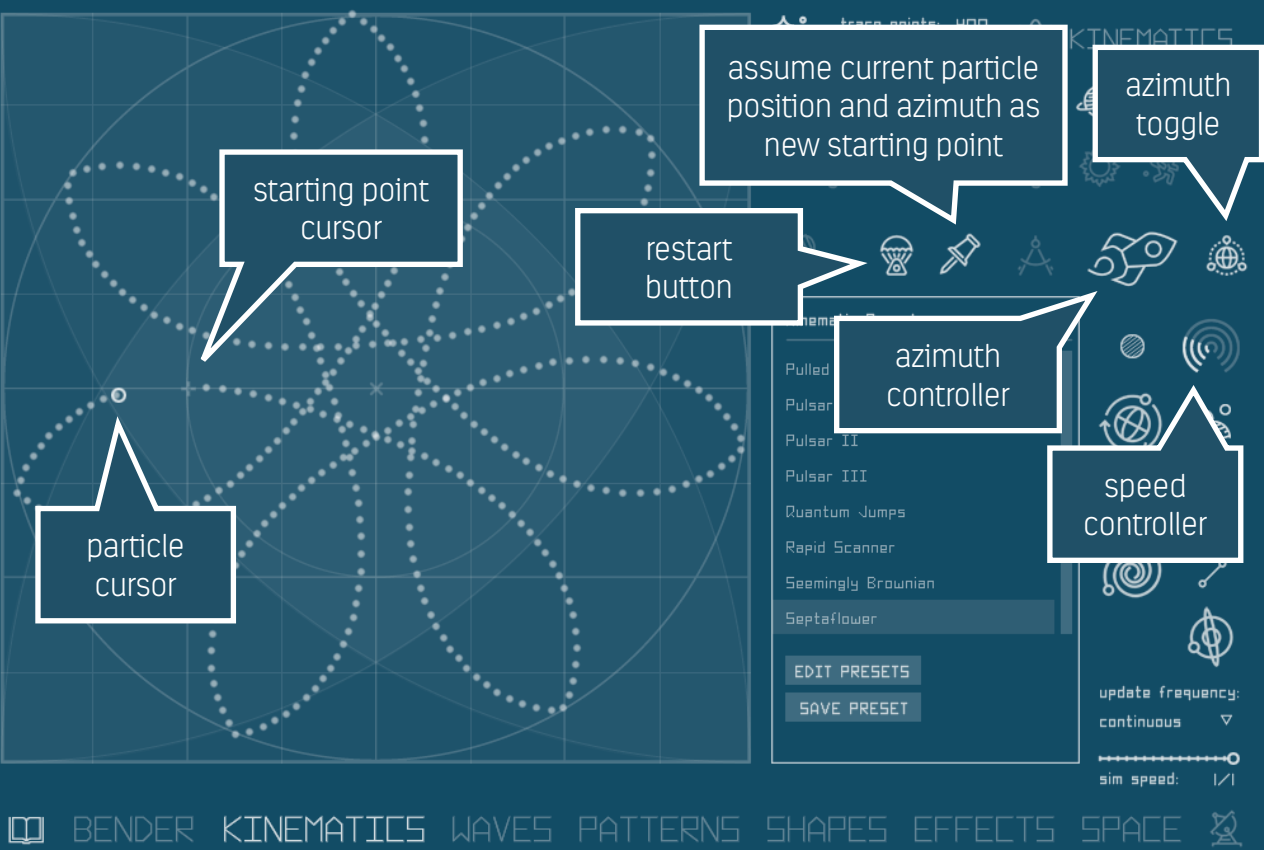
In dynamic mode, there are three cursors available in simulation area: starting point, centre of gravity and particle position. The particle has now three new properties: speed, azimuth (moving direction) and spin. The particle will travel in defined direction bouncing off simulation area edges. Spin will make it gradually change azimuth as it moves, changing the path from straight line to a curve. Basically it's bouncing ball simulation with a spin.

Azimuth controller ("rocket" icon) will change it's value when bouncing or when spin is applied. Note that particle cursor is not bound to a predefined path, like in path mode. It can travel anywhere and if you move it manually it will continue from new position. Hence to set up the simulation you should first define starting point, set up azimuth, speed and spin and press restart button to place the particle at starting point before starting the simulation.

Note that initial particle state includes both position and azimuth. Hence starting point cursor also has separate azimuth value. To define initial azimuth select starting point cursor (click on "+" cursor to highlight it), then set azimuth controller. Selecting particle cursor again will change azimuth controller value to one that is currently assigned to the particle.

Pressing restart button will copy position and azimuth values from starting point to particle cursor. You can also make a reverse operation and set current particle position and azimuth as new starting point – press "pin" button.

You can set azimuth controllers by dragging it directly or pressing toggle button which will increase azimuth value snapping to multiplies of 45°, which can be useful if you'd like to draw a specific geometric path. You can change multiplier to 15° by holding ALT key or increment by one degree by holding SHIFT when clicking on toggle button.





# KINEMATICS: DYNAMIC MODE

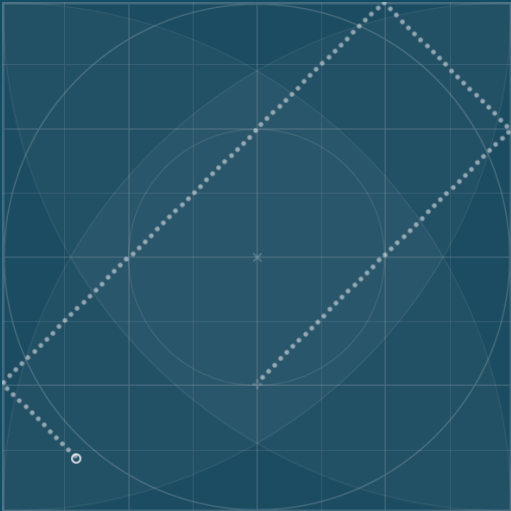
First rotation controller adjusts particle spin, it will animate azimuth controller as simulation progresses. Second rotation controller moves the particle around the gravity centre, the same way as in path mode. When speed and spin find a balance the particle will travel within static circle. However if you just want particle to move in circular manner, most simple way to set it, is to keep speed at zero and only apply rotation.

As in path mode, you can set variable spin and/or rotation speed, however this time spin and rotation will slow down as particle approaches the centre of the box (I know it's fairly confusing).

Next to speed controller there is box/circle switch which defines bouncing edge. Bouncing the particle within circular space makes a bit more sense for some applications, like automating volume mix cursor.



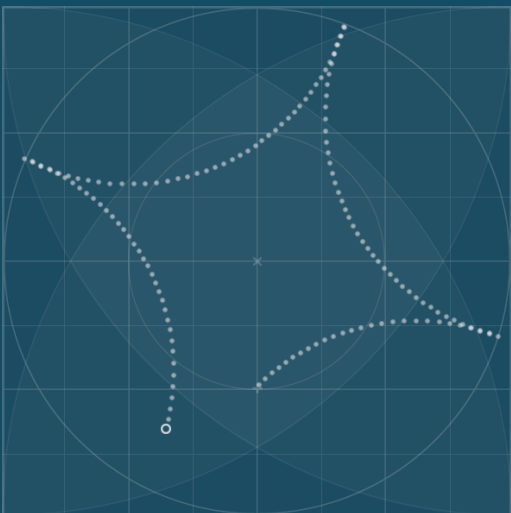
example: straight path within a box



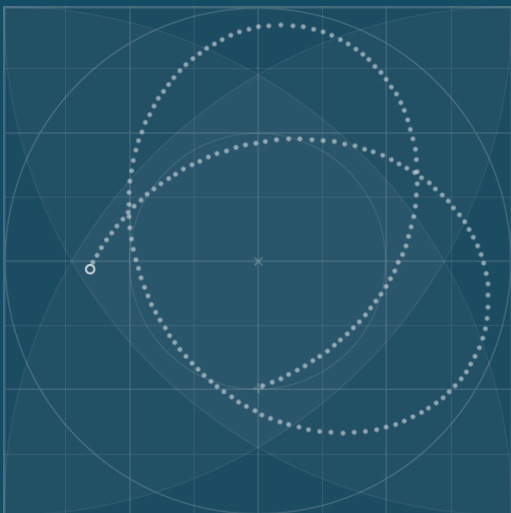
same path with bouncing in a circle



previous path with clockwise spin...



...and here's rotation on top of spin



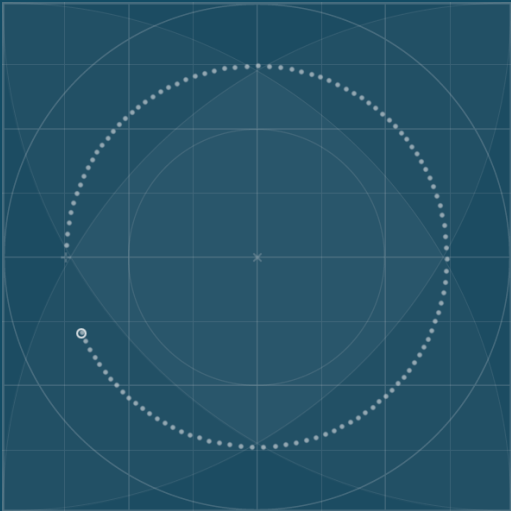
# KINEMATICS: PULSAR

Pulsar is additional function which rhythmically shrinks and expands the simulation space towards centre of gravity. It adds LFO vibe to simulation. There are three pulsar controllers: depth, speed and type. Depth controller also acts as on/off switch. Type switch is analogous to LFO shape, there are two available types: triangle and sine.

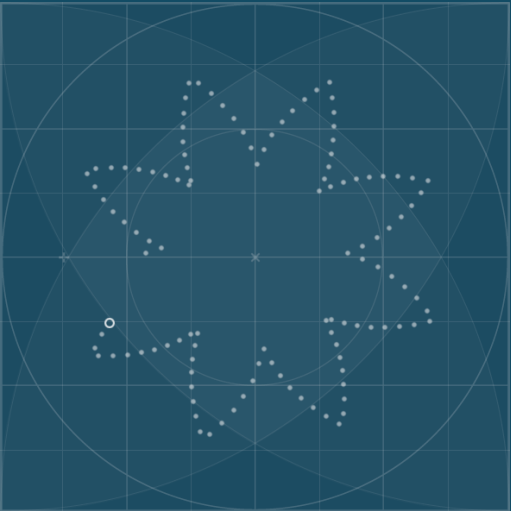
Note that if particle speed is set to zero it won't move when you start the simulation, unless there is rotation or pulsar applied. You can use such setup to set simple animation shapes.



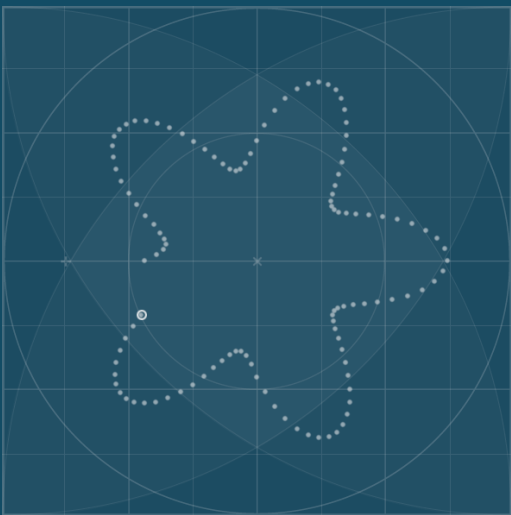
example: zero speed and rotation



same with linear pulsar



same with sinusoidal pulsar



# KINEMATICS: TIMING

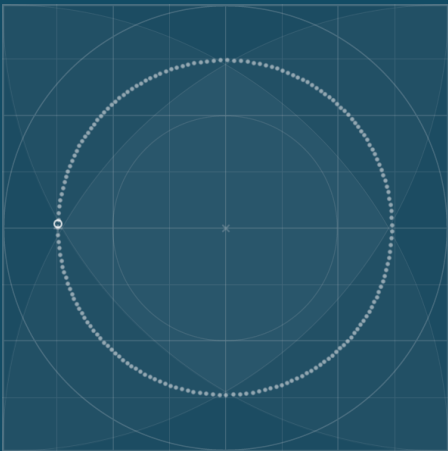
Below pulsar controllers you will find Kinematics timing options: update frequency and simulation speed.

Simulation speed is a simple way to slow down the simulation. It acts as clock divider, defining how often simulation steps are being calculated. At full speed simulation is calculated every MIDI tick. If you set speed to 1/2 it will be calculated every second tick, 1/3 every third tick and so on. Often there are multiple timed parameters in a simulation, so once they are set it may be tricky to adjust overall speed without changing particle path. If you use simulation speed slider, the end result of the simulation will be exactly the same, it will be just performed at different rate. It's handy to convert a fast rhythmic effect to slowly evolving pad.

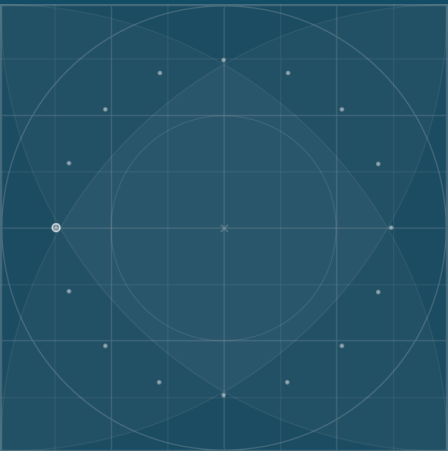
Note that adjusting simulation speed will not affect controller text feedback concerning time. So if you set 1/2 simulation speed and define a path time as whole note, it will take two whole notes to complete. You will need to keep that in mind.

Update frequency is a quantization function, it will make Kinematic to act more like step sequencer than smooth motion modulator. When frequency is set to "continuous" cursor position is applied at every calculation cycle, so every MIDI tick (if simulation speed is 1/1). If you change frequency to eighth note, particle movement will still be calculated every MIDI tick, but actual cursor position will be updated every eighth note, making cursor jump through its path.

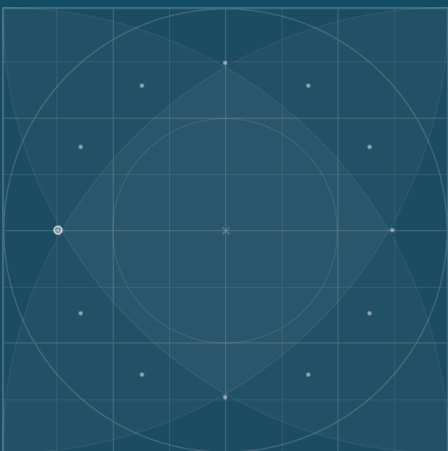
rotation, whole note per turn,  
update frequency: continuous



rotation, whole note per turn,  
update frequency: 16th note



rotation, whole note per turn,  
update frequency: eighth triplet



update frequency  
drop-down menu

simulation  
speed slider

update frequency:  
continuous ▾  
sim speed: 1/1

# WAVES

Waves section is where you can assign wavetables to oscillators. Each wavetable is a transition between two waveforms. There are 16 base waveforms, in all combinations excluding repeating ones (like AB and BA), making 120 wavetables to choose from.

Waveforms with names starting with “digi” (digital) are software rendered, these are basic ones: sine, triangle, square. “Mini” indicates Minimoog waveforms, these were captured from analog synthesizer, not actual vintage Moon, but a modular clone, these are: saw and blade. “Dixie” indicates captures from Intellijel analog oscillators for modular system. “Fuzzy rat” and “Bender” waveforms are captures from distortion effects, ProCo Rat and Tone Bender clones that I built.

Waveform selection controller is XY pad, similar to those on Bender page. To select a waveform you need to click on oscillator icon and drag it around over the list of wavetables. Graphically selection cursors reflect oscillator position on Bender page. Cursors may overlap indicating multiple oscillators attached to given wavetable.



oscillator A



oscillator B



oscillator C



oscillator D



oscillators A and D



To quickly select random wavetables for all oscillators click on “mushroom cloud” icon. Note that “locked” wavetables are excluded from this function (those with padlock button activated on Bender page).

# WAVES

You can automate selection cursors with Kinematics. Use one of two additional simulations where you can define automation target. Note that changing wavetable will not affect notes that are already playing, newly selected wavetable will only be used for notes triggered after making the selection. Automating wave selection cursors can be fun when used with arpeggiator.

You may notice that there are four wave cursors and only two spare Kinematic simulations. To automate all wave cursors with just one simulation you can use link function. With link enabled, moving one cursor will automatically move three remaining cursors. There are three link modes: “joint” – select the same wavetable, “circular” and “mirror” – different takes on distributing cursors symmetrically over selection area.

In this section you can also assign FX busses to oscillators and set bus gains. There are four insert slots where you can load different effects (look at Effects page). Initially each oscillator is assigned to separate bus. Oscillator A goes to bus 1, oscillator B goes to bus 2 and so on. But you can assign any oscillator to any of four busses. Then you can assign any effect to any bus.

You can use gain controllers to adjust bus loudness. Gain is applied after insert effects and after send points to space section. So when you turn down gain controller if doesn't affect send levels, which makes it possible to create setup where space effects (reverbs and delays) function in “wet only” mode. For example, using two oscillators you can make reverberation effect where reverb signal comes from different waveform than lead signal. Or create echoes with entirely different waveform texture.



# PATTERNS

On Patterns page you will find controllers for Branebender’s arpeggiator. It’s a different take on arpeggiator idea, which I wrote specially for this instrument. It can run multiple arpeggio patterns at once (up to six). Each can have entirely different set of parameters, like algorithm, rate or octave shift. Each pattern has volume sequence, note duration sequence and algorithm sequence. There are three base algorithms, with up and down variants. You can sequence them within a pattern. For example play “up” for 8 steps and then play “down” for 4 steps.

If you don’t want to explore ways of programming different patterns, you can simply use provided presets. There are many to choose from. “/3” and “/4” suffixes in preset names are suggestions of how many notes in a chord to use with given preset.

Initially there is only one active pattern. You can add new patterns using “+” button next to “pattern 1” button. “-” button will remove pattern with highest number, or should I say, hide and disable it, as no data is being removed. If you remove pattern and then press “+” it will reveal the removed pattern with all settings unchanged. To reset pattern, use “tools” menu.

“Light bulb” button mutes selected pattern, which may be useful to discover which pattern plays which sounds (it can get confusing with multiple patterns). Whole arpeggiator function can be turned on and off with “arpeggiator” button.



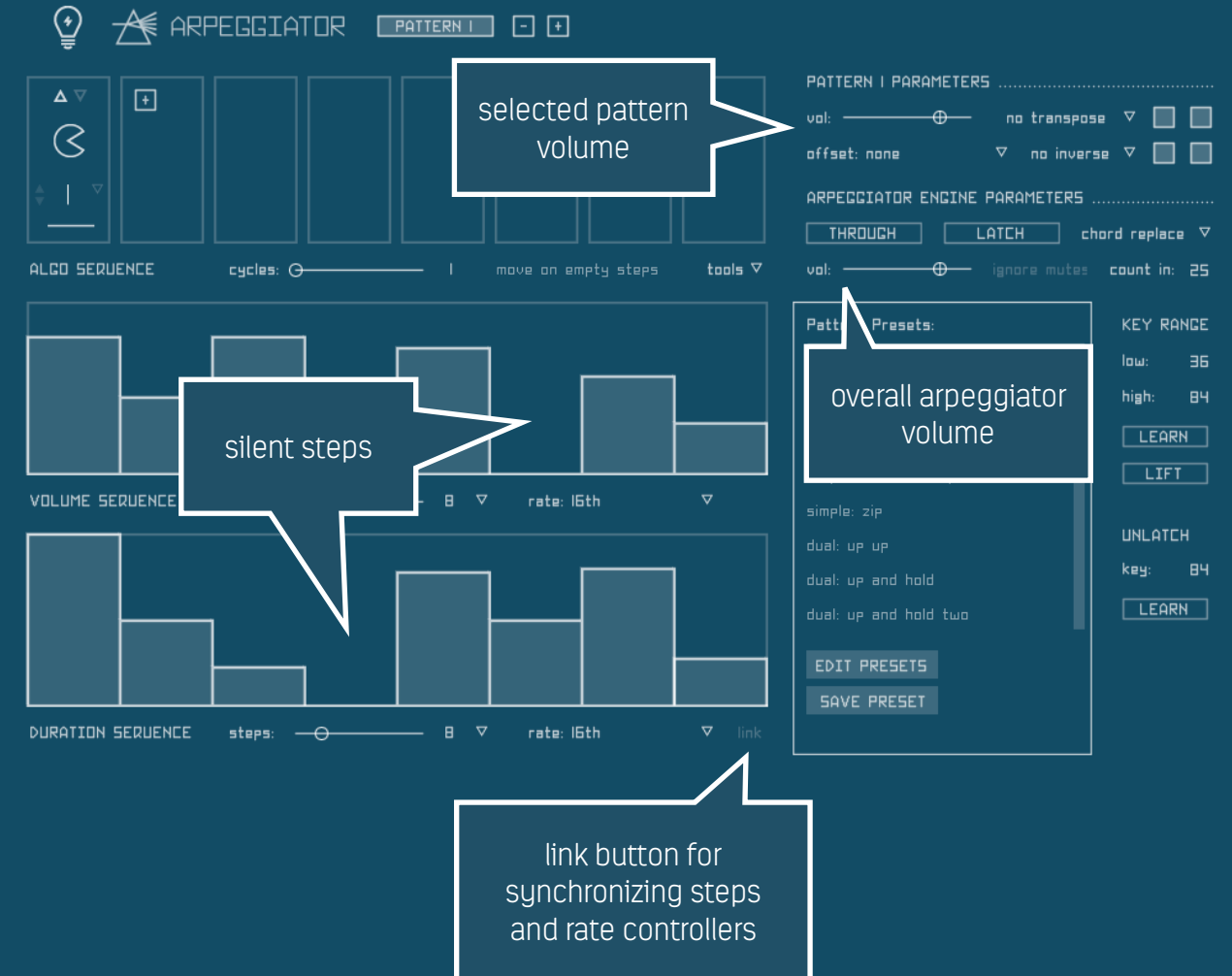
## PATTERNS: DYNAMICS

Use volume and duration sequences to define pattern rhythm. A duration sequence step sets note duration for following arp sequence note, defined as percentage of volume (not duration) sequence rate. You can set different rates and different length (steps) for each sequence. If at given step either volume value or duration value is set to zero, the step will be silent, nothing will be played. By setting duration sequence rate value longer than volume rate you can control steps in blocks. For example when volume rate is 16th and duration rate is whole, single step of duration rate applies to 16 following pattern steps. To make things easier, you can enable “link” button, then “rate” and “steps” parameters will be the same for both sequences (within selected pattern).

You can also adjust overall pattern volume using volume slider. It can be useful when multiple patterns are active. Pattern volume sliders can be automated, each pattern has a “separate controller”, so when you automate it and switch view to another pattern, moving the MIDI controller will only affect volume for pattern which was selected when you assigned automation.

There’s separate volume slider for overall arpeggiator loudness. Use it with keyboard split or “through” function, when both arpeggiated and non-arpeggiated notes are playing.

Sequence pattern controller (the area where you set step values) is not standard Kontakt table controller and it behaves in somewhat different manner (if you are familiar with programming Kontakt sequences). So right mouse click and drag doesn’t work for drawing a line. Instead use keyboard function keys. Hold ALT to draw a line. Hold SHIFT to set all steps you move cursor to, to the same value (draw horizontal line). The value will depend on initial click position. Hold CONTROL to move the whole sequence. Vertical movement will adjust value of all steps and horizontal movement will rearrange the steps.

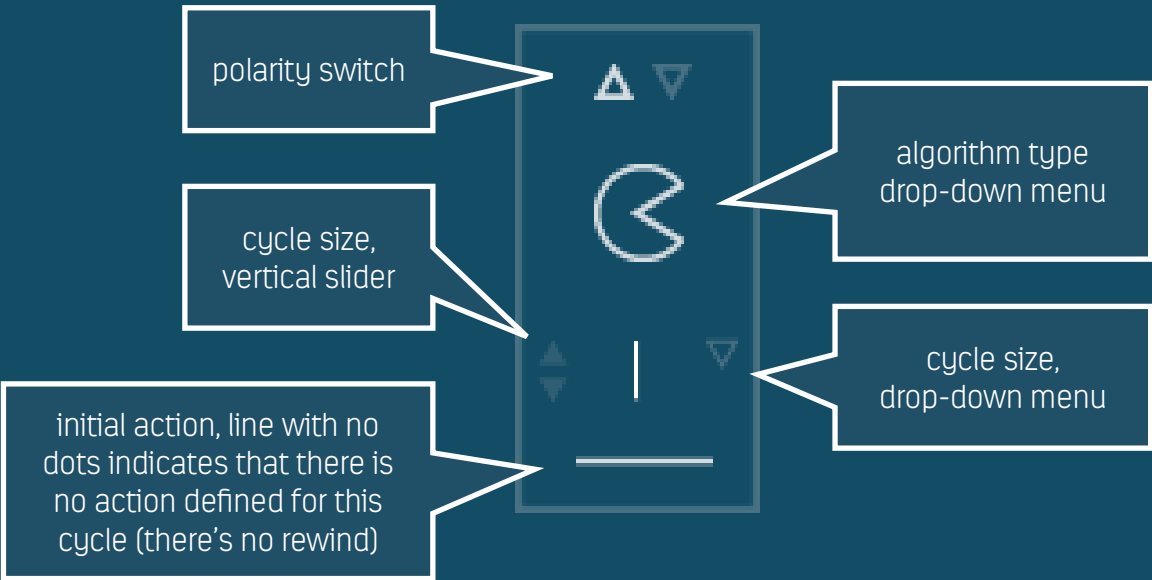




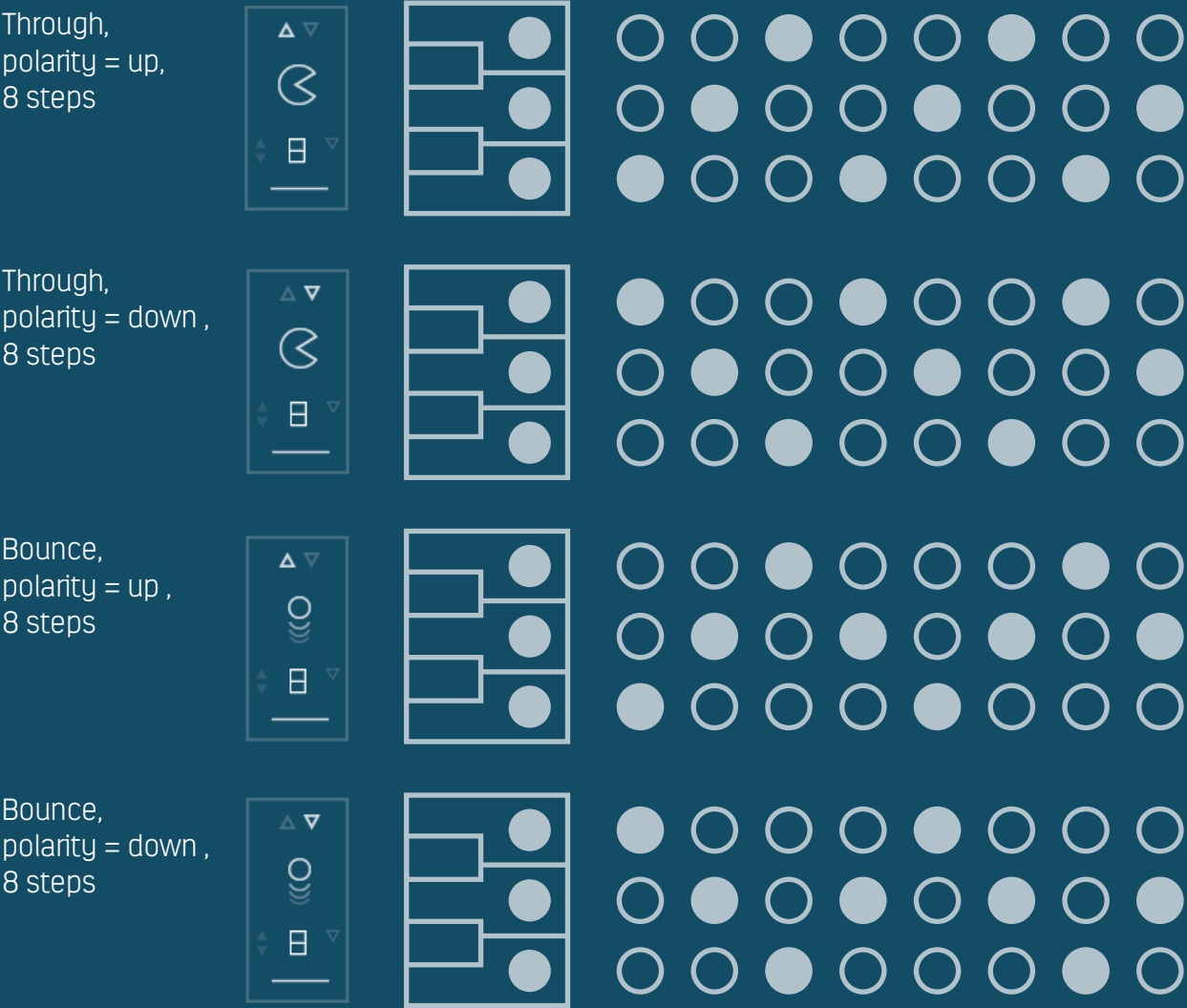
# PATTERNS: ALGORITHMS

“Algo sequence” is where you can program note playing algorithm. You can have up to 8 steps (named cycles) in algo sequence. Use “cycles” slider or “+”/“-” buttons to set the number of cycles. For each cycle you can define: algorithm type, algorithm polarity, cycle size (how many steps should be processed using current algorithm before switching to next cycle) and initial action (you can rewind cursor position to specific note at the beginning of the cycle).

There are three base algorithms: through, bounce and zip. Additionally you can select “hold” (do not move cursor – repeat notes) or “quiet” (do not move cursor – do not play notes) which produces silent steps. Polarity can be set to “up” or “down” (it doesn’t apply to hold and quiet).



Algorithm mechanics are illustrated below, as it would look on a piano roll.

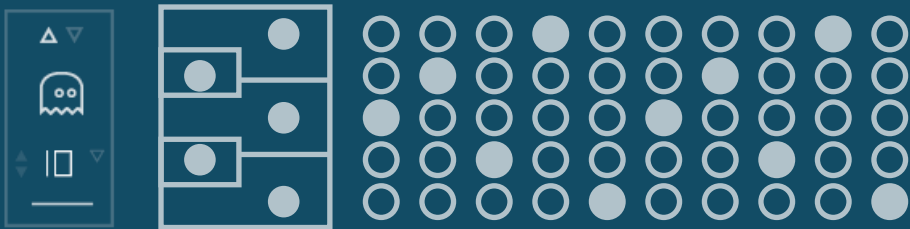




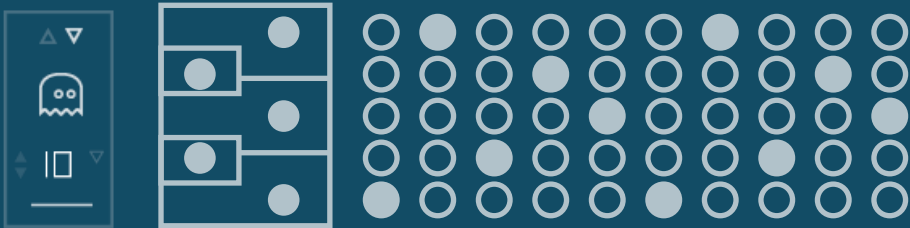
# PATTERNS: ALGORITHMS

“Zip” algorithm is only distinguishable from “through” when there are more than 3 notes in an arpeggiated chord.

Zip,  
polarity = up,  
10 steps



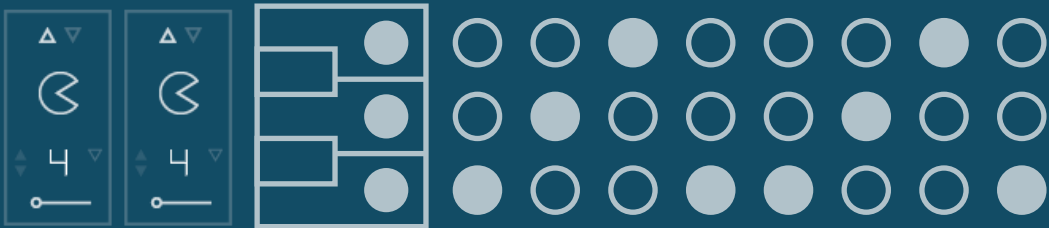
Zip,  
polarity = down,  
10 steps



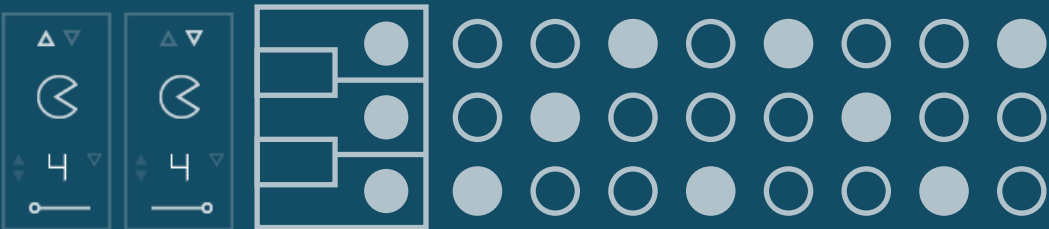
There is a switch named “move on empty steps” below algo sequence. It tells the algorithm what to do if the step being played is silent (step volume or duration is set to zero). Normally arpeggiator algorithm will skip silent steps, that is it will do nothing and wait for a step which generates a note. With “move on empty” option enabled it will move to next note without playing it, as if it was playing “silent notes” instead of ignoring “silent steps”.

Example algorithm two cycle combinations.

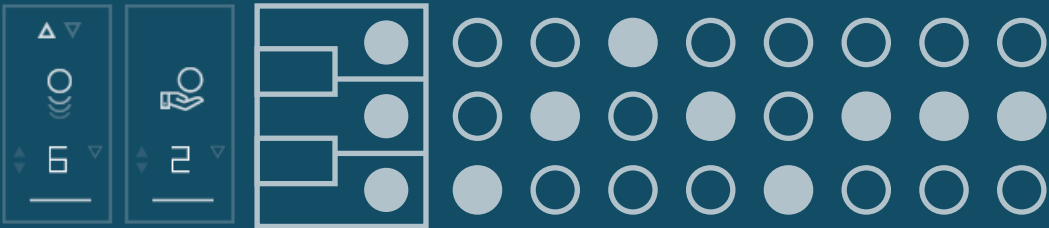
Through,  
with rewind



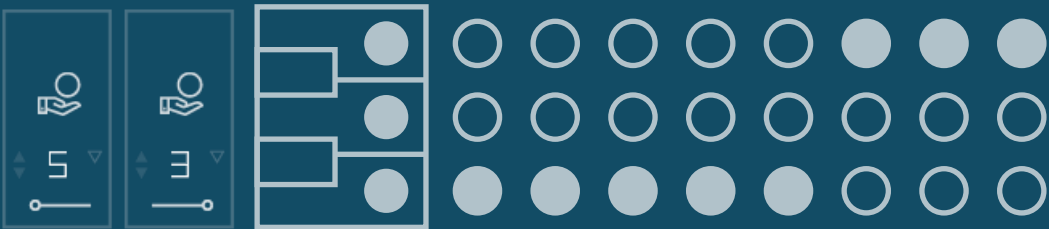
Through,  
with rewind  
and polarity  
change



Bounce  
and hold



Hold  
with rewind



## PATTERNS: LATCH AND KEYBOARD SPLIT

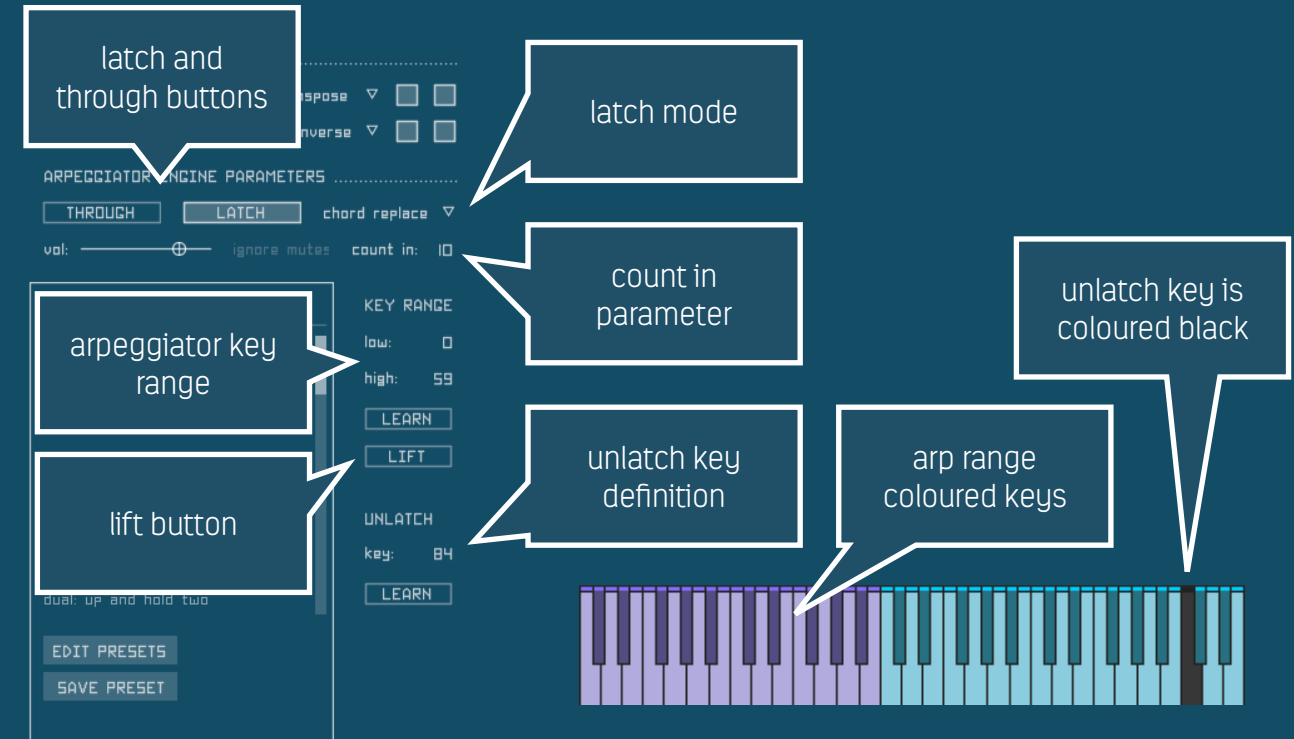
You can split MIDI keyboard to only use defined key range to trigger arpeggiator and play normal notes outside of the arp range. Use “low” and “high” parameters under “KEY RANGE”, low should point to lowest key in arpeggiator range and high to highest key. Alternatively press LEARN button and then press high and low keys on MIDI keyboard (in any order). Keys assigned to arpeggiator will have different colour on Kontakt’s virtual keyboard.

If you switch “THROUGH” button on, keys in arpeggiator range will do both: trigger the arpeggiator and play normal notes.

You can use “LATCH” function to hold arp keys for you. Latch has two modes: chord replace and sticky keys. Sticky keys is traditional latch mechanism, press a key once to latch it, press it again to unlatch. For me it was always difficult to use, as you have to remember which keys are latched to unlatch them properly. “Chord replace” mode is my approach to latching. Press a key to latch it, then if you press another key it will also latch, if there is at least one key being held in arp key range. Once all keys are released, pressing a new key will automatically unlatch all keys and latch the new key. In practice: play a chord, release keys, arp keeps playing, press a new chord to replace the playing chord. I find this approach much easier to handle, however you need a way of unlatching all keys (without latching new ones). This can be achieved in two ways. You can automate “LATCH” button. Switching the button off, will unlatch all keys (except those being physically held). Or you can define a dedicated “unlatch” key on MIDI keyboard.

Another unique function in Branebender arpeggiator is “lift”. Pressing LIFT button will temporarily disable arp key range. You can combine it with latch. When arp is playing latched chord, press LIFT and you can use whole keyboard range to play sustained (non-arpeggiated) notes.

In setup section you can assign sustain pedal to control either LATCH or LIFT buttons.



Between latch and key range controllers you will find “count in” parameter. It adds a short delay to arpeggiator when it starts on first note, which is quite important. The delay is needed when you want arpeggiator to start properly with a chord, especially when you play by hand (as opposed to drawing notes in DAW). It is not humanly possible to press all chord keys simultaneously at the exact same time, there are always micro delays between keys. So a delay is needed for arp to see all notes in the chord as it starts, otherwise it will start from the first note that arrives and will already be playing as you press remaining keys.

Count in is defined in MIDI ticks, 30 is equal to 128th note. Adjust according to how tight is you playing. Set to zero to disable. However, even if the notes are being set in a DAW and aligned to grid, I’d always use a bit of delay to avoid possible event queuing problems.

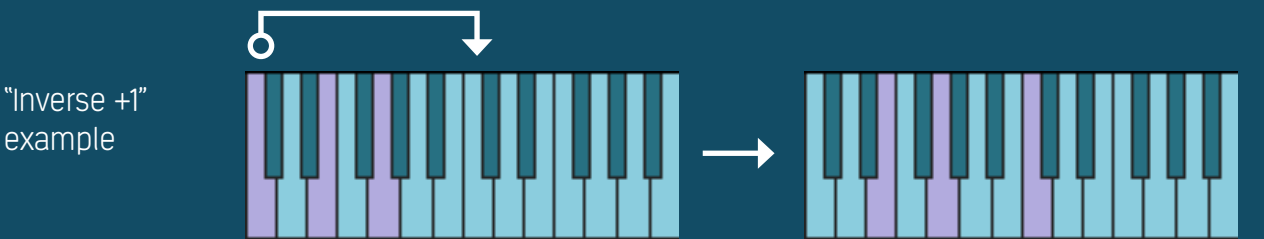
# PATTERNS: OCTAVE SHIFT, INVERSE/EXPAND

Having multiple arpeggiator patterns only really make sense if you can differentiate sets of notes being played. Each pattern will define a set of notes to play and will move playing cursor within the set. When no modifications are active, note set will contain only the notes that are being held in arp key range. In Branebender’s arpeggiator there is no tuning, new note set can only be populated by moving or cloning notes by whole octave increments.

Octave shift is the easier way or changing the note set. Use “transpose” drop down menu to move note set for selected pattern up or down by whole octave(s).

Then there’s inverse/expand menu. Inverse function creates a chord inversion. If you select “Inverse +1” it will take the lowest note in the chord and move it up one octave. For example, if input chord is C3-E3-G3 it will be transformed to E3-G3-C4. If the new note was already present in the input set, it will be moved up an octave again. “Inverse +2” repeats the process two times, so: move lowest note up, take the new chord and move lowest note up. In such case C3-E3-G3 will be transformed to G3-C4-E4.

“Inverse -1” is the same idea but works in opposite direction: take highest note and move it one octave down. Then “expand” is a variation of “inverse” where notes are not moved but cloned. So with input chord C3-E3-G3, “expand +1” will produce C3-E3-G3-C4.

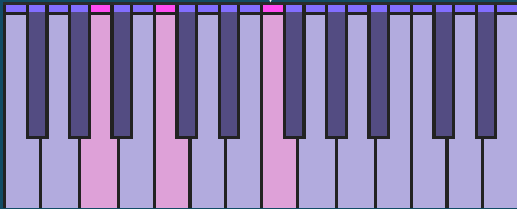


octave shift and inverse/expand drop-down menus



You can combine octave shift with inverse/expand options. When arpeggiator is playing it will highlight current note set for selected pattern on virtual keyboard. You will see that different notes might be highlighted as you select different pattern.

note set for selected pattern highlighted on virtual keyboard.



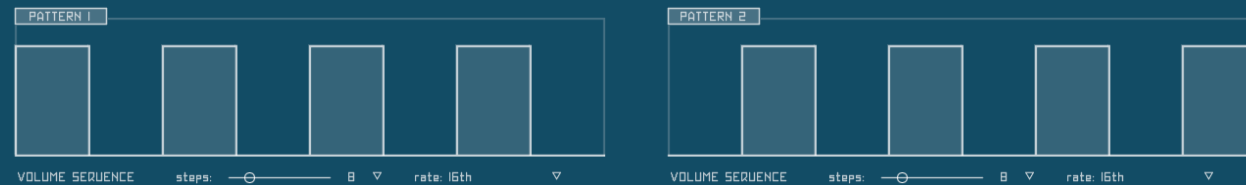


# SEQUENCING PATTERNS

Multiple patterns playing at the same time is fun, but you may also want to play them in sequence. For example, play arp pattern where every second note is moved octave up, or where following notes are playing following oscillators.

This can be achieved in two ways. You can prepare volume sequences in such way that only one pattern plays a note at given step. Or you can use offset parameter.

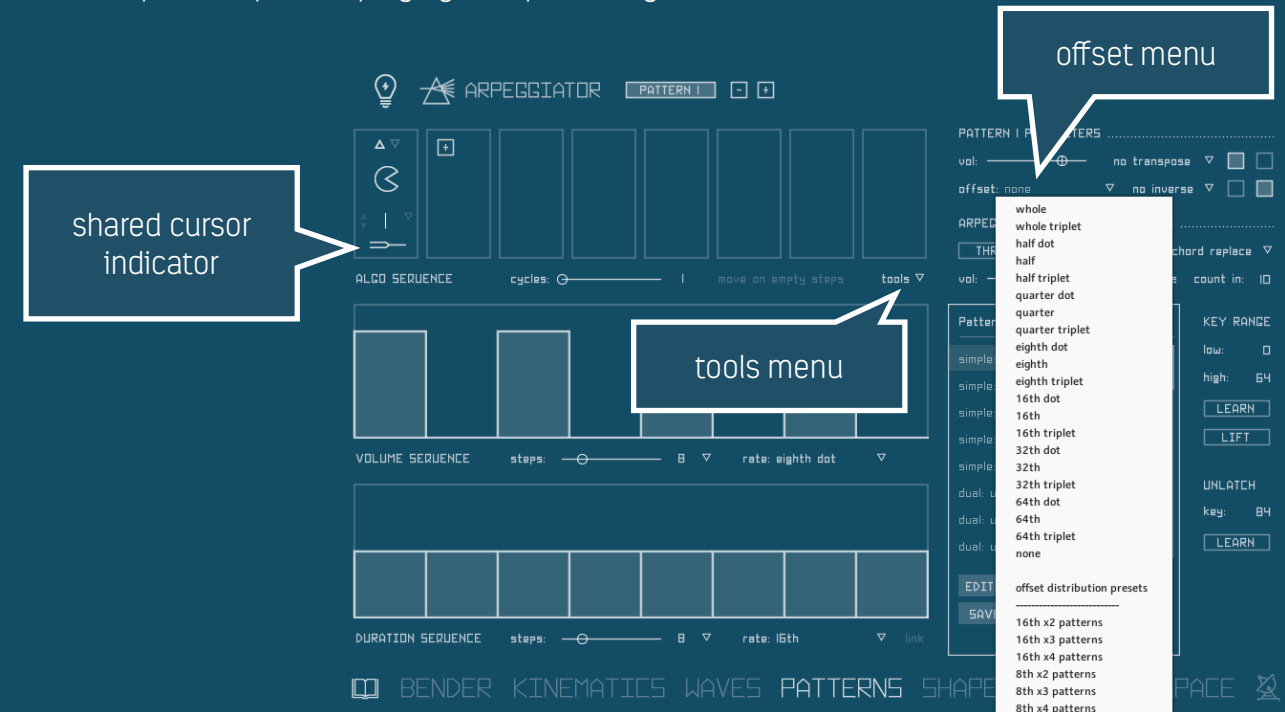
This is how two patterns sequenced with volume would look like:



You can create such setup automatically. First activate as many patterns as you want to sequence. Then use “tools” drop-down menu and select “queue patterns with vol sequence”. “(1 step)” will produce result like pictured above, play one step from pattern 1, move to pattern 2 and so on. “(2 step)” will play two steps of a pattern before switching to next one. Or you can pick “random mode” to distribute steps among patterns randomly.

Using offset is somewhat less intuitive. Pattern offset is basically how much is given pattern delayed from the beginning of the arp sequence. You can use offset to misalign patterns to create swing effect or to sequence them. For example, if you have two pattern playing at quarter rate and you set one pattern offset to eighth note, the result will sound like single pattern playing at eighth note rate, just every other note will be triggered by the second pattern.

You can create offset distributed pattern automatically from offset menu. Just note that patterns will be added starting from selected one. So start with one active pattern unless you want sequenced pattern playing over previously activated ones.



When sequencing patterns, you may want to use a “shared cursor” function. You can set it in individual algo cycles (last option in initial action / rewind menu). Normally each pattern counts which note to play next individually. When “shared cursor” is used, note order can be passed between patterns. So a pattern will read cursor position from a common variable, move it according to its algorithm and then save the shared position. Then when it’s turn for next pattern to play, it will resume playing from shared position and so on. Note that you need to set “shared cursor” in each pattern you want to participate in such “common effort”.

## EFFECTS

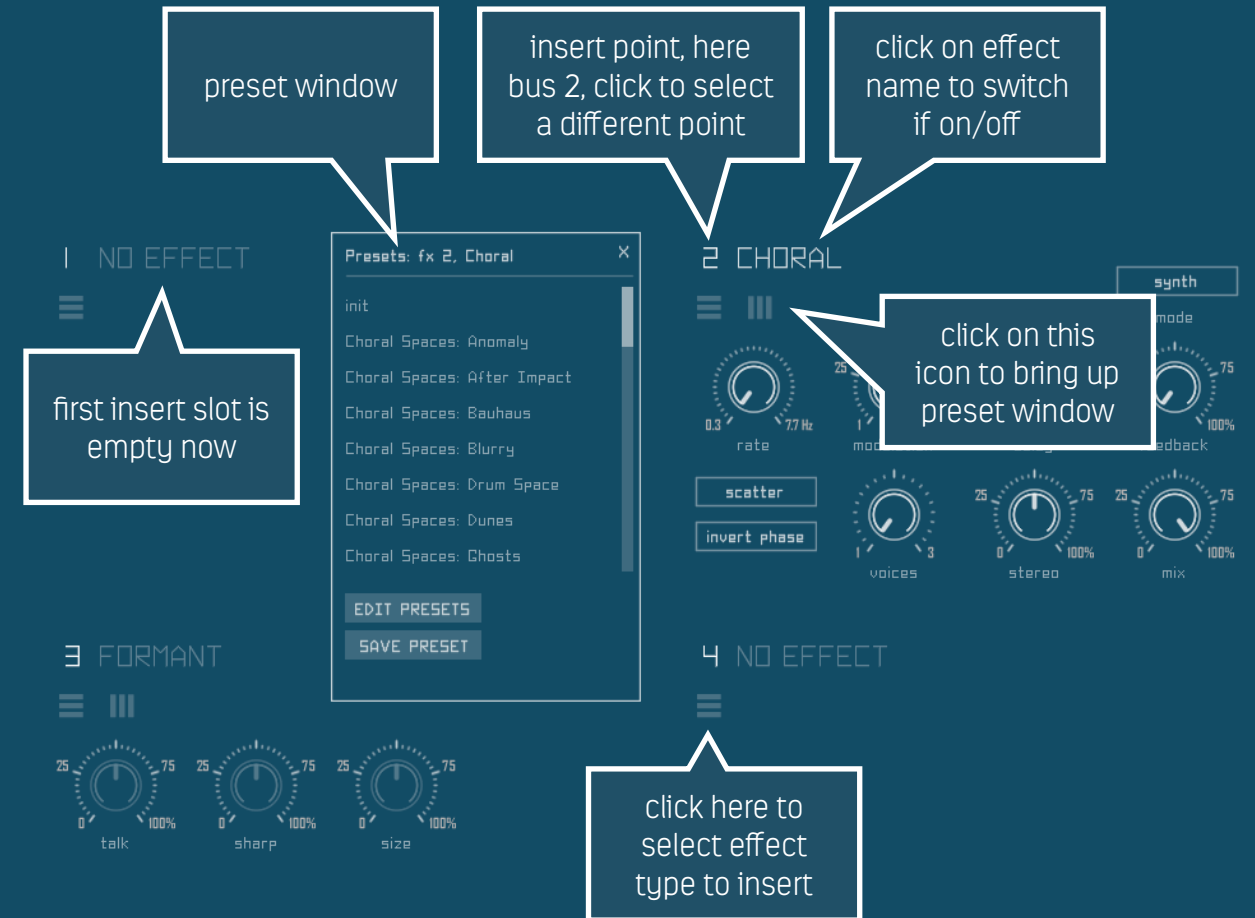
Branebender's Effects page contains 4 insert slots. Which means that you can have up to four effects loaded at the same time. You can pick different effect types and different insert points, so any effect can be applied to single oscillator or a group of oscillators.

Oscillators are routed through effect busses, initially each oscillator is assigned to separate bus. Busses are named 1,2,3,4. So oscillator A goes to 1, B goes to 2 and so on. You can group oscillators by assigning them to single bus (look at Waves page), then you can process a group of oscillators with single effect, or one chain of effects.

Each of four effects can be assigned to any bus, additionally there are two post-bus insert points. named "N" and "M". "N" (iNsert) is located after summing of all busses, so it will apply to all busses (if you want the effect to work for all oscillators you can switch it to N, instead of routing oscillators to one bus). "M" (Master) is located at the end of chain, after N and after Space effects return. There are only two processors after M point, master filter (look at Bender page) and Master Limiter (look at Setup page).

Available effects are:

- Kontakt's new modulation effects, Choral, Phasis and Flair;
- classic modulation effects (still very useful), Chorus, Phaser and Flanger;
- filters, main filter (with selection of filter types), same as used on Bender page, formant, fluid filter (based on 3x2 Versatile) and wah;
- 2 band equalizer;
- distortion effects, transistor/tube distortion, lo-fi, overdrive and screamer;
- rotator;
- dynamics control effects – supercharger compressor, transparent limiter and tape saturator;
- stereo modeller;
- six delay variants (delays are also available in Space section as send effects).



BENDER KINEMATICS WAVES PATTERNS SHAPES EFFECTS SPACE

For most of effects you can bring up a preset selection window. Effects with very few controllers (like wah or filter) are excluded from preset support.

# SPACE

Space page is where you find send effects. The page layout is similar to Effects, only you have three effects instead of four and they can't be removed completely. Additionally you have controllers for send end return levels. Send point is located at the end of each effect bus (before gain controller), so space effects process oscillators output and all effects applied at bus level.

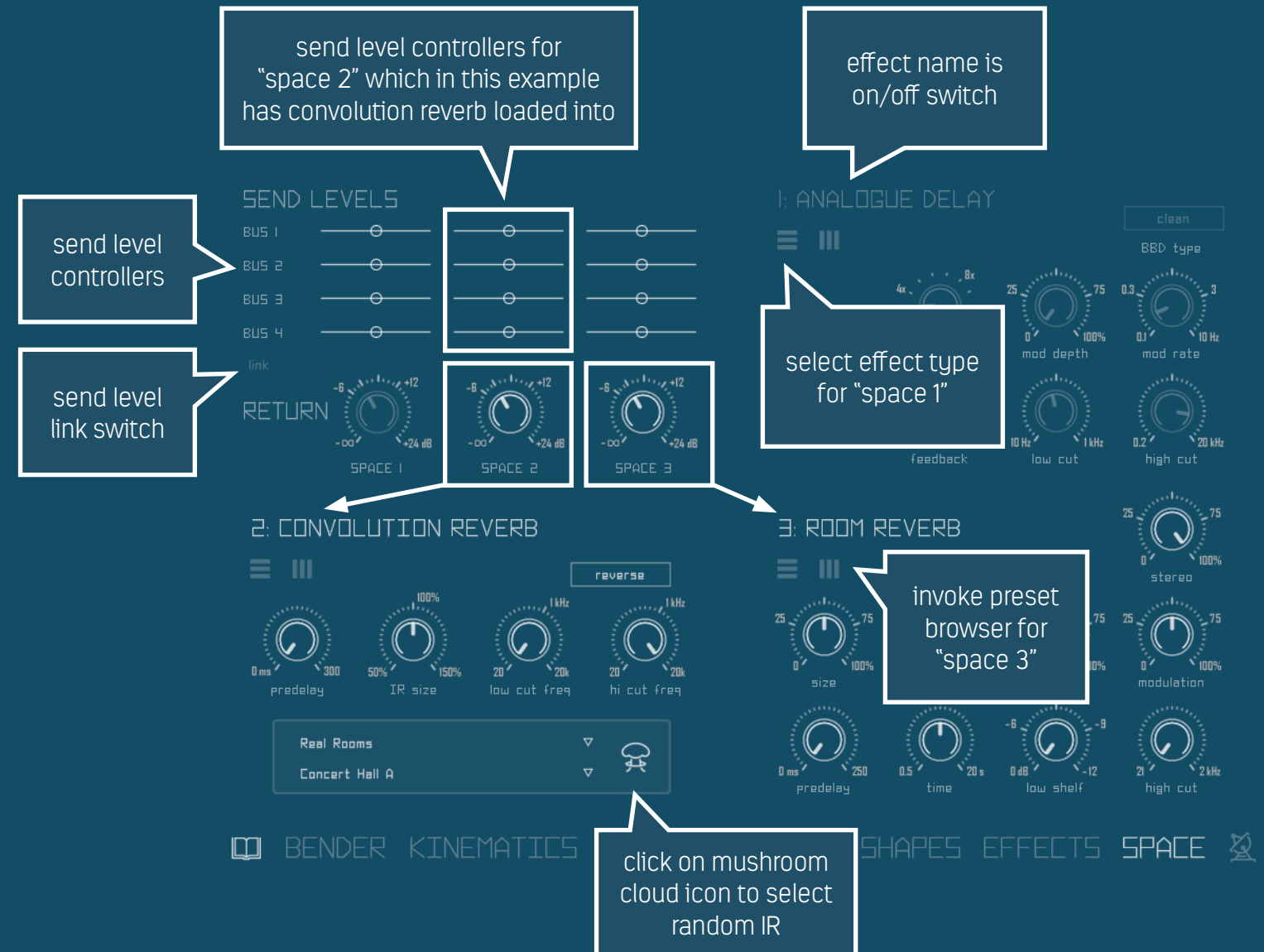
Use "send levels" horizontal slider to control amount of signal sent from each effect bus. To set the same send level for each bus, enable "link" switch and move any of send level sliders. Return knobs control output level for each space effect.

There are six delay types and four reverb types available for each space slot.

Delay types are: analogue, diffusion, modern, tape, vintage – which are modes of Replika delay, split into separate sections for convenience, and digital delay, which is old, Kontakt legacy delay.

Reverb types are: room, hall, plate and convolution. Convolution reverb makes use of IR files supplied in Kontakt installation.

As with insert effects you can use preset browser for any space effect.





# PRESETS

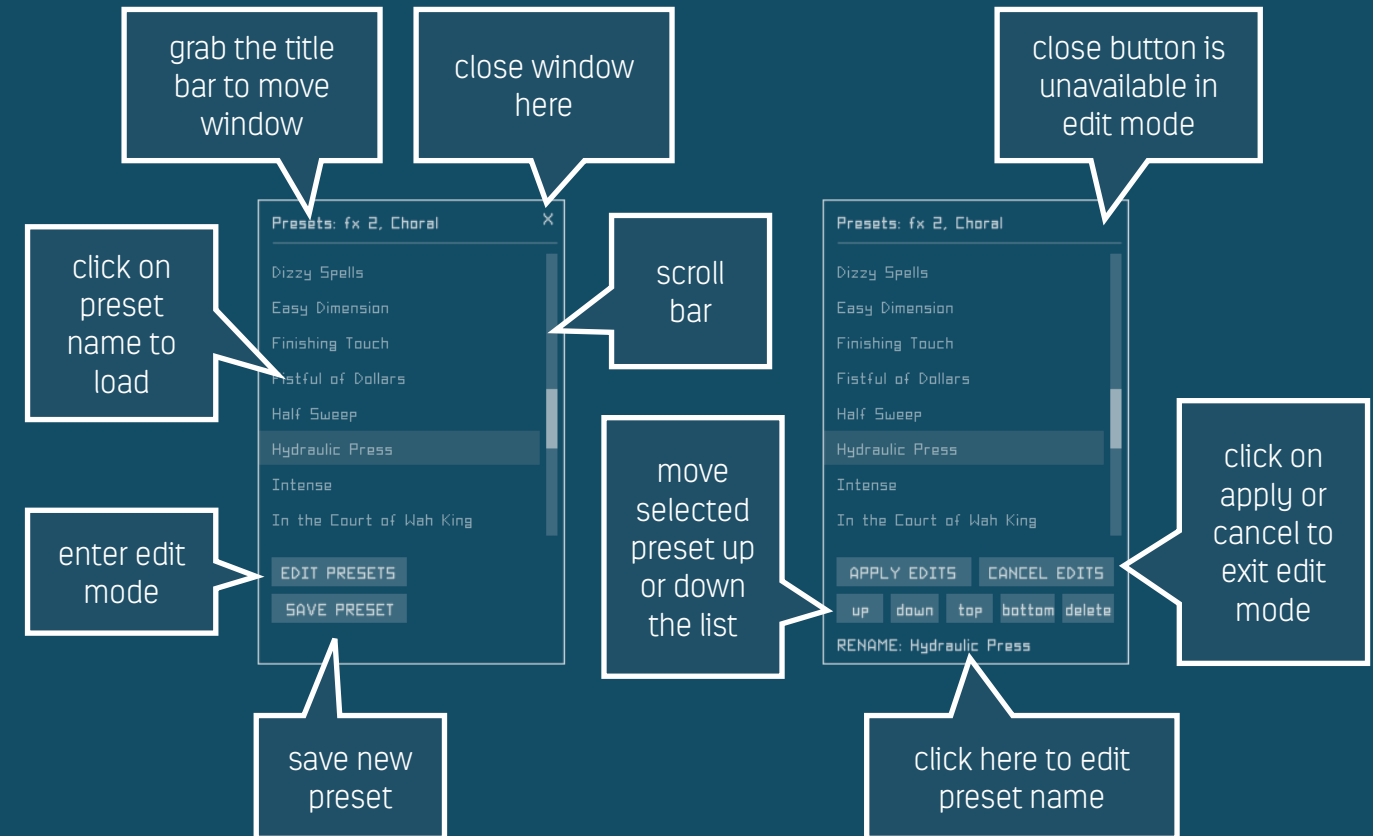
Branebender has preset system which is used in different sections. There are presets for Kinematics, Patterns, most of individual effects and Setup parameters. In Kinematics and Patterns preset window is fixed in place and integrated into UI. On Effects and Setup pages you can invoke and close preset window, also you can move it around the UI area, just grab the title bar.

You can save your own presets. Just click on “save preset” button. Then a text line will appear: “RENAME: Preset ...” with preset number. Click on “Preset ...” part to change preset name.

A note here: text input in Kontakt is somewhat imperfect. There is a long-standing bug, which will erase any changes you typed-in when UI elements move or change position. There are many moving elements in Branebender. You may need to stop playing the instrument and stop any automation to be able to type in the name successfully. For this reason Kinematics will be paused when rename widget is active.

To reorganize presets click in “edit presets” button. You can move selected preset up and down the list, change the name or delete it. (There is no automatic sorting, as Kontakt doesn’t provide any means of text string analysis, sorry). Any changes you make while in edit mode are not permanent yet. You have two exit options “apply edits” or “cancel edits”, click on “apply” to save presets for section you edited. Click “cancel” to discard changes and reload presets as they were before you entered edit mode. Note that when preset edit mode is active you cannot close preset window with “x” button (which is hidden) or change section page. Do not panic, just make a choice: apply or cancel.

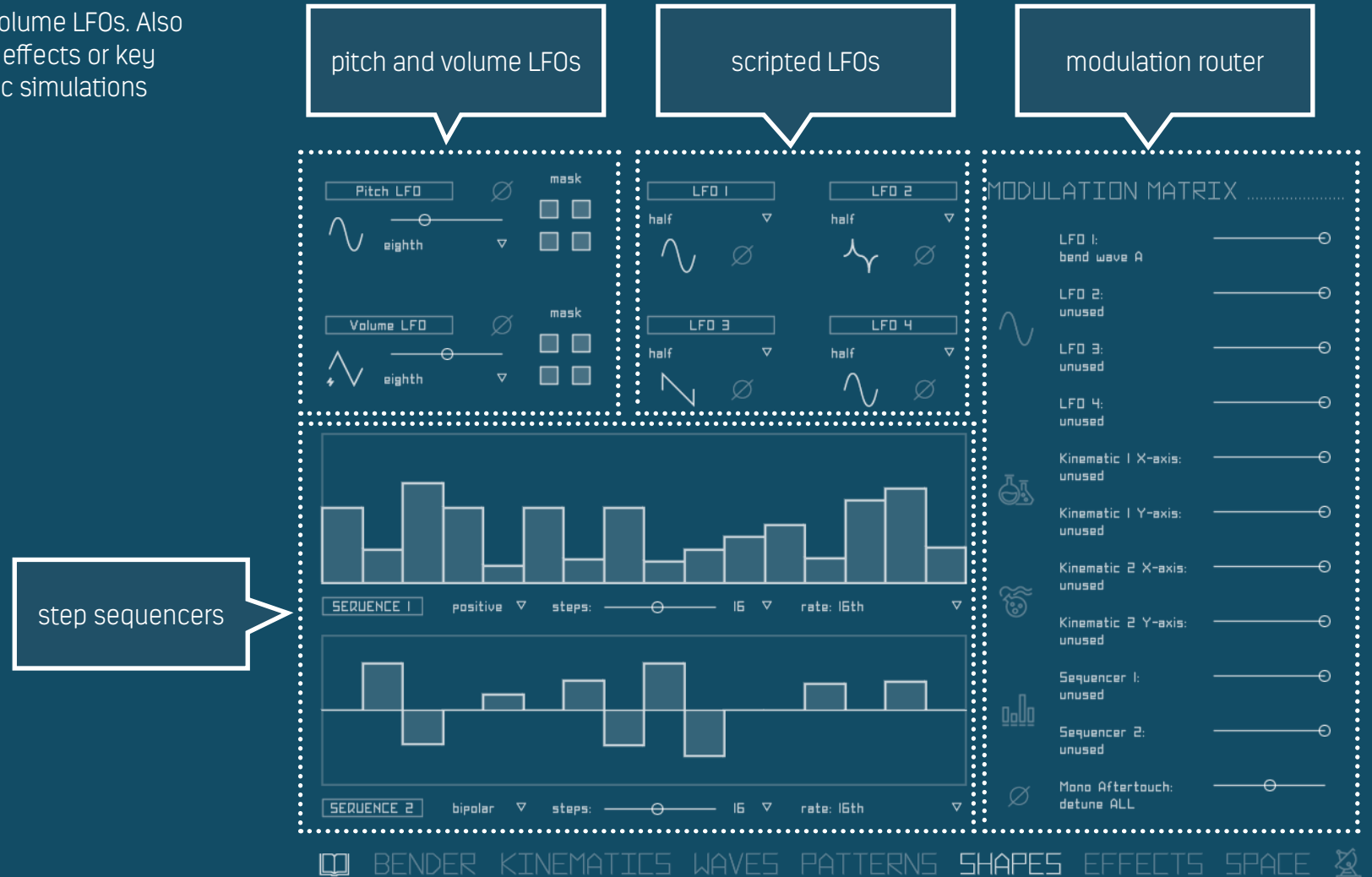
Preset data is saved as .nka files in “Data” directory, located in the same folder as Branebender nki patch. Saved presets are available in any instance of the instrument, there is no need to re-save the patch. You may need to restart the instrument to refresh preset list if you have multiple instances open. You can save up to 256 presets for each preset type.





# SHAPES

Shapes section is Branebender's modulation hub. Here you will find pitch and volume LFOs. Also there are four scripted LFOs and two step sequencers which you can assign to effects or key engine parameters (pitch and wave bending). You can also use two of Kinematic simulations and aftertouch as modulation sources.



# SHAPES: PITCH AND VOLUME

Pitch and volume LFOs use Kontakt’s internal modulators. You can choose between regular and retriggered shapes. Retriggered shape will restart the LFO shape for each note individually.

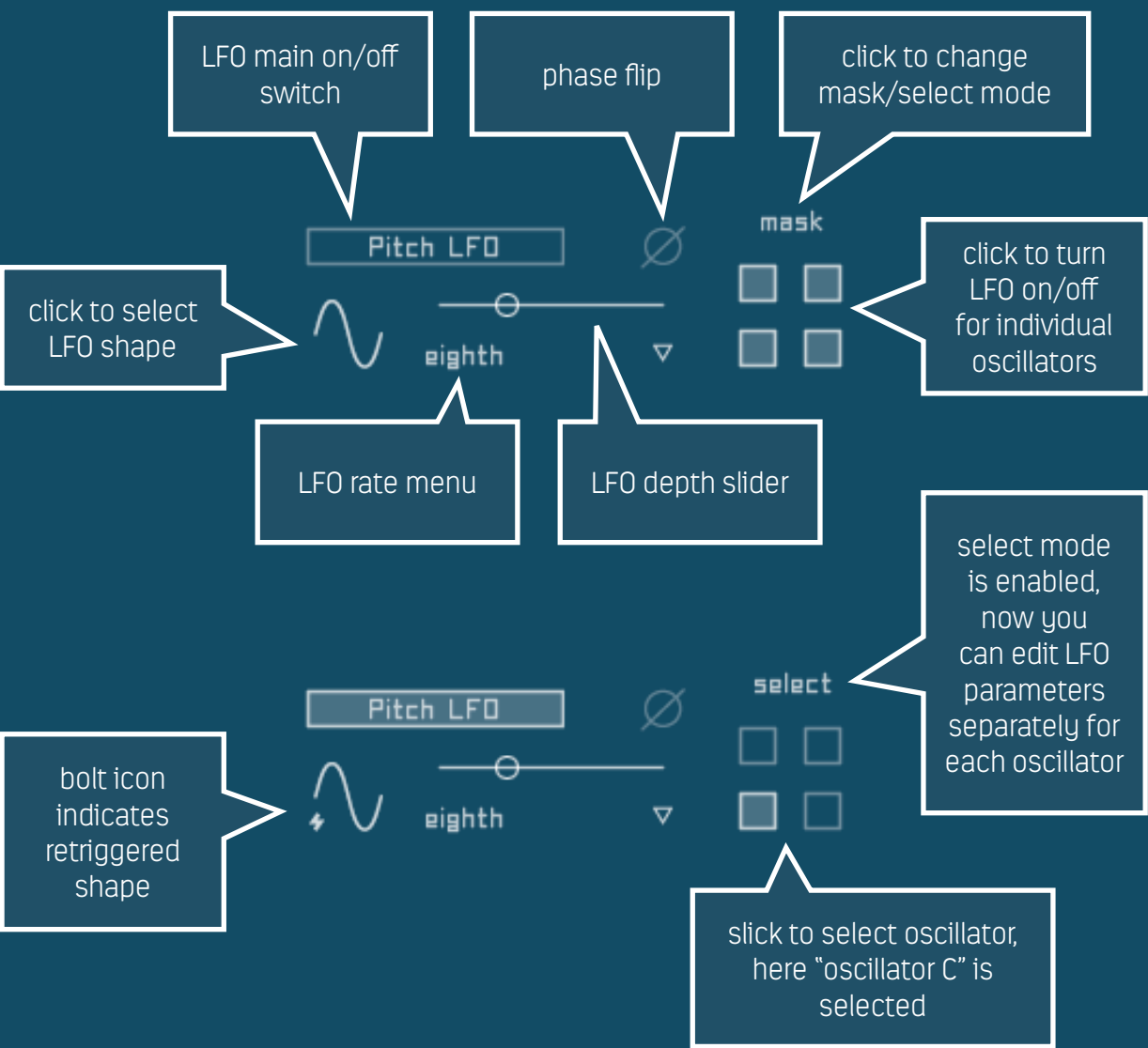
Use oscillator mask switches to apply LFO to selected oscillators only. These work similarly to oscillator switches on Patterns page.

Alternatively you can switch from “mask mode” to “select mode” and control all LFO parameters individually for each oscillator. In other words, in “mask mode” use square buttons to turn LFO on/off for each oscillator (on top of LFO on/off switch), in “select mode” use square buttons to show LFO control set for selected oscillator, so you can set different shapes and rates for different oscillators.

# SHAPES: SCRIPTED LFOs

Scripted LFOs don’t have retriggered mode, which would be irrelevant as most of possible modulation targets do not operate at note level. Instead they offer a unique shape: anti-sine.

Scripted LFOs can be restarted using manual retrigger button, if you choose to include modulators into its functionality – see Setup page.



# SHAPES: STEP SEQUENCERS

Branebender’s step sequencers have three modes: positive, negative and bipolar. Positive only adds to modulated value, negative only subtracts and bipolar does both. Switching sequencer mode will change graphical presentation of the sequence, but it’s non-destructive, meaning it doesn’t change the programmed sequence structure, so you can switch forth and back. What changes is modulation range. Positive has range of 0–100%, negative -100–0% and bipolar -50–50%. To cover whole range of modulated controller you would need to set it to minimal value in case of positive mode, maximum for negative and middle point for bipolar.

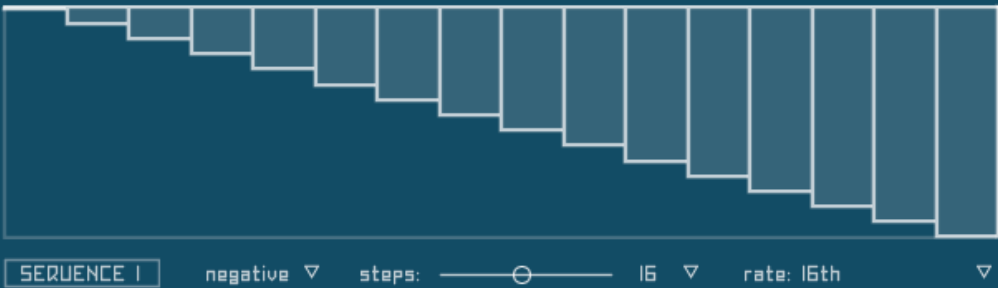
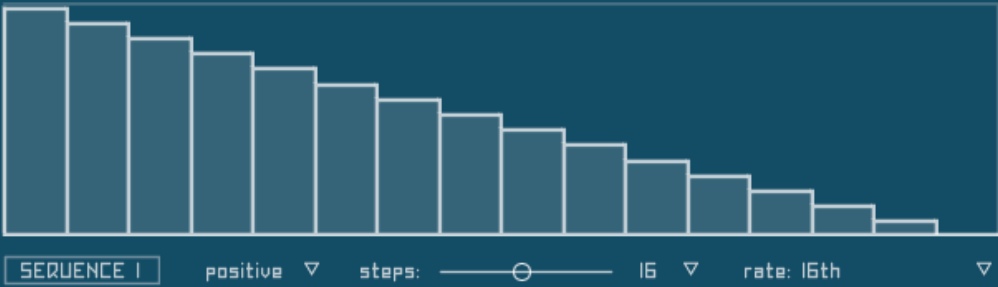
Step sequencers controllers use same UI mechanism as arpeggiator sequences. Same keyboard modifier apply: hold SHIFT to draw horizontal line, hold ALT to draw angled line, hold CONTROL to move the whole sequence. Additionally you can hold SHIFT and ALT to reset sequence values to middle point.

In some cases you may want (or not) to synchronize step sequencers with arpeggiator sequencers. There is appropriate switch on Setup page, named “sync shape seq. with arp”. It is enabled by default (in “initialize” patch). What enabled, step sequencers are being restarted every time arpeggiator restarts.

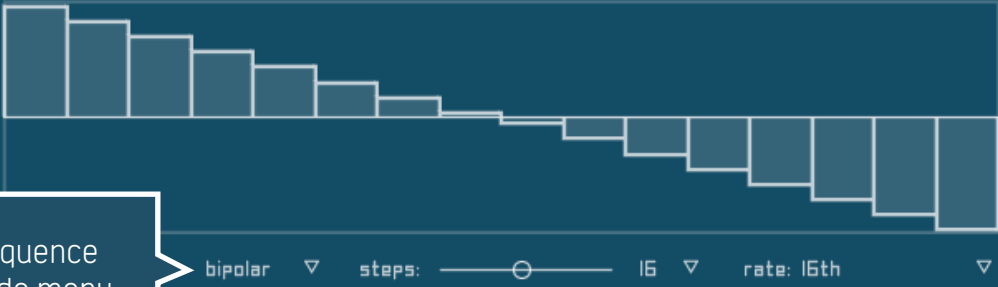
Note: Scripted LFOs and sequencers have on/off switches and are switched off by default. Remember to switch them on before or after attaching to a controller. But I’d recommend to keep them switched off when unused to reduce CPU usage.

Here’s same sequence in positive, negative and bipolar variants:

sequencer on/off switch, remember to turn it on



sequence mode menu



# SHAPES: MODULATION MATRIX

Modulation matrix is where you can assign modulators to parameters. For each modulation source you will see its name, modulated parameter name and modulation depth slider. Additionally aftertouch has phase flip switch.

Besides LFOs and sequencers you can use Kinematics as modulation source. In which case each axis of particle position will produce an LFO shape.

Click on modulator name to invoke a menu where you can pick modulation target. Listed targets are: quantized pitch, detune and bend, for each oscillator separately or for all oscillators at once.

Quantized pitch is added mainly with step sequencers in mind, it has range of two octaves (- one octave to + one octave if you use bipolar mode) and output value is rounded to semitone. When it is selected as target for step sequencer, you will get precise text readout in message area of how many semitones change does given step produce, when programming the sequence.

Detune has two senitones range with no quantization. It's appropriate for vibrato effect.

Bend applies to waveform bending in Bender section, if modulates "Saturn" controller. You will see modulation effect in motion on waveform preview.

You can attach multiple modulators to the same target. Modulations will then be summed.

scripted LFOs

LFO 1:  
Space 1, Analogue Delay, return

LFO 2:  
unused

LFO 3:  
unused

LFO 4:  
Effect 3, Formant, talk

Kinematic 1

Kinematic 1 X-axis:  
unused

Kinematic 1 Y-axis:  
unused

Kinematic 2

Kinematic 2 X-axis:  
unused

Kinematic 2 Y-axis:  
unused

step sequencers

Sequencer 1:  
bend wave A

Sequencer 2:  
unused

Mono Aftertouch:  
detune ALL

modulation depth sliders

click on modulator name to select modulation target

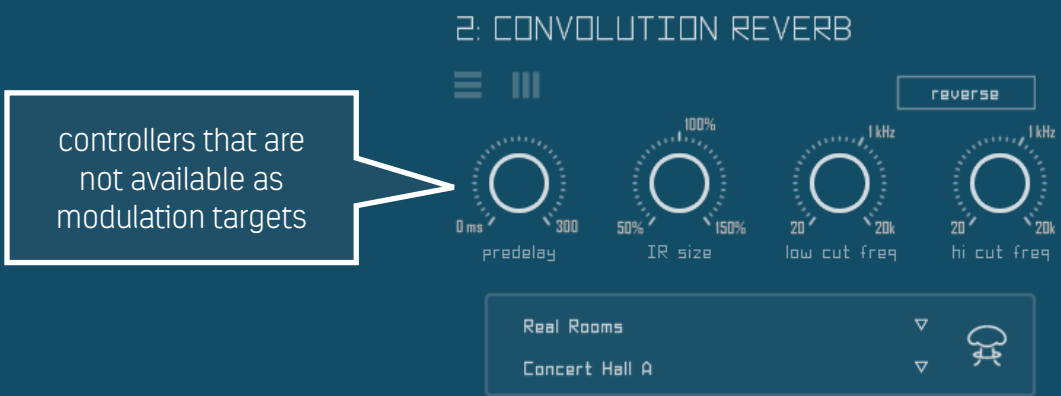
phase switch for aftertouch

# SHAPES: MODULATION MATRIX

Besides parameters on the menu list, you can attach modulators to any knob controller on Effects and Space pages (with few exceptions). To do so you need to first load/select effect you want to modulate, once target controller is visible go to Shapes section, click on modulator name and pick “select modulation target from effects/space page”, UI page will automatically change to Effects or Space, depending on your choice. Now just click on knob you want to modulate. You should see appropriate message in the message area and modulation indicator should appear over knob pointer. It will move to visualize modulation amount, as modulation is applied. If you change page without clicking on any knob, modulation assignment process will be cancelled.

Once modulation target is assigned, its name will appear on Shapes page, under modulator name. If you remove modulated effect or change its type so modulated parameter is no longer available, you will see “removed parameter” as target name. If you put the effect back again, it will resume modulation. Some effects share the same controllers, like different delay or Flair types. In such case if you change effect type, but controller will be still available, modulation will continue to function, only target name will be updated.

There are few controllers excluded from modulation. For example convolution parameters, which when moved trigger recalculating whole IR file, which creates immense CPU usage spike. Excluded parameters will be missing from UI view when modulation selection is active. Also all non-knob shaped controllers are excluded as modulation targets in Effects and Space pages.



# SETUP: VELOCITY CURVE, NOTE VOLUME

You can control keyboard velocity curve using “falling star” icon. Horizontal movement will change the curvature, from linear to exponential. Vertical movement controls velocity depth, that is how much note velocity affects loudness of sounds being played. If you move the icon all the way to the top, note velocity parameters will be ignored, as if you played a non-dynamic MIDI keyboard.

You can also apply volume randomization (aka humanizing effect) to notes being played. Use the knob to define range of random volume change to be added when a note is triggered. Turn it fully counter-clockwise to disable the function by setting the range to zero. By default the function only applies to notes generated by arpeggiator. If you are using a non-dynamic MIDI keyboard or possibly draw notes quickly in DAW, you can switch from “only arp” to “all notes” using drop-down menu.

# SETUP: MASTER LIMITER

You will find Master Limiter controllers on Setup page. Use it to control dynamic and loudness of the instrument without need to dive deep into each page of settings. Master Limiter is inserted at the very end of the signal chain. Click on “Master Limiter” name to switch the effect on/off.

velocity curve controller

UI COLOUR

KEY VELOCITY RESPONSE

MIDI MAPPING

MANUAL RETRIGGER

TRANSPOSE

MASTER LIMITER

RANDOMIZE NOTE VOLUME

target: all notes

mode: bipolar

quantize: off

threshold

release

ceiling

only arp

type: CC button

controller number: 118

target: kinematics

kinematics auto retrigger: on first note

pitchwheel range: 1 semitone

sustain pedal: arp lift

sync shape seq. with arp

arp flashing keys

show volume meters

show wave letters

BRANE Bender I.O. created by SZCZ, 2016-2024

BENDER KINEMATICS WAVES PATTERNS SHAPES EFFECTS SPACE

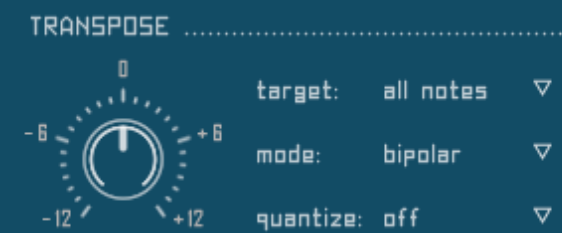
show setup page

# SETUP: TRANSPOSE TOOL

Transpose knob will change tuning of all new notes in semitone increments. The idea for this tool is to automate it and use with arpeggiator. You can use it only for notes generated by arpeggiator or all notes. Use “target” drop-down menu, to define that.

It has three modes: “up”, “down” and “bipolar”, which change the range of the effect (0 to +12, -12 to 0 or -12 to +12).

“Quantize” parameter will change knob’s resolution. With quantize “off” it will output following string of values when moved up: 0, +1, +2, +3... Set quantize to “2 semi” and the output will be: 0, +2, +4... And so on. It can make it easier to adjust when playing live.

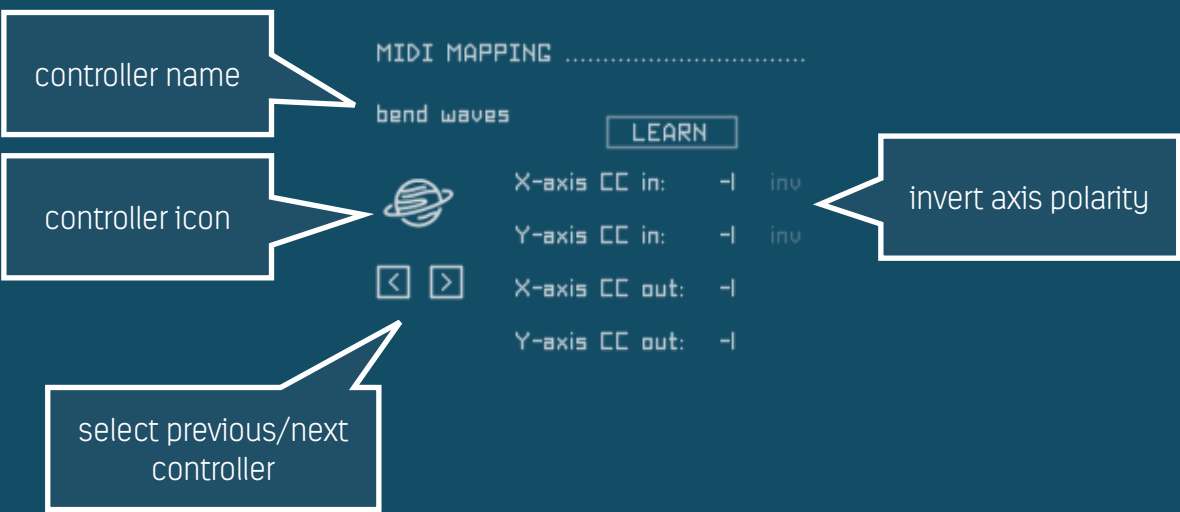


# SETUP: MIDI MAPPING TOOL

If you have a touchpad on your MIDI controller, or perhaps you would like to use a tablet to control Branebender’s XY-pads (possible with MIDI over Bluetooth), you can use MIDI mapping tool to define MIDI CC automation. Use arrows to select controller, then type in CC numbers of your hardware pad (to “CC in” parameters) or activate “learn” button and move the controller. Use “inv” switches to invert X or Y axis according to hardware pad behaviour.

You can also use the tool to output Kinematics simulation as two LFOs (define “X/Y axis CC out”), possibly to control another instrument. Make sure that MIDI CC output is enabled in Kontakt: click on “options” (gear icon), “engine” tab, “send MIDI to outside world”, see if “script generated CC’s” option is selected.

To disable automation CC or CC output, type in “-1” as CC number.



## SETUP: MANUAL RETRIGGER

---

You can define a MIDI switch to use to restart numerous modulations happening in Branebender at a desired moment. You can use MIDI key, MIDI button or MIDI slider/pedal – select an option in “type” menu.

With MIDI key (“key down”), you define a keyswitch, when key is pressed defined modulations will be restarted.

“CC button” option will work for buttons on MIDI controllers, these usually send “127” when pressed and “0” when pressed again. CC button mode will react each time any value is received for defined CC, so every time you press the button, regardless of button value.

“CC pedal” will work for MIDI pedals/sliders/knobs, to make retrigger happen, the assigned controller has to cross mid-value threshold (move value over 63), then to retrigger again, controller value has to fall below the threshold and then cross it again.

You can define which parts of Branebender engine will be affected by retrigger switch (“target”):

kinematics – restart all active simulation;

patterns – restart all active arpeggiator patterns;

modulators – restart all scripted modulators: LFOs and step sequencers on Shapes page, as well as waveshaper LFOs on Bender page.

For Kinematics you can also define conditions for “auto retrigger” – as described on page 14.

## SETUP: OTHER SETTINGS

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Under label “OTHER SETTINGS” you will find several tweak options:

Pitchwheel range – define MIDI pitchwheel depth.

Sustain pedal mode – you can use sustain pedal in several different ways:

- “off”, disable the pedal completely, freeing it to use with MIDI learn as automation source;
- “on”, regular sustain notes mode, blocks note release for all notes until the pedal is lifted;
- “sostenuto”, just like regular mode, but works only for notes that were playing when pedal has been pressed, notes played after the pedal has been pressed play normally;
- “arp latch”, use the pedal to automate LATCH button on Patterns page;
- “arp lift”, use the pedal to automate LIFT button on Patterns page.

Sync shape seq. with arp – restart step sequencers on Shapes page every time Arpeggiator restarts.

Arp flashing keys – arpeggiator will highlight notes it generates on Kontakt virtual keyboard, you can turn it off here, if you desire so.

Show volume meters – show/hide oscillator volume meters on Bender page.

Show wave letters – show/hide oscillator names (A, B, C, D) on Bender page. I prefer a cleaner look, but I felt I have to put the letters over oscillator waveform preview for first time users.



# SETUP: PRESETS

You can save your setup setting as a preset. Which will be especially handy to save MIDI mappings, possibly to use different ones with different controllers. Press “vertical bars” icon to invoke preset menu.

Setup presets save the following:

- everything on setup page: UI colour, velocity curve, MIDI mapping, Master Limiter, etc.;
- from Patterns page: Latch mode, unlatch key definition, count-in parameter.

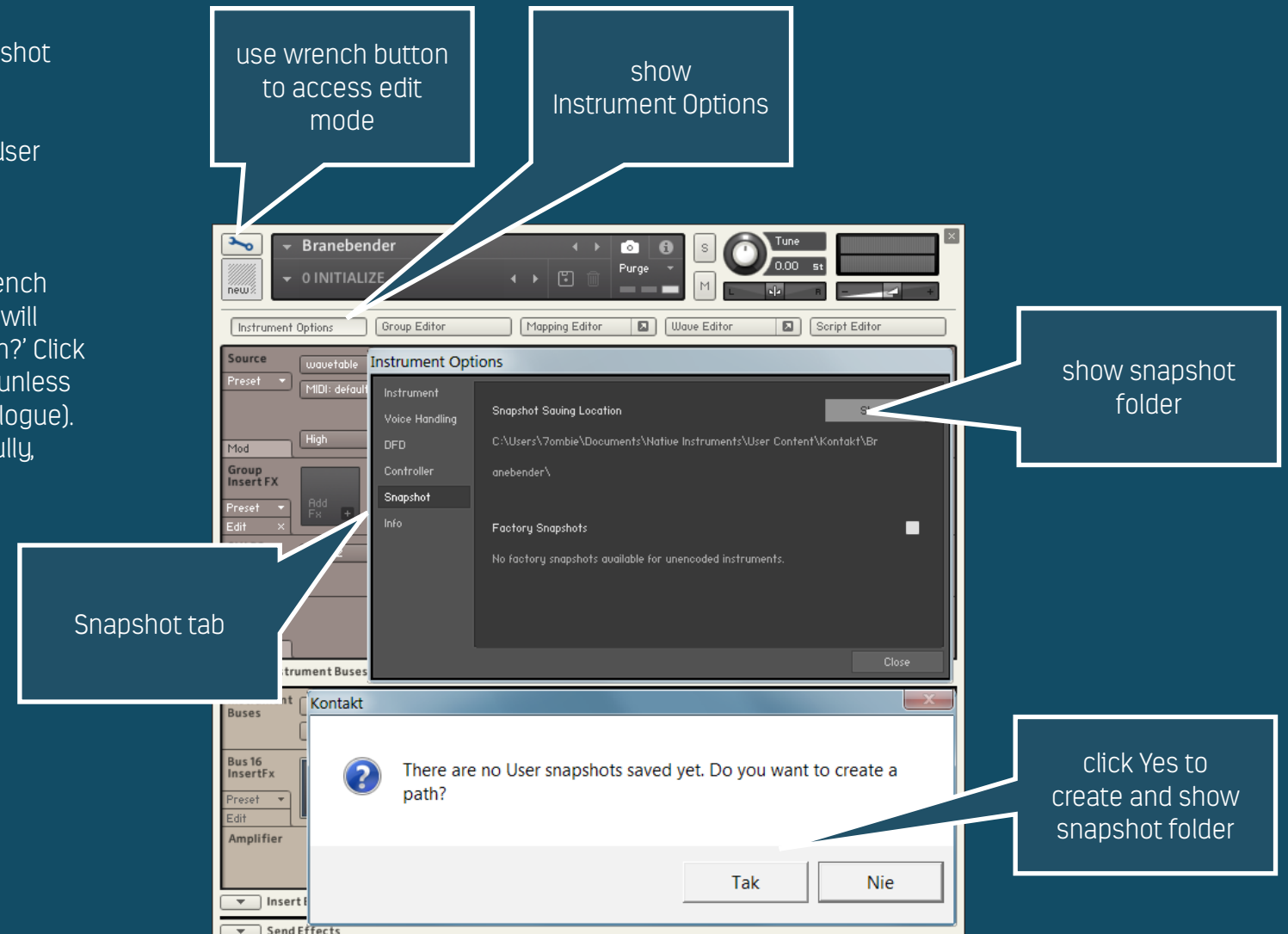


# SNAPSHOTS

Branebender is using Kontakt's snapshot format for presets. You will need to install snapshot files manually.

First locate the snapshot folder, usually it is similar to ...Documents\Native Instruments\User Content\Kontakt\ (depending on system), create folder named 'Branebender' and copy contents of snapshots folder in instrument package into it.

You can use Kontakt to find or create snapshot folder quickly. Go to edit mode (press wrench button), click on 'Instrument Options', select 'Snapshots' tab and click 'Show' button. You will see system message 'There is no User snapshot saved yet. Do you want to create a path?' Click 'Yes', the destination folder will be created for you and it will be opened in file manager (unless you did save a snapshot already, in which case the folder will be opened without the dialogue). Now copy 'snapshots' folder contents into it. Once the operation is completed successfully, snapshot list will appear in snapshot tab in the instrument.



END OF FILE

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This document ends here.

Branebender has been created by Marcin Gruszczyński.

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