

# KONTOUR

Manual



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Special thanks to the Beta Test Team, who were invaluable not just in tracking down bugs, but in making this a better product.

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# 1 Welcome to KONTOUR

## 1.1 Foreword by Stephan Schmitt

I have always been fascinated by FM synthesis. For about five years in the 80's and 90's a Yamaha DX7-II was my main instrument. FM synthesizers are based on simple building blocks (often called operators) but at the same time they offer such a vast potential for sound programming that you will never be able to explore them completely.

For me, FM synths represented a large step forward compared to analog synths. First of all, it was easier to obtain metallic and other sounds containing inharmonic sound spectra. Secondly, it became possible to build polyphonic synths which are expressively playable, because they respond very musically to key velocity variations.

Digital audio engines can execute abstract, mathematically defined algorithms. I like it when they provide pure and basic waveforms, distortion shapes, and filter types, and when it is possible to combine them to produce complex sounds. It is exciting to learn about the "nature" of these algorithms and to find out how similar they can sound to acoustic or other electronic instruments - or how much character they have on their own.

An interesting lesson from "chaos theory" is that even a simple system can behave chaotically if it contains a filter with its inherent delay and a non-linear component inside of a feedback loop with enough gain. This can be applied to synthesizers, too.

The algorithms of the early FM synths already offered feedback loops. In NI's FM7/8 we extended the concept by providing a matrix where any operator's output signal can be sent to any operator's input. We also added filter and distortion operators which make a lot of sense in such structures. KONTOUR reflects some aspects of FM8, but they are realized with a much smaller parameter set and more attention to the filters and the distortion.

The design of KONTOUR's predecessor SPARK was also inspired by the early REAKTOR Ensemble Weedwacker, an instrument that surprised many users because its simple structure was able to produce organic and chaotic sounds. The secret behind this was an internal feedback loop. With KONTOUR I have continued to pursue the goal of making feedback more accessible for sound creation.

I prefer synthesis engines that follow their own laws and which are not designed to emulate something in the physical or electronic world. Such instruments behave in a less familiar manner and therefore might not be so easy to learn, but in the end the effort can be very rewarding.

I hope you will enjoy exploring the potential of KONTOUR. Take the presets as starting points, use the four macro controls to create some variations and then also try the more specific parameters. You will see that they are not so hard to master and will give you access to a very deep and rich sound space.

KONTOUR's sound engine was originally designed to be controlled by human interfaces, like pedals or ribbon controllers. In order to answer the needs of electronic music production techniques, we added the motion recorders. They open a wide field for experimentation that can be inspiring. One last tip: when using KONTOUR in a sequencer, please don't neglect the rich sound dimension you can get with different MIDI velocities!

*Stephan Schmitt*

## 1.2 Basic Information

Thank you very much for downloading this REAKTOR ensemble from Native Instruments. Created by Stephan Schmitt, this new and exciting synthesizer can be used either with the free REAKTOR PLAYER, or the full version of REAKTOR 5.9.2 (or above). On behalf of the entire NATIVE INSTRUMENTS team, we hope this product will inspire you.



To get the best from this instrument please read the manual in its entirety.

### Manual Conventions

This manual uses particular formatting to point out special facts and to warn you of potential issues. The icons introducing the following notes let you see what kind of information is to be expected:

Whenever this exclamation mark icon appears, you should read the corresponding note carefully and follow the instructions and hints given there if applicable.



This light bulb icon indicates that a note contains useful extra information. This information may often help you to solve a task more efficiently, but does not necessarily apply to the setup or operating system you are using; however, it's always worth a look.

Furthermore, the following formatting is used:

- Text appearing in (drop-down) menus (such as *Open...*, *Save as...* etc.) and paths to locations on your hard drive or other storage devices is printed in *italics*.
  - Text appearing elsewhere (labels of buttons, controls, text next to checkboxes, etc.) is printed in light blue. Whenever you see this formatting applied, you will find the same text appearing somewhere on the screen.
  - Important names and concepts are printed in **bold**.
- Single instructions are introduced by this play button type arrow.
- Results of actions are introduced by this smaller arrow.

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## 2 What is KONTOUR?

KONTOUR is the latest synthesizer from Native Instruments founder Stephan Schmitt—an ultra-responsive synthesizer that reacts to even the slightest parameter adjustments. This instrument allows you to create stunningly organic textures from mallets to plucked and bowed strings to distorted, aggressive and noisy sounds—a true performance machine.

The Performance View (View A) condenses all KONTOUR's power into four Macro controls for easy, on-the-fly sound manipulation. Each Macro is mapped to several parameters for radical tweaking. Use the Motion Recorder to automate custom modulations, timbre transitions or long, evolving soundscapes.

KONTOUR gives sound designers the keys to a sonic kingdom. The core of the engine consists of two sine oscillators with powerful capabilities of phase modulation, extensive wave-shaping options, and ring modulation. A precise, tunable comb filter, a flexible state variable filter, and an elaborate feedback routing are forming a resonating structure that gives you complex harmonic textures.

KONTOUR represents the next step in Stephan Schmitt's quest for an expressively playable, organic-sounding digital synthesizer.

## 3 Installation and Activation

### 3.1 Installing KONTOUR

The following section explains how to install and activate KONTOUR. Although this process is straightforward, please take a minute to read these instructions, as doing so might prevent some common problems.

- To install KONTOUR, double-click the installer application and follow the instructions on the screen. The installer application automatically places the new ensemble file into a REAKTOR PLAYER directory. Alternatively, during the installation process, choose the directory where you would like to have KONTOUR installed.

The full version of REAKTOR (5.9.2 or later) or the free REAKTOR PLAYER is required to play REAKTOR Instruments and Effects. You can download the free REAKTOR PLAYER from the Native Instruments website.

### 3.2 Activating KONTOUR

When installation is finished, start the Service Center application, which was installed with KONTOUR. It will connect your computer to the Internet and activate your KONTOUR installation. In order to activate your copy of KONTOUR, you have to perform the following steps within the Service Center:

**Log in:** Enter your Native Instruments user account name and password on the initial page. This is the same account information you used in the Native Instruments Online Shop, where you bought your REAKTOR Instrument, and for other Native Instruments product activations.

**Select products:** The Service Center detects all products that have not yet been activated and lists them. You can activate multiple products at once—for example, several REAKTOR Instruments.

**Activate:** After proceeding to the next page, the Service Center connects to the Native Instruments server and activates your products.

**Download updates:** When the server has confirmed the activation, the Service Center automatically displays the Update Manager with a list of all available updates for your installed products. Please make sure that you always use the latest version of your Native Instruments products to ensure they function correctly.



Downloading updates is optional. After activation is complete, you can always quit the Service Center.



## 4 Using KONTOUR in REAKTOR

The following sections will give you a brief overview over some basic operations: you will learn how to open KONTOUR, how to explore the factory-set Snapshots and how to load and play KONTOUR Snapshots from the Header and the Sidepane.

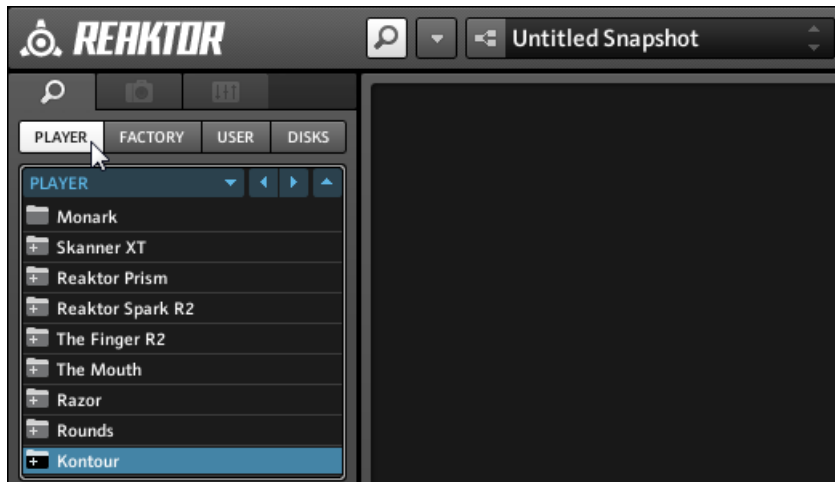


For latest information on REAKTOR PLAYER files and using Snapshots please refer to the REAKTOR Getting Started Guide.

### 4.1 How to Open KONTOUR

This is how to open KONTOUR in REAKTOR or REAKTOR PLAYER:

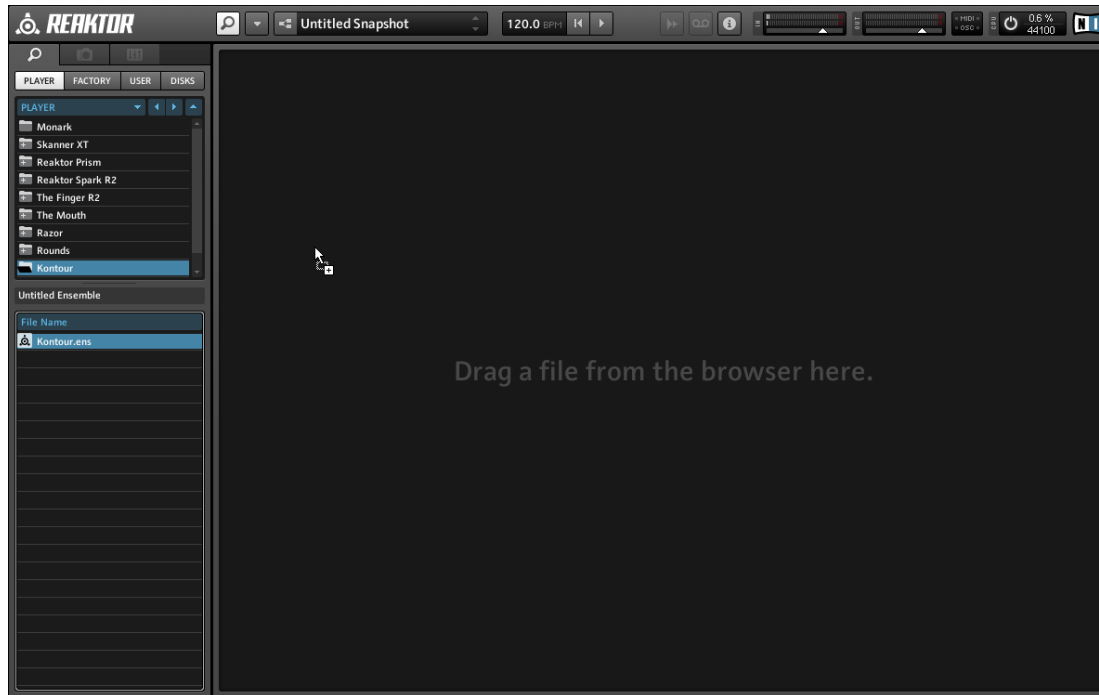
1. Start REAKTOR or REAKTOR PLAYER respectively.
2. In the Browser on the left side of the REAKTOR / REAKTOR PLAYER window, click the **PLAYER** button to show the REAKTOR PLAYER files (you can open the browser with the [F5] key from your keyboard).



- Click the **KONTOUR** folder. The content of the folder will be displayed in the lower section of the browser.



4. Double-click the **KONTOUR.ens** file, or drag it into the main screen.



5. KONTOUR will be loaded in REAKTOR / REAKTOR PLAYER:



## 4.2 Exploring Factory-set Snapshots

Play some notes on your MIDI keyboard to get an idea of how the ensemble sounds.



Please refer to the REAKTOR manual for details on configuring your Audio and MIDI settings.

Now, let's change the sound completely by loading a different Snapshot.



A Snapshot is REAKTOR's notion for a sound, preset, or patch. KONTOUR can hold banks of Snapshots, and loading any of these Snapshots will set each control of that Instrument to a specific value, and re-create a particular sound.

The Snapshots of ROUNDS are accessible from the drop-down menu in REAKTOR PLAYER's Header (Main Bar) or from the Sidepane.



KONTOUR interface with Snapshot list in the Sidepane.

- (1) Sidepane button
- (2) Snapshot drop-down menu
- (3) Snapshot tab
- (4) Snapshot Banks
- (5) Snapshots

### 4.2.1 Loading a Snapshot from the Sidepane

If it is not already visible after startup, you need to open the Sidepane. The Sidepane holds a full overview of the Snapshot Banks and Snapshots from KONTOUR.

1. Click the Sidepane button (1) in the Header to open the Sidepane.
  2. Click the Snapshot tab to display Snapshots (3).
  3. Select a Snapshot Bank (4).
  4. Select the name of a Snapshot entry (5) and double-click it with your mouse to load it.
- The Snapshot is loaded and ready to play.

### 4.2.2 Loading a Snapshot from the Header

Loading a Snapshot from the REAKTOR PLAYER drop-down menu in the Header is the simplest way to interact with Snapshots.

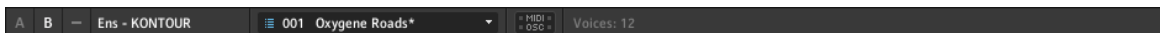
1. Click the Snapshot drop-down menu (2). The menu holds all Snapshots and Banks of the Instrument.
2. Click an entry to select it.
3. The Snapshot is loaded and ready to play.

## 4.3 Saving a Snapshot

Snapshots can be saved using REAKTOR and REAKTOR PLAYER. However, all parameter settings made in ROUNDS will conveniently be saved as part of your DAW project. Please read the REAKTOR documentation for more information on plug-in mode and saving Snapshots.

## 4.4 Selecting KONTOUR A and B Panel Views

REAKTOR allows for each Instrument to have two separate Panel layouts, A and B. You can switch between the A and B Panel Views by clicking on the View A and View B buttons in the Instrument Header or by right-clicking on the Instrument Panel and clicking on the *View A* or *View B* menu entry. The View A and View B buttons in the Instrument Header are labeled (on the far left-hand side) with an **A** and **B**, respectively.



The Instrument Panel View buttons

## View A



View A—KONTOUR

View B



View B—KONTOR

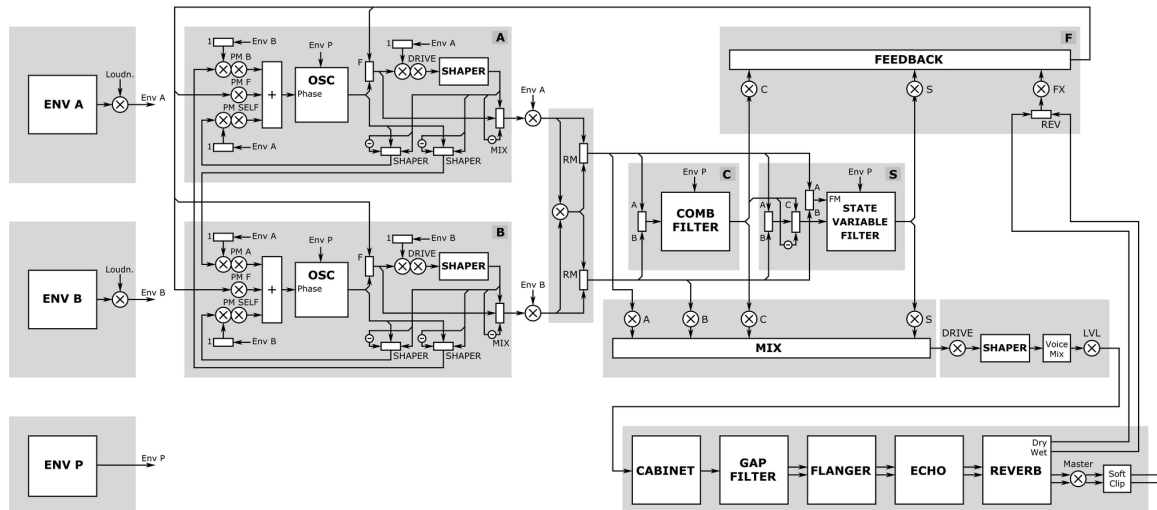


## 5 Overview of KONTOUR Ensemble

KONTOUR has evolved from previous synthesizers created by Stephan Schmitt such as Native Instruments SPARK and CHA-OSC. It also benefits from the experience gained creating PRISM and SKANNER. The intention with KONTOUR was to build an expressive and playable instrument that has its very own character.

As with SPARK and CHA-OSC its voice structure uses very basic waveforms—only two sine oscillators. There are also similarities in the use of phase modulation, wave shaping, a comb filter (formerly "voice delay"), a multi-mode filter and a feedback signal path.

Compared to its predecessors the concept of KONTOUR is more radical and consistent. Its based on pure sine waves from the oscillators and shapers. The result is a very symmetric structure with a signal source that can be described as a 2-operator FM synthesizer. Since the comb filter is based on an advanced design (thanks to Gabriel Mulzer) it will work as a versatile resonator that can give the instrument an "acoustic" sound.



- the phase modulation amounts (with separately adjustable amounts).
- the input gains of the shapers (with separately adjustable amounts).
- An [AD Envelope \(ENV P\)](#) for the oscillator pitches and the filters.
- Ring modulation ([RM](#)) between the output signals of Oscillator and Shaper A and B.
- A polyphonic Comb Filter based on a delay and a 2-pole all-pass filter.
- A 4-pole State Variable Filter with:
  - two 2-pole filters of which the cutoffs can be shifted.
  - crossfading between serial and parallel modes.
  - crossfading between low-pass, bandpass and high-pass response.
  - cut-off frequency modulation by the oscillator signals.
- Flexible mixing and routing for the feedback signal ([FEEDBACK](#) mixer):
  - to the phase modulation ([PM F](#)) of the oscillators.
  - to the inputs of the shapers (via the F crossfader).
- An output mixer ([MIX](#)) including a polyphonic sine shaper for the sum.

**For the sum of voices:**

- A chain of five effects ([CABINET](#), [GAP FILTER](#), [FLANGER](#), [ECHO](#), [REVERB](#)).
- A soft clipping (sine-shaped) saturator after the master level at the output.

For a detailed description of all parameters please refer to chapter [↑7, Overview of KONTOUR User Interface—View B](#).

### 5.1.1 Design Considerations—About the Synthesis Engine

KONTOUR has a small but powerful signal generating core that is based on two sine oscillators only. The spectral variety is created by phase modulation (also called FM), wave shaping, two advanced filters, a feedback bus and a chain of effects.

In an earlier stage of the project it was a 4-operator synthesizer. By setting the frequencies of two of the sine oscillators to 0 Hz they became sine shapers. With additional parameters for fold-back and asymmetry the shapers became more flexible.

The routing is chosen so that each of the shapers processes the output signal of a sine oscillator. For the different signal paths the amount of wave shaping can be adjusted individually. With these shapers even a 2-operator structure becomes a powerful synthesis engine.

The signal from the phase-modulation core can be passed through two filters: the Comb Filter for complex spectral shaping or as a resonator, and the State Variable Filter for the more analog-style subtractive filtering.

Feedback is an important concept of KONTOUR. As with other products there are local feedback loops in the phase-modulation routing of Oscillators and Shapers and also in the Comb Filter, in the State Variable Filter and in the Flanger and Echo. In addition, KONTOUR has a less common feature, a feedback bus that creates feedback loops between different function blocks.

The source of the feedback signal is determined by a mixer for the signals from the (polyphonic) Comb Filter and State Variable Filter, and from the (monophonic) FX chain with a separately adjustable Reverb mix.

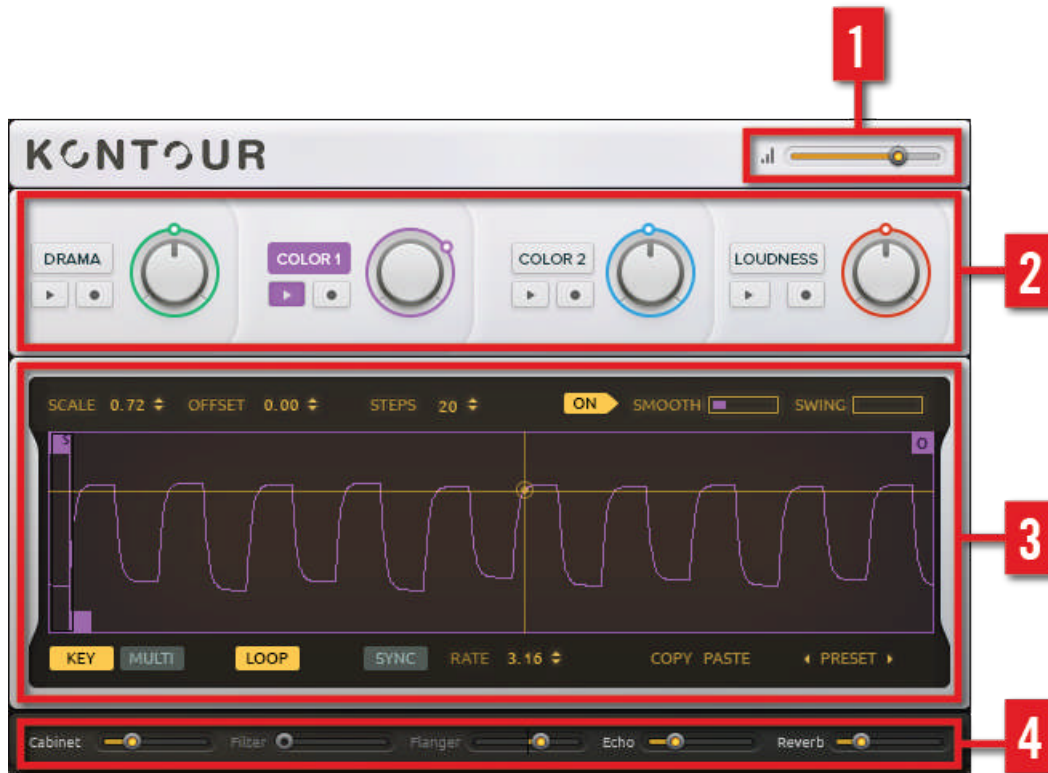
The feedback signal can be sent to the phase modulation inputs of the oscillators and to the inputs of the shapers for direct audio feedback.

The filters have an important influence on the feedback behavior: their delay and their amplitude and phase responses determine the frequencies where the feedback structure can start a self oscillation.

The sum of voices of KONTOUR are processed by a chain of five effects and a soft clipper. The Cabinet creates distortion similar to a guitar amp. The Gap Filter can be used for subtle or radical filtering and stereo spreading. The Flanger can add resonances and rotation or chorusing effects. The Echo and Reverb can place the signal in a virtual space, or create rhythmical echoing.

## 6 Overview of KONTOUR User Interface—View A

View A in KONTOUR is a compact view with a reduced but convenient set of controls for live use.



View A—Overview of KONTOUR User Interface

- (1) **Volume Slider:** Use the volume control to adjust the output volume. For more information please read [↑6.1, Volume](#).
- (2) **Macro Controls:** Use the macro controls for real-time musical control by modulating their target parameters. For more information please read [↑6.2, Macro Controls](#).

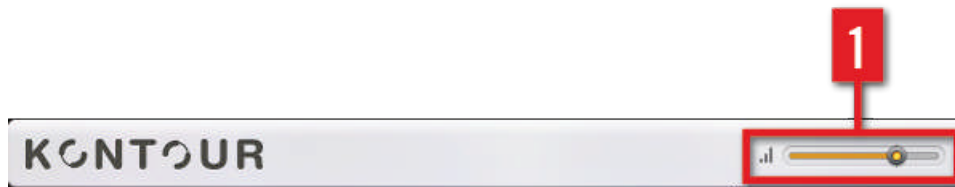
(3) **Motion Recorder:** Use the Motion Recorder to record a waveform for modulating parameters, to select preset waveforms, and control modulation playback parameters. For more information please read [↑6.3, Motion Recorder](#).

(4) **Effect controls:** Set the mix amount for each effect. For more information please read [↑6.4, Effect Controls](#).

## 6.1 Volume

Use the volume control to adjust the output volume. The volume control is at the output of the chain of effects. The resulting signal is processed by a soft clipper before it is passed to the output of REAKTOR. We recommend to adjust the volume level so the red bar will only appear when playing really loud.

### Volume Parameter



View A—Volume slider

(1) **Volume:** The volume level control is stored with each Snapshot. It affects the signal after the effects chain and before it is limited by the soft clipper at the output of the instrument. The soft clipper prevents levels higher than 0 dB full scale, which would be hard clipped at the sound card output. The red bar shows the amount of saturation in the soft clipper. It will only appear when playing really loud.

## 6.2 Macro Controls

The four Macro controls are easy-to-use and predefined with each Snapshot. The sound designers have chosen one or more target parameters and modulation amounts for each Macro control to give access to interesting sound variations.

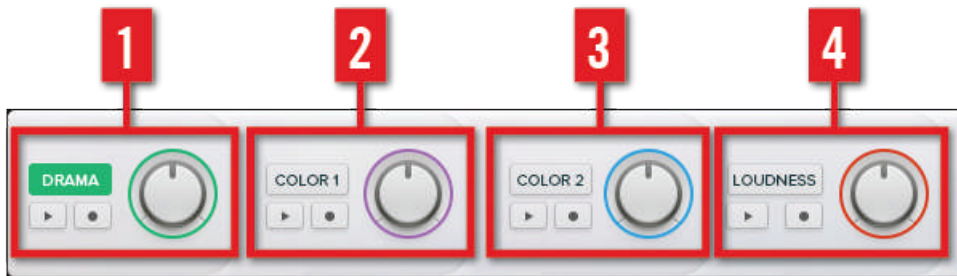
The Macro controls are designated to various target parameters of the synthesis engine and effects of KONTOUR, where the modulation amounts can be user defined and stored per preset. It is also possible to assign them to MIDI sources, for example, a modulation wheel, or expression pedal. View B provides functions for the easy assigning of the modulation wheel (**MW**) and MIDI channel aftertouch (**AT**). They can also be controlled by sequencer automation within your DAW (Digital Audio Workstation).

Internal modulation is provided by the Motion Recorder and then represented by the animation of the outer ring of the knob when the play button next to the Macro control is clicked. When the play button is clicked a second time (unlit) the recorder stops and the Macro knob can be manually controlled using the mouse, MIDI or automation.



Parameters can only be assigned in View B. For more information on how to assign parameters to Macro Controls in View B please read [↑7.1, Macro Controls](#).

## Macro Controls



View A—Macro Controls overview

(1) **DRAMA** Macro: This is the first macro control with up to eleven targets. Typically this is used for sound changes that will make the sound more "dramatic". For detailed parameter descriptions please read section [↑6.2.1, Drama Macro Section](#).

(2) **COLOR 1** Macro: This is the second macro control with up to twelve targets. Typically this is used to change the "color" of the sound by influencing the brightness or the amount of higher partials. For detailed parameter descriptions please read section [↑6.2.2, Color 1 Macro Section](#).

(3) **COLOR 2** Macro: This is the third macro control with up to twelve targets. Typically this is used to change the "color" of the sound as a variation to **COLOUR 1**, as it controls a different set of parameters, which mainly influence the amount or type of resonant peaks in the spectrum. For detailed parameter descriptions please read section [↑6.2.3, Color 2 Macro Section](#).

(4) **LOUDNESS** Macro: This is the fourth macro control with up to nine targets. Typically this is used to change the internal levels of the sound engine. For detailed parameter descriptions please read section [↑6.2.4, Loudness Macro Section](#).



Assign parameters to Macros, and set the range of assigned parameters using the Macro controls in View B. For more information please read [↑7.1, Macro Controls](#).

### 6.2.1 Drama Macro Section

**DRAMA** is a macro control with up to eleven targets. **DRAMA** influences the distortion and feedback, the amounts of flanging, echo, reverb, and the sustain phases of the envelopes.

#### Drama Macro Parameters



View A—Drama macro parameters

(1) **Knob**: First macro control. The knob is for manual control and recording, while the ring (2) shows the control signal when it is smoothed or played back by the Motion Recorder. In playback mode the knob disappears, while the ring shows the control signal.

(2) **Ring**: Displays the control signal when it is smoothed or played back by the Motion Recorder.

(3) **Record Button**: Enables the recording of the Motion Recorder.

(4) **Play Button**: Enables the playback of the Motion Recorder. If **LOOP** is off it will run only when it is triggered by a Note-On. For this the **KEY** button needs to be on.



(5) **DRAMA button**: Displays the macro in the user interface of the Motion Recorder.



Assign the **DRAMA** knob (1) to a MIDI controller like an expression pedal or as a sequencer automation parameter.

## 6.2.2 Color 1 Macro Section

**COLOUR 1** is a Macro Control with up to twelve targets in the synthesizer engine. **COLOUR 1** influences the brightness of the spectral color by phase modulation or shaping and the cutoff and resonance frequencies of the filters.

### Color 1 Parameters



View A—Color 1 macro parameters

(1) **Knob**: Second macro control. The knob is for manual control and recording, while the ring (2) shows the control signal when it is smoothed or played back by the Motion Recorder. In playback mode the knob disappears, while the ring shows the control signal.

(2) **Ring**: Displays the control signal when it is smoothed or played back by the Motion Recorder.

(3) **Record Button**: Enables the recording of the Motion Recorder.

(4) **Play Button**: Enables the playback of the Motion Recorder. If **LOOP** is off it will run only when it is triggered by a Note-On. For this the **KEY** button needs to be on.

(5) **COLOR 1 button**: Displays the macro in the user interface of the Motion Recorder.

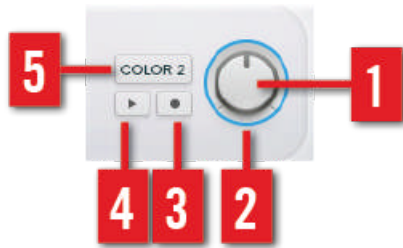


Assign the **COLOR 1** knob (1) to a MIDI controller like an expression pedal or as a sequencer automation parameter.

### 6.2.3 Color 2 Macro Section

**COLOR 2** is a macro control with up to twelve targets. Typically this is used to change the "color" of the sound, influences the intensity or character of the spectral color by the amount of resonance or the type of the filters. It also can shift the oscillator frequencies and influence **MIX A**.

#### Color 2 Parameters



View A—Color 2 macro parameters

- (1) **Knob**: Third macro control. The knob is for manual control and recording, while the ring (2) shows the control signal when it is smoothed or played back by the Motion Recorder. In playback mode the knob disappears, while the ring shows the control signal.
- (2) **Ring**: Displays the control signal when it is smoothed or played back by the Motion Recorder.
- (3) **Record Button**: Enables the recording of the Motion Recorder.
- (4) **Play Button**: Enables the playback of the Motion Recorder. If **LOOP** is off it will run only when it is triggered by a Note-On. For this the **KEY** button needs to be on.
- (5) **COLOR 2 button**: Displays the macro in the user interface of the Motion Recorder.

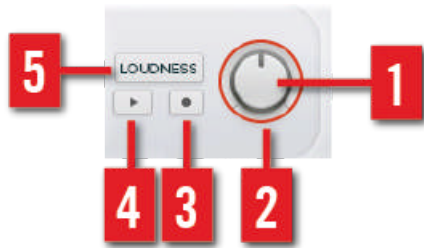


Assign the **COLOR 2** knob (1) to a MIDI controller like an expression pedal or as a sequencer automation parameter.

## 6.2.4 Loudness Macro Section

**LOUDNESS** is a macro control with up to nine targets. **LOUDNESS** influences the levels and mix amounts at different stages of the signal flow. This not only includes the loudness at the output, but also the amount of phase modulation and saturation, and therefore the intensity of the overtones.

### Loudness Parameters



View A—Loudness macro parameters

- (1) **Knob:** Forth macro control. The macro knob is for manual control and recording, while the ring (2) shows the control signal when it is smoothed or played back by the Motion Recorder. In playback mode the knob disappears, while the ring shows the control signal.
- (2) **Ring:** Displays the control signal when it is smoothed or played back by the Motion Recorder.
- (3) **Record Button:** Enables the recording of the Motion Recorder.
- (4) **Play Button:** Enables the playback of the Motion Recorder. If **LOOP** is off it will run only when it is triggered by a Note-On. For this the **KEY** button needs to be on.
- (5) **LOUDNESS button:** Displays the macro in the user interface of the Motion Recorder.



Assign the **LOUDNESS** knob (1) to a MIDI controller like an expression pedal or as a sequencer automation parameter.

## 6.3 Motion Recorder

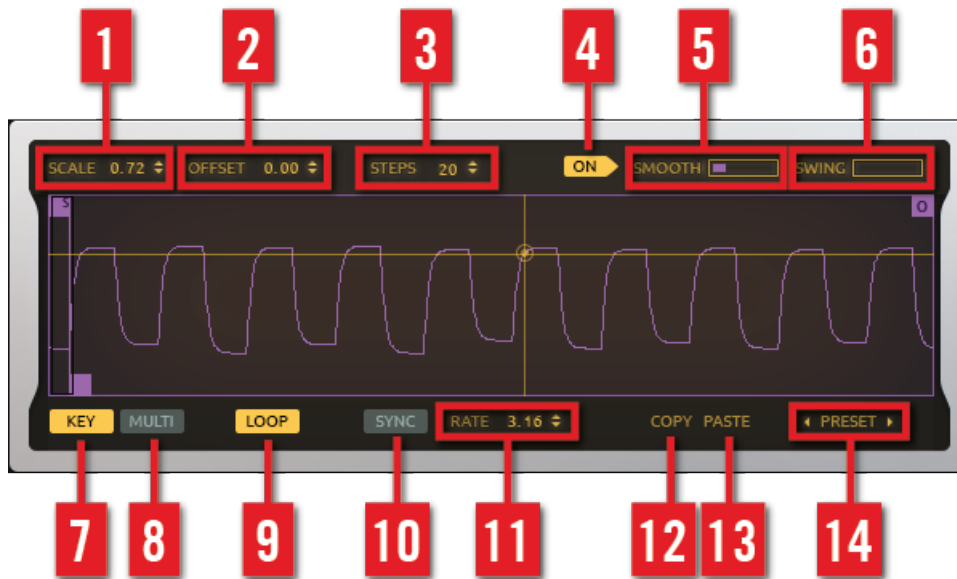
Each of the four macro controls is equipped with a motion recorder that can record and playback the movements of the macro knob. The four motion recorders share a common space where the control panel of the recorder of the selected macro control is shown.

The motion recorder can record a movement that is executed on the macro control knob and will reproduce it later in the form of a "one-shot" that is similar to an envelope or a loop that can function like a flexible LFO.

The recorded control signal can be modified by numerous parameters. They provide control over the start and end points or loop limits, the playback mode and speed, the amplitude scaling and shifting, the down sampling for creating steps and a flexible real-time filter that smoothes the signal.

In addition, there is access to built-in waveform presets and copy and paste of the content of a Motion Recorder.

## Motion Recorder Parameters



View A—Motion Recorder parameters

- (1) **SCALE**: In playback mode the output signal of the recorder can be scaled by this factor. Negative values will invert the signal.
- (2) **OFFSET**: In playback mode the output signal of the recorder can be shifted by this amount.
- (3) **STEPS**: Sample and hold function that creates a stepped curve form. If Smooth is on the steps will be smoothed. The value shows the number of steps between **L** (left) and **R** (right). In Loop mode the start point **S** can be used to shift the phase of the step period.
- (4) **ON**: Toggles the smoothing filter on and off.
- (5) **SMOOTH**: Enables smoothing for the recorded signal and the real-time movements of the macro control. When smoothing is set to **OFF** you see the raw data of the recording. Use in combination with **ON** (4).
- (6) **SWING**: Amount of swinging of the smoothed signal, adjusted by setting the resonance of a 2-pole low-pass filter. Use in combination with **ON** (4).

(7) **KEY**: Determines if MIDI Note-On will influence the playback.

- In one-shot mode a Note-On will start the playback (key trigger).
- In loop mode a Note-On will set the position back to **S** (key sync).

(8) **MULTI**: Mode of the key triggering

- Off - single-trigger: legato notes will not reset/restart the playback.
- On - multi-trigger: every note will reset/restart the playback.

(9) **LOOP**: This activates the Loop mode, where the playback continuously repeats the segment between **L** and **R**. When Loop is off (one-shot mode) it will run only one time from **S** to **E**.

(10) **SYNC**: In the **SYNC** mode the speed is automatically set so that a number of beats of the sync master fit into the selected time range. If **KEY** is off, the playback position will be controlled by the song position of the sync master.

When **SYNC** is off, the recorder is driven by its internal clock source. The playback tempo can be adjusted freely.

(11) **RATE/BEATS**: Speed for the free-running mode (**SYNC** = off). At default speed 1.00 the max. recording time is ten seconds at a sample rate of 100 Hz. With negative values the cursor will run backwards. When **SYNC** is on, this control will be replaced by the **BEATS** control.

**BEATS**: Speed adjustment for the Sync mode. The speed is controlled by setting the number of beats of the sync master which fit into the selected time range. The numerator sets the length of the loop in number of beats, and the beat value is determined by the denominator.

(12) **COPY**: Copies the current content of the Motion Recorder to a clipboard, so it can be pasted into another recorder or a different snapshot.

(13) **PASTE**: The content of the clipboard will be pasted into this Motion Recorder.

(14) **PRESET**: Opens a list of twelve pre-defined preset curves that can be loaded into the Motion Recorder. A second click will close it.

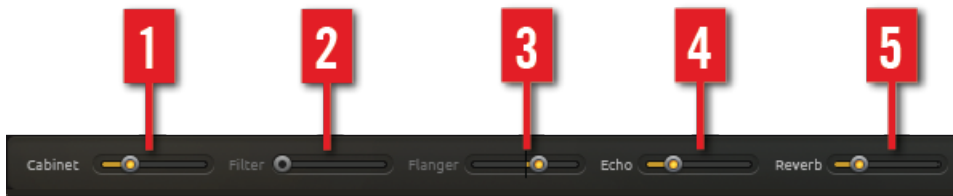


View A—Motion Recorder preset modulation waveforms

## 6.4 Effect Controls

The five effects at the output of KONTOUR can have a large impact on the sound. They are therefore also represented in View A. Clicking an effect label toggles between the active state and the bypass of the effect. Use the slider to increase or decrease the mix amount of the selected effect.

### Effects Level Parameters



View A —Effects sliders

(1) **Cabinet**: Toggles between the active state and the bypass of the Cabinet. Use the slider to increase the mix amount of the Cabinet effect.

(2) **Filter**: Toggles between the active state and the bypass of the Gap Filter. Use the slider to increase the mix amount of the Filter effect.

- (3) **Flanger**: Toggles between the active state and the bypass of the Flanger. Use the slider to increase the mix amount of the Flanger effect. The slider is bipolar providing a negative range for mixing with the inverted effect signal.
- (4) **Echo**: Toggles between the active state and the bypass of the Echo. Use the slider to increase the mix amount of the Echo effect.
- (5) **Reverb**: Toggles between the active state and the bypass of the Reverb. Use the slider to increase the mix amount of the Reverb effect.



## 7 Overview of KONTOUR User Interface—View B

View B in KONTOUR provides access to all parameters and can be used to program sounds.



View B—Overview

(1) **Macro Controllers:** The four assignable knobs for easy access to sound variations. For detailed parameter descriptions see [↑7.1, Macro Controls](#).

(2) **Mod Assignment:** Selection for the assignment of five of the modulations sources. For detailed parameter descriptions see [↑7.5, Mod Assignment](#).

- (3) **Global Settings:** Here you find controls for the master volume and tuning, and the voices, spread, and phase of the unison mode. For detailed parameter descriptions see [↑7.5.5.1, Aftertouch Modulation Assignment Target List](#).
- (4) **Envelopes:** The parameters of the three envelopes which modulate the oscillators, shapers and filters. For detailed parameter descriptions see [↑7.7, ENV Sections](#).
- (5) **Synthesizer Engine:** The controls of the core synthesizer engine which consists of two sine oscillators with phase modulation, two wave shapers, mixing and routing controls, a comb filter and a state variable filter. For detailed parameter descriptions see [↑7.8, Synth Engine Sections](#).
- (6) **MIX:** The sliders of the output mixer which gives access to four different signals of the synthesizer engine. For detailed parameter descriptions see [↑7.9, MIX](#).
- (7) **SHAPER:** The controls for the wave shaper and the level at the output of the polyphonic part of the synthesizer. For detailed parameter descriptions see [↑7.10, SHAPER](#).
- (8) **FEEDBACK:** The sliders of the feedback mixer that determines which signals are used in the feedback path. For detailed parameter descriptions see [↑7.11, FEEDBACK](#).
- (9) **Effects:** Control panels for the five effects that process the output signal of the synthesizer. For detailed parameter descriptions see [↑7.12, Effects Section](#).

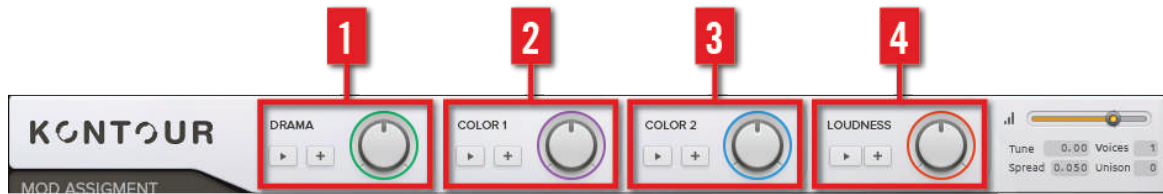
## 7.1 Macro Controls

KONTOUR has four Macro Controls. They are designated to various target parameters of the synthesis engine and effects of KONTOUR, where the modulation amounts can be user defined and stored per Snapshot. It is possible to assign them to MIDI sources, for example, a modulation wheel, or expression pedal.

They can also be controlled by sequencer automation within your DAW (Digital Audio Workstation).

An internal modulation is provided by the Motion Recorder and then represented by the animation of the outer ring of the knob when the play button next to the Macro control is clicked. When the play button is clicked a second time (unlit) the recorder stops and the Macro knob can be manually controlled using the mouse, MIDI or automation.

## Macro Parameters



View B—Macro Control section overview

(1) **DRAMA** Macro: This is the first macro control with up to eleven targets. Typically this is used for sound changes that will make the sound more "dramatic". For detailed parameter descriptions and a list of modulation targets please read [↑7.1.1, Drama Macro Section](#).

(2) **COLOR 1** Macro: This is the second macro control with up to twelve targets. Typically this is used to change the "color" of the sound by influencing the brightness or the amount of higher partials. For detailed parameter descriptions and a list of modulation targets please read [↑7.1.1, Drama Macro Section](#).

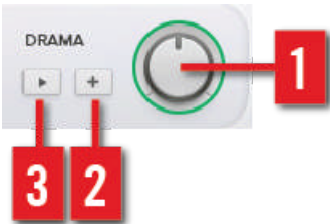
(3) **COLOR 2** Macro: This is the third macro control with up to twelve targets. Typically this is used to change the "color" of the sound as a variation to **COLOR 1**, as it controls a different set of parameters, which mainly influence the amount or type of resonant peaks in the spectrum. For detailed parameter descriptions and a list of modulation targets please read [↑7.1.2, Color 1 Macro Section](#).

(4) **LOUDNESS** Macro: This is the fourth macro control with up to nine targets. Typically this is used to change the internal levels of the sound engine. For detailed parameter descriptions and a list of modulation targets please read [↑7.1.3, Color 2 Macro Section](#).

### 7.1.1 Drama Macro Section

**DRAMA** is a macro control with up to eleven targets. **DRAMA** influences the distortion and feedback, the amounts of flanging, echo and reverb, and the sustain phases of the envelopes.

### Drama Macro Parameters



View B—Drama macro parameters

- (1) **Knob:** The knob is for manual control and recording. In playback mode the knob disappears, while the ring shows the control signal, when it is played back by the Motion Recorder. When the smoothing filter is on, the ring is also visible to show the smoothed control signal.
- (2) **Assign Button:** Shows the modulation targets and amounts.
- (3) **Play Button:** Enables the playback of the Motion Recorder. If **LOOP** (View A) is off it will run only when it is triggered by a Note-On. For this the **KEY** button needs to be on.



Assign the **DRAMA** knob (1) to a MIDI controller like an expression pedal or as a sequencer automation parameter.

### Drama Macro Modulation Targets

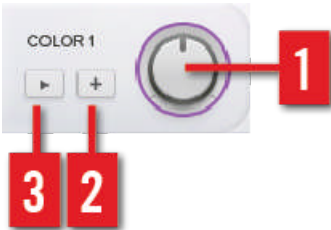
Drama Assign Targets	Description of Modulated Parameter
ENV A: S	Sustain portion of Envelope A.
ENV B: S	Sustain portion of Envelope B.
CABINET: MIX	Mix level of the Cabinet effect
FLANGER: DEPTH	Relative amount of the LFO modulation applied to the flanger delay lines.
FLANGER: RATE	Frequency of the modulation LFO for the flanger.
FLANGER: MIX	Dry/wet mix of the Flanger. In the center position the mix is dry. To the upper end the wet signal is mixed in normal phase and to the lower end in inverted phase.
ECHO: MIX	Dry/Wet mix of the Echo.
REVERB: MIX	Dry/Wet mix of the Reverb.

Drama Assign Targets	Description of Modulated Parameter
FEEDBACK: C	Feedback mix factor for the output of the Comb Filter.
FEEDBACK: S	Feedback mix factor for the output of the State Variable Filter.
FEEDBACK: FX	Feedback mix factor for the output of the effects chain. The reverb amount in the feedback can be set by REV independently. Since the effect chain is monophonic such feedback will cause intermodulation between the voices.

7.1.2 Color 1 Macro Section


COLOUR 1 is a Macro Control with up to twelve targets. COLOUR 1 influences the brightness of the spectral color by phase modulation or shaping and the cutoff/resonance frequencies of the filters.

Color 1 Parameters



View B—Color 1 macro parameters

- (1) **Knob:** The knob is for manual control and recording. In playback mode the knob disappears, while the ring shows the control signal, when it is played back by the Motion Recorder. When the smoothing filter is on, the ring is also visible to show the smoothed control signal.
- (2) **Assign Button:** Shows the modulation amounts.
- (3) **Play Button:** Enables the playback of the Motion Recorder. If LOOP (View A) is off it will run only when it is triggered by a Note-On. For this the KEY button needs to be on.

 Assign the COLOUR 1 knob (1) to a MIDI controller like an expression pedal or as a sequencer automation parameter.

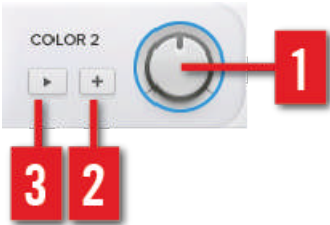
### Color 1 Macro Modulation Targets

Color 1 Assign Targets	Description of Modulated Parameter
OSC A: PM SELF	Amount of phase modulation by Oscillator and Shaper A (local feedback)
OSC A: PM B	Amount of phase modulation by Oscillator and Shaper B.
OSC A: DRIVE	Gain for the input signal of the Shaper. Driving the shaper with higher gains will deliver stronger distortion.
OSC B: PM SELF	Amount of phase modulation by Oscillator and Shaper B (local feedback)
OSC B: PM A	Amount of phase modulation by Oscillator and Shaper A.
OSC B: DRIVE	Gain for the input signal of the Shaper. Driving the shaper with higher gains will deliver stronger distortion.
COMB FILTER: B	The input signal of the Comb Filter is a crossfade between signal A and B (from the Oscillators & Shapers)
COMB FILTER: PITCH	Coarse pitch of the resonant oscillations in the tuned delay line of the Comb Filter (in semitones, based on MIDI note numbers).
COMB FILTER: AP TUNE	Center frequency of the 2-pole all-pass filter in the signal loop of the Comb Filter (in semitones). This is the frequency where the phase is shifted by 180 degrees. At the maximum position (140 st) the all-pass has no effect.
STATE VARIABLE FILTER: CUTOFF	Filter cutoff frequency (in semitones) at C3=60. Applies to both stages of the filter. The offset between their individual cutoffs is controlled by Spread.
FILTER: CENTER	This sets the average center frequency of the gaps in both channels [in semitones].
FILTER: MIX	Dry/wet mix, crossfading between the input signal and the filtered signal.

### 7.1.3 Color 2 Macro Section


**COLOR 2** COLOR 2 is a macro control with up to twelve targets. Typically this is used to change the "color" of the sound. It influences the intensity or character of the spectral color by the amount of resonance or the type of the filters. It also can shift the oscillator frequencies and influence the MIX controls of the shapers.

Color 2 Parameters



View B—Color 2 macro parameters

- (1) **Knob:** The knob is for manual control and recording. In playback mode the knob disappears, while the ring shows the control signal, when it is played back by the Motion Recorder. When the smoothing filter is on, the ring is also visible to show the smoothed control signal.
- (2) **Assign Button:** Shows the modulation amounts.
- (3) **Play Button:** Enables the playback of the Motion Recorder. If **LOOP** (View A) is off it will run only when it is triggered by a Note-On. For this the **KEY** button needs to be on.

 Assign the **COLOR 2** knob (1) to a MIDI controller like an expression pedal or as a sequencer automation parameter.

Color 2 Macro Modulation Targets

Color 2 Assign Targets	Description of Modulated Parameter
OSC A: PITCH	Coarse pitch of the oscillator at C3 (MIDI note 60) (in semitones, based on MIDI note numbers). The range below zero is shaped in the way that -20 corresponds to 0 Hz.
OSC A: MIX	Mix amount of the shaped (distorted) signal at the output of the Shaper. At zero (center position), no shaper signal is added to the oscillator/feedback mix. At negative values, the shaped signal in the mix is inverted.
OSC B: PITCH	Coarse pitch of the oscillator at C3 (MIDI note 60) (in semitones, based on MIDI note numbers). The range below zero is shaped in the way that -20 corresponds to 0 Hz.
OSC B: MIX	Mix amount of the shaped (distorted) signal at the output of the Shaper. At zero (center position), no shaper signal is added to the oscillator/feedback mix. At negative values, the shaped signal in the mix is inverted.

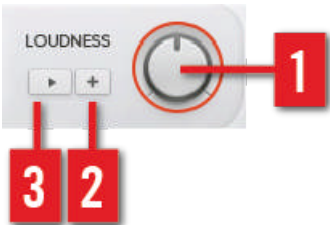
Color 2 Assign Targets	Description of Modulated Parameter
COMB FILTER: AP RESO	Resonance of the 2-pole all-pass. Determines how steep the phase shift rises around the center frequency.
COMB FILTER DECAY	Amount of the internal feedback noticeable as the decay time of the impulse response (logarithmic scaling: dB_ms).  At negative values, the feedback signal is inverted, which shifts the fundamental resonance down by one octave.
COMB FILTER: HI CUT	Cutoff frequency of the low-pass filter in the signal loop of the Comb Filter. It damps the higher frequencies so that they decay faster than the fundamental.
STATE VARIABLE FILTER: RESO	Filter cutoff frequency (in semitones) at C3=60. Applies to both stages of the filter. The offset between their individual cutoffs is controlled by Spread.
FILTER: SPREAD	Offset between the cutoffs of the two 2-pole filters (in semitones). It can be used to reduce the strong resonance peak in the serial mode and to get a filter curve with two formants in the parallel mode.
FILTER: L-B-H	Crossfades between the low-pass, bandpass and high-pass outputs of the two filter stages.
FILTER: STEREO	Sets the difference between the cutoff frequencies in the left and right channel (in semitones).
FLANGER: TIME	Average delay time as the basis for the LFO modulation. It is effective when Depth is set to zero.

### 7.1.4 Loudness Macro Section

LOUDNESS is a macro control with up to nine targets. Typically this is used to change the internal levels of the sound engine. They influence the loudness at the output but also the amount of phase modulation and saturation and therefore the intensity of the overtones.



## Loudness Parameters



View B—Loudness macro parameters

- (1) **Knob:** The knob is for manual control and recording. In playback mode the knob disappears, while the ring shows the control signal, when it is played back by the Motion Recorder. When the smoothing filter is on, the ring is also visible to show the smoothed control signal.
- (2) **Assign Button:** Shows the modulation amounts.
- (3) **Play Button:** Enables the playback of the Motion Recorder. If **LOOP** (View A) is off it will run only when it is triggered by a Note-On. For this the **KEY** button needs to be on.



Assign the **LOUDNESS** knob (1) to a MIDI controller like an expression pedal or as a sequencer automation parameter.

## Loudness Macro Modulation Targets

Loudness Assign Targets	Description of Modulated Parameter
ENV A: LVL RANGE	Influence on the level of Envelope A which controls the amplitude and the phase modulation amounts of Oscillator A and the input gain of Shaper A.
ENV B: LVL RANGE	Influence on the level of Envelope B which controls the amplitude and the phase modulation amounts of Oscillator B and the input gain of Shaper B.
CABINET: LEVEL	Controls the output level of the saturation effect before it is mixed with the dry signal.
SHAPER: DRIVE	Input gain of the sine shaper stage. Higher gains will create more distortion and harmonics.
SHAPER: LEVEL	Output level of the synthesizer. This signal will be processed by the effects.
OUTPUT: A	Output mix factor for the direct output of Oscillator and Shaper A.

Loudness Assign Targets	Description of Modulated Parameter
OUTPUT: B	Output mix factor for the direct output of Oscillator and Shaper B.
OUTPUT: C	Output mix factor for the output of the Comb Filter. With negative mix amounts the filter signal is inverted and cancellation frequencies are shifted.
OUTPUT: D	Output mix factor for the output of the State Variable Filter. With negative mix amounts the filter signal is inverted and cancellation effects are different.

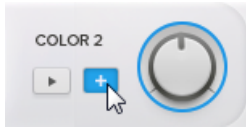
## 7.2 Assigning Parameters to Macros

Each of the four Macro knobs has its own set of predefined parameters which can be controlled automatically using the Motion Recorder in View A, or manually using the mouse or a mapped hardware controller.

When the assign button is pressed the labels of the available parameters for the Macro will be highlighted.

To assign a parameter to a Macro knob:

1. Click the assign button.



This will highlight the available modulation destinations.



- Click on the highlighted label of the parameter you want to set, and drag the mouse up to set the modulation range, or drag the mouse down to inverse the polarity of the modulation. Repeat this action for each parameter you want to modulate.



- Switch to View A to access the Motion Recorder to select a preset waveform or record a modulation waveform.

## 7.3 Selecting a Modulation Waveform

1. Select View A.
2. Select a Macro.



3. Select **PRESET**.



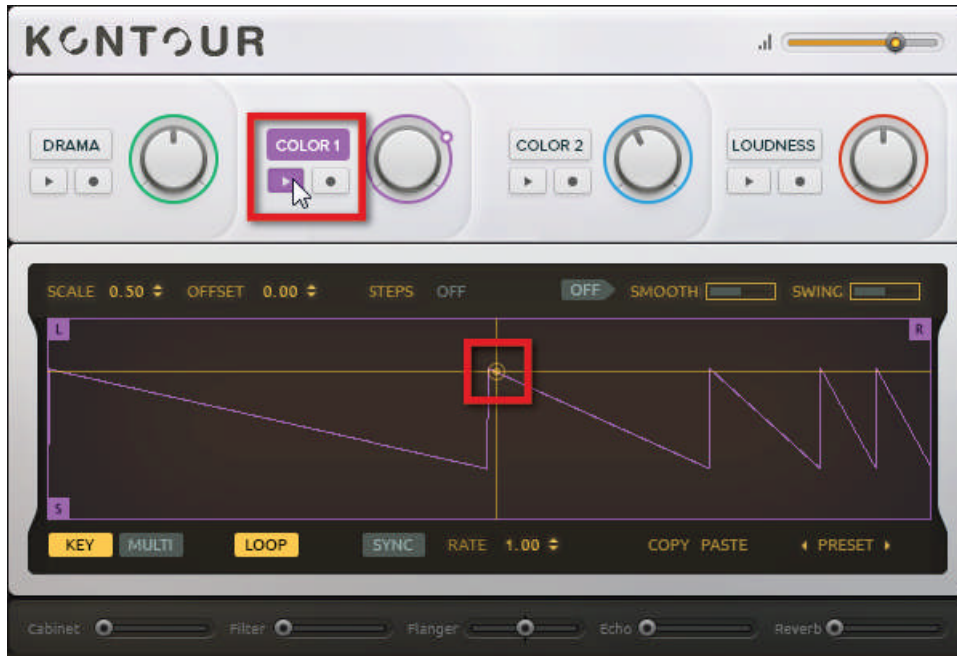
4. Choose a waveform to use as a modulation source.



The selected waveform will be displayed in the Motion Recorder.



5. Click the Play button of the color related Macro to begin modulation.





## 7.4 Recording a Waveform in the Motion Recorder

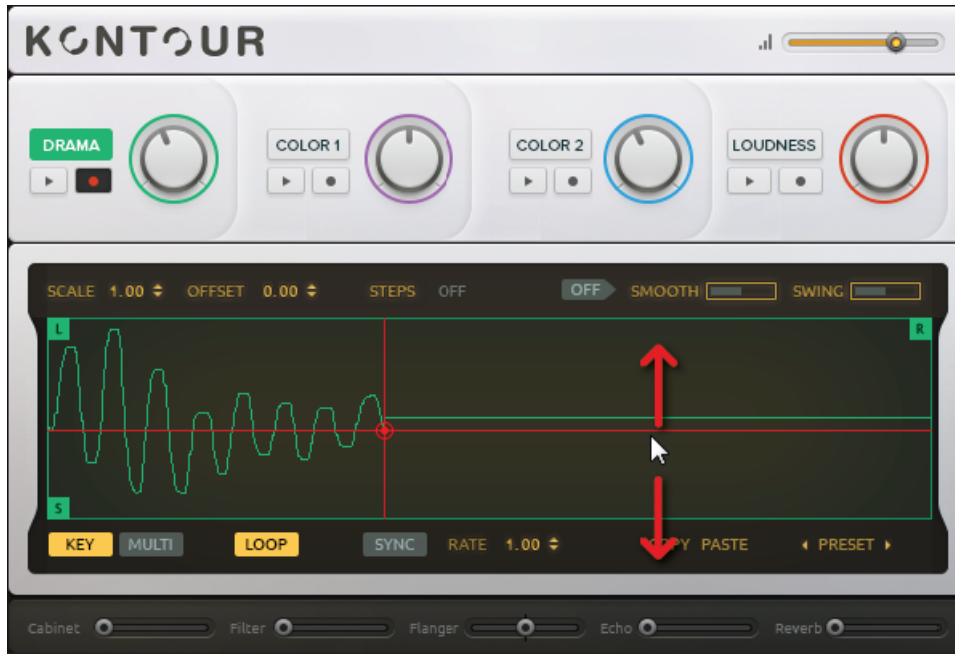
1. Select View A.
2. Select a Macro.



3. Click the Record button of the color related Macro you want to modulate.

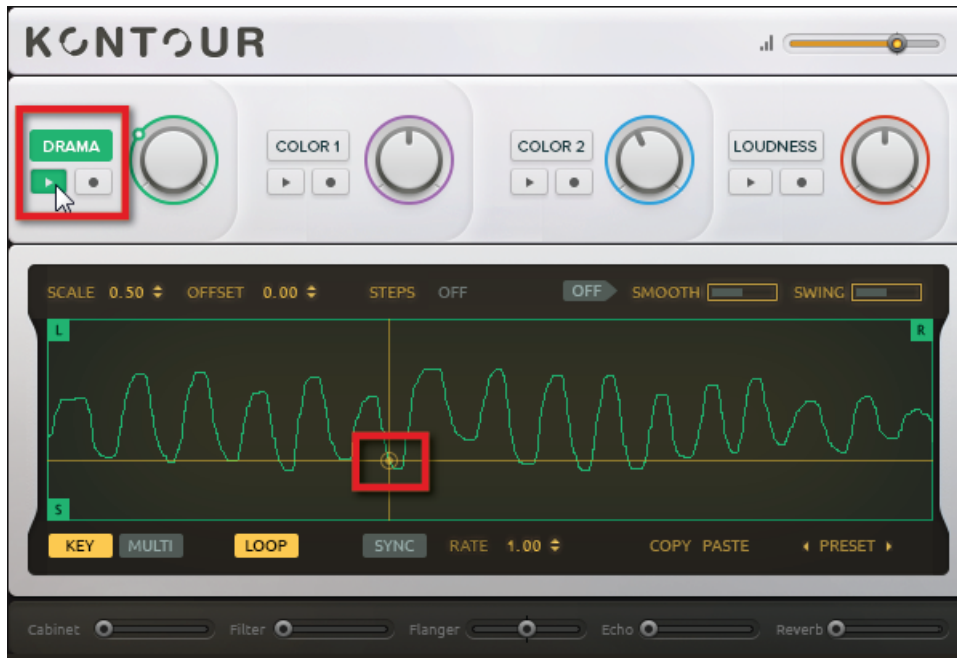


4. In the waveform display click and hold the right mouse button and move the mouse up and down. The horizontal line of the crosshair follows your movement and creates the desired modulation shape. The Motion Recorder will only record while the mouse button is pressed.



5. Click the Record button again to disable recording.

6. Click the Play button to hear the modulation playback. The crosshair will follow the path of the waveform and the assigned parameters will be modulated accordingly.



7. Set the left and right locator to set the loop range if required.



If **LOOP** is off the modulation playback will run only when it is triggered by a MIDI Note-On. For this the **KEY** button needs to be on.

## 7.5 Mod Assignment

Using the Modulation Assignment section you can select one of five modulations sources, for modulation assignment. The first two are polyphonic sources that represent the velocity and key position of a note. They are used to adjust the dynamic response and how the instrument behaves depending on the pitch of a note. The three modulation sources provide access to the assignment of the three most important global MIDI control sources: Pitch Bend, Mod Wheel and Channel Aftertouch.

## Mod Assignment Parameters



View B—Global parameters

(1) **VEL**: Shows the modulation targets and amounts for MIDI velocity. To learn how to make velocity modulation assignments and to see a full list of assignable parameters, please read section [↑7.5.1, Velocity Modulation Assignments](#).

(2) **Key Tracking**: Shows the modulation targets and amounts for the key tracking. To learn how to make key tracking modulation assignments and to see a full list of assignable parameters, please read section [↑7.5.1.1, Velocity Modulation Assignment Target List](#).

(3) **PB**: Shows the modulation targets and amounts for Pitch Bend. To learn how to make pitch bend modulation assignments and to see a full list of assignable parameters, please read section [↑7.5.2.1, Key Tracking Modulation Assignment Target List](#).

(4) **MW**: Assign the Mod Wheel to one of the four macro controls:

- In manual mode it controls the knob directly.
- In playback mode it controls the modulation amount by crossfading between the manually adjusted position and the signal from the motion recorder.

To learn how to make modulation wheel assignments and to see a full list of assignable parameters, please read section [↑7.5.3.1, Pitch Bend Modulation Assignment Target List](#).

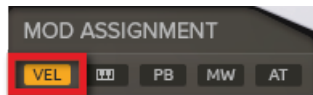
(5) **AT**: Set the influence of MIDI Channel Aftertouch on the four macro controls. To learn how to make aftertouch modulation assignments and to see a full list of assignable parameters, please read section [↑7.5.4.1, Mod Wheel Modulation Assignment Target List](#).

## 7.5.1 Velocity Modulation Assignments

The velocity modulation sources can be assigned to a set of predefined parameters. When the **VEL** button is pressed the available parameters for assignment will illuminate and the arrows indicating the range will be highlighted.

### Making Velocity Assignments

1. Click the **VEL** button.



The labels of the available parameters will be highlighted.



2. Click on the highlighted label of the parameter you want to set, and drag the mouse up to set the modulation range, or drag the mouse down to inverse the polarity of the modulation. Repeat this action for each of the available parameters you want to modulate.



### 7.5.1.1 Velocity Modulation Assignment Target List

Here is a list of the Velocity modulation targets:

Modulation Target	Description of Target Parameter
ENV A: LEVELS	Influence of the Note-On velocity on the peak, breakpoint and sustain levels of the envelope. At maximum velocity, the parameters will be at their original settings. Lower velocities will reduce them. At 100% full linear control by the MIDI velocity (dynamic range: 43 dB).
ENV A: A	Influence of the Note-On velocity on the attack time. At minimum velocity, the attack time will be the original parameter setting. Higher Note-On velocities will reduce the attack time.
ENV A: R	Influence of the Note-Off velocity on the release time. At minimum velocity, the release time will be the original parameter setting. Higher velocities will reduce the release time.



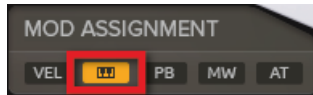
Modulation Target	Description of Target Parameter
ENV B: LEVELS	Influence of the Note-On velocity on the peak, breakpoint and sustain levels of the envelope. At maximum velocity, the parameters will be at their original settings. Lower velocities will reduce them. At 100% full linear control by the MIDI velocity (dynamic range: 43 dB).
ENV B: A	Influence of the Note-On velocity on the attack time. At minimum velocity, the attack time will be the original parameter setting. Higher Note-On velocities will reduce the attack time.
ENV B: R	Influence of the Note-Off velocity on the release time. At minimum velocity, the release time will be the original parameter setting. Higher velocities will reduce the release time.
ENV P: LEVELS	Influence of the Note-On velocity on the peak level of the envelope [in %]. Original level at maximum velocity. Lower velocities will reduce it. At 100% full linear control by the MIDI velocity (dynamic range: 43 dB).
ENV P: A	Influence of the Note-On velocity on the attack time. At minimum velocity, the attack time will be the original parameter setting. Higher Note-On velocities will reduce the attack time.
ENV P: D/R	Influence of the Note-Off velocity on the release time. At minimum velocity, the release time will be the original parameter setting. Higher velocities will reduce the release time.

7.5.2 Key Tracking Modulation Assignment

The key tracking modulation sources can be assigned to a set of predefined parameters. When the key tracking button is pressed the available parameters for assignment will illuminate and the arrows indicating the range will be highlighted.

## Making Key Tracking Assignments

1. Select the **key tracking** assignment button.



The labels of the available parameters will be highlighted.



2. Click on the highlighted label of the parameter you want to set, and drag the mouse up to set the modulation range, or drag the mouse down to inverse the polarity of the modulation. Repeat this action for each of the available parameters you want to modulate.



7.5.2.1 Key Tracking Modulation Assignment Target List

Here is a list of the key tracking modulation targets:

Modulation Target	Description of Target Parameter
ENV A: LEVELS	Key tracking of the peak, breakpoint and sustain levels [in dB per semi-tone]. Positive values: levels increase with higher keys. Negative values: levels decrease with higher keys. Original levels at C3=60.
ENV A: TIMES	Key tracking of the attack, decay and release times [in %], making the times shorter for higher notes. Original times at C3=60. At 100% they are reciprocally proportional to the frequency of the key (half per octave).
ENV B: LEVELS	Key tracking of the peak, breakpoint and sustain levels [in dB per semi-tone]. Positive values: levels increase with higher keys. Negative values: levels decrease with higher keys. Original levels at C3=60.
ENV B: TIMES	Key tracking of the attack, decay and release times [in %], making the times shorter for higher notes. Original times at C3=60. At 100% they are reciprocally proportional to the frequency of the key (half per octave).
ENV P: LEVELS	Key tracking of the peak level [in dB per semitone]. Positive values: level increases with higher keys. Negative values: level decreases with higher keys. Original level at C3=60.

Modulation Target	Description of Target Parameter
ENV P: TIMES	Key tracking of the attack, decay and release times [in %], making the times shorter for higher notes. Original times at C3=60. At 100% they are reciprocally proportional to the frequency of the key (half per octave).
OSC A: PITCH	(permanently visible) Key tracking of the oscillator pitch. This is the scaling factor between the key position of a received MIDI note (relative to C3=60) and the pitch of the oscillator. At 1.0 the pitch follows the equal temperament scale. Larger values result in a stretched tuning. At 0.5 the result is a quartertone scale and at 0.0 the oscillator pitch is constant for all keys.
OSC B: PITCH	(permanently visible) Key tracking of the oscillator pitch. This is the scaling factor between the key position of a received MIDI note (relative to C3=60) and the pitch of the oscillator. At 1.0 the pitch follows the equal temperament scale. Larger values result in a stretched tuning. At 0.5 the result is a quartertone scale and at 0.0 the oscillator pitch is constant for all keys.
COMB FILTER: PITCH	(permanently visible) Key tracking of the pitch. This is the scaling factor between the key position of a received MIDI note (relative to C3=60) and the pitch of the comb filter. At 1.0 the pitch follows the equal temperament scale. At values slightly larger than 1.0 you get a stretched tuning. At 0.0 the oscillation frequency is independent from the note pitches.
COMB FILTER: DECAY	Amount of key tracking, shortening the decay times for higher keys. 0%: no influence, 100 %: half time per octave, origin at C3=60
COMB FILTER: AP TUNE	Center frequency of the 2-pole allpass filter in the signal loop of the Comb Filter.  Key tracking: 0%: no influence, 100 %: full tracking with the notes, origin at C3=60.

Modulation Target	Description of Target Parameter
COMB FILTER: HI CUT	<p>Cutoff frequency of the low-pass filter in the signal loop of the Comb Filter. It damps the higher frequencies so that they decay faster than the fundamental.</p> <p>Key tracking: 0%: no influence; 100%: full tracking with the notes, origin at C3=60.</p>
SV FILTER: CUTOFF	<p>Filter cutoff frequency [in semitones] at C3=60. Applies to both stages of the filter. The offset between their individual cutoffs are controlled by Spread.</p> <p>Key tracking: 0%: no influence; 100%: full tracking with the notes, origin at C3=60</p>

### 7.5.3 Pitch Bend Modulation Assignment

Pitch Bend modulation sources can be assigned to a set of predefined parameters.

#### Making Pitch Bend Assignments

1. Select the PB assignment button.



The labels of the available parameters will be highlighted.



2. Click on the highlighted label of the parameter you want to set, and drag the mouse up to set the modulation range, or drag the mouse down to inverse the polarity of the modulation. Repeat this action for each of the available parameters you want to modulate.



7.5.3.1 Pitch Bend Modulation Assignment Target List

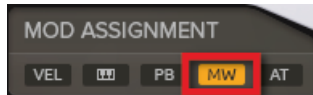
Modulation Target	Description of Target Parameter
OSC A: PITCH	Oscillator pitch. Maximum amount of up or down shifting by the MIDI pitch bender [in semitones].
OSC B: PITCH	Oscillator pitch. Maximum amount of up or down shifting by the MIDI pitch bender [in semitones].
COMB FILTER: PITCH	Comb Filter pitch. Maximum amount of up or down shifting by the MIDI pitch bender [in semitones].
COMB FILTER: AP TUNE	Center frequency of the 2-pole allpass filter in the signal loop of the Comb Filter. Amount of shifting from the pitch bender [in semitones].
S. V. FILTER: CUTOFF	Filter cutoff frequency. Amount of shifting from the pitch bender [in semitones]

## 7.5.4 Mod Wheel Modulation Assignments

The Mod Wheel can be assigned to one macro control.

### Making a Mod Wheel Assignment

1. Select the **MW** assignment button.



The labels of the available parameters will be highlighted.



2. Click on the highlighted label of the macro control to assign it to the modulation wheel.





→ The yellow dot next to a Macro knob indicates the Macro is now controlled by the Mod Wheel.



7.5.4.1 Mod Wheel Modulation Assignment Target List

Modulation Target	Description of Target Parameter
DRAMA	exclusive on/off
COLOR 1	exclusive on/off
COLOR 2	exclusive on/off
LOUDNESS	exclusive on/off

7.5.5 Aftertouch Modulation Assignments

Aftertouch modulation sources can be assigned to control a Macro.

## Making Aftertouch Assignments

1. Select the **AT** assignment button.



The labels of the available parameters will be highlighted.



2. Click on the highlighted label of the parameter you want to set, and drag the mouse up to set the modulation range, or drag the mouse down to inverse the polarity of the modulation. Repeat this action for each of the available parameters you want to modulate.



→ The yellow amount bar indicates MIDI Channel Aftertouch is assigned to the Macro control.



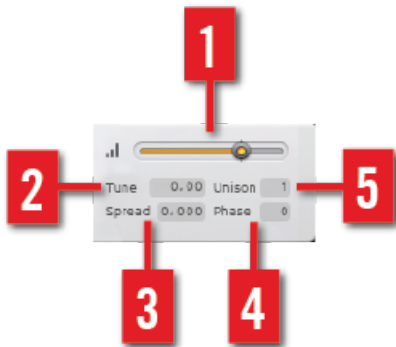
7.5.5.1    Aftertouch Modulation Assignment Target List

Modulation Target	Description of Target Parameter
DRAMA	Macro Control
COLOR 1	Macro Control
COLOR 2	Macro Control
LOUDNESS	Macro Control

7.6        Global Settings Section

This section contains the controls for the master level and tuning and for the unison mode. In this mode more than one voice will be assigned to a note that is played. These voices can be detuned against each other and the resulting sound becomes rich, as if an ensemble is playing the note.

Global Settings Parameters



View B—Global parameters

(1) **Volume:** The Volume level control is stored with each Snapshot. It affects the signal after the effects chain and before it is limited by the soft clipper at the output of the instrument. The soft clipper prevents levels higher than 0 dB full scale, which would be hard clipped at the sound card output. The red bar shows the amount of saturation in the soft clipper. It should only appear when playing really loud.

(2) **Tune:** Global pitch transpose and fine tune (in semitones). At zero the indicated oscillator pitches are identical to the MIDI note numbers.

(3) **Spread:** Pitch offset between unison voices (in semitones).

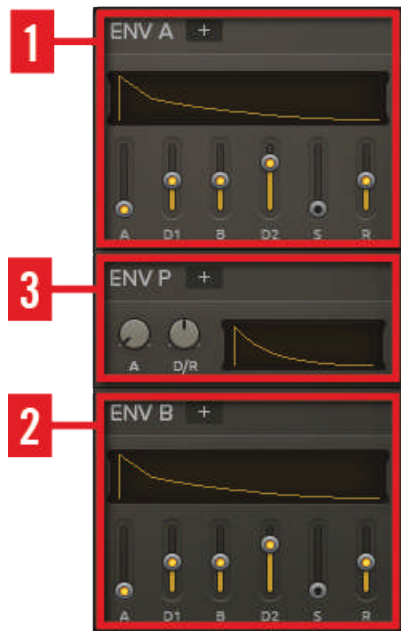
(4) **Phase:** Offset between the start phases of the oscillators of the unison voices. Normally all voices start at the same phase. With unison this leads to a phase sweep at the beginning of each note. This can be reduced by the phase offset. At 100% the start phases are spread to a maximum of 360 degrees.

(5) **Unison:** The number of unison voices, which are assigned when playing a key, is adjustable here. At 1 the unison effect is off.

## 7.7 ENV Sections

KONTour has three envelopes, these consist of two **ADBDsr** envelopes labeled **ENV A** and **ENV B** and an **AD** envelope labeled **ENV P**. **ENV A** controls the amplitude of Oscillator **A** and Shaper **A**. **ENV B** controls the amplitude of Oscillator **B** and Shaper **B**. **ENV P** is independent and can be used to modulate oscillator pitches and filter frequencies.

## Envelope Overview



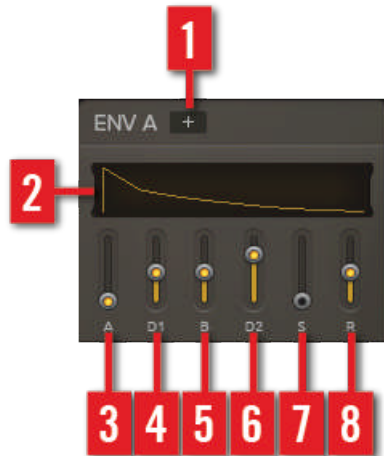
View B—Overview of the Envelope A, Envelope B and Envelope P section

- (1) **ENV A**: Controls the signals of Oscillator **A** and Shaper **A**.
- (2) **ENV B**: Controls the signals of Oscillator **B** and Shaper **B**.
- (3) **ENV P**: Controls the modulation of the oscillator pitches and filter frequencies.

### 7.7.1 ENV A

This envelope controls the signals of Oscillator and Shaper A. It has full control over their output level and can have adjustable influences on the phase modulation amounts by their signal and the amount of distortion in the shaper. For better control of percussive sounds the decay phase is split into **D1** and **D2** with an adjustable breakpoint level **B**.

The levels and the attack time can be influenced by MIDI Note-On Velocity and the release time by Note-Off Velocity. The levels and times depend on the key position by an amount that can be adjusted by the key tracking parameters.



View B—Envelope A parameters

(1) **Modulation Target button:** Shows the modulation targets and amounts for Envelope A.

(2) **ENV Display:** Visual display of the envelope.

(3) **A (Attack):** Adjusts the time it takes after a key is pressed for the envelope signal to climb from zero to its peak level. The Attack segment has a linear shape.

Due to a logarithmic scaling (in dB\_ms) the values:

-20 .. 0 .. 20 .. 40 .. 60 .. 80

result in the following times:

0.1 .. 1 .. 10 .. 100 .. 1000 .. 10000 ms.

(4) **D1 (First Decay):** Adjusts the time it takes for the envelope signal to fall from the peak level to the Breakpoint level. This decay segment has a linear shape.

Due to a logarithmic scaling (in dB\_ms) the values:

0 .. 20 .. 40 .. 60 .. 80

result in the following times:

1 .. 10 .. 100 .. 1000 .. 10000 ms.

(5) **B** (Breakpoint): Sets the level of the breakpoint where the First Decay segment ends and the Second Decay segment starts.

(6) **D2** (Second Decay): Adjusts the time it takes for the envelope signal to fall from the Breakpoint level to the Sustain level. This decay segment has an exponential shape.

Due to a logarithmic scaling (in dB<sub>ms</sub>) the values:

0 .. 20 .. 40 .. 60 .. 80

result in the following times:

1 .. 10 .. 100 .. 1000 .. 10000 ms.

(7) **S** (Sustain): Sets the level that the envelope remains at while the key is held down, after the Second Decay time has expired.

(8) **R** (Release): Adjusts the time it takes for the envelope signal to fall from the Sustain level to zero once the key is released. The Release segment has an exponential shape.

Due to a logarithmic scaling (in dB ms) the values:

0 .. 20 .. 40 .. 60 .. 80:

result in the following times:

1 .. 10 .. 100 .. 1000 .. 10000 ms.

### 7.7.1.1 Envelope A Assignments

1. Select the ENV A assignment button.



The available parameters will be highlighted.





2. Click on the highlighted label of the parameter you want to set, and drag the mouse up to set the modulation range, or drag the mouse down to inverse the polarity of the modulation. Repeat this action for each of the available parameters you want to modulate.



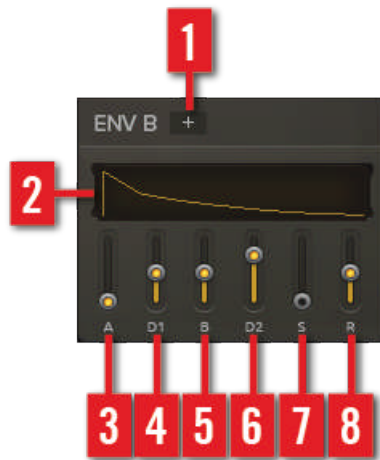
7.7.1.2 Envelope A Modulation Assignment Target List

Modulation Target	Description of Target Parameter
OSC A: PM SELF	Amount of modulation by Envelope B. At zero, PM Self stays constant; at higher values, the envelope applies a time-variant attenuation.
OSC B: PM A	Amount of phase modulation by Oscillator and Shaper A Amount of modulation from Envelope A. At zero, the PM A remains constant; at higher values, the envelope applies a time-variant attenuation.
SHAPER A: DRIVE	Gain for the input signal of the Shaper. Driving the shaper with higher gains will deliver stronger distortion. Amount of the modulation of the Drive gain from Envelope A. At zero, the gain stays constant; at higher values the envelope applies a time-variant attenuation.
OSC + SHAPER A level	The envelope applies always 100%—no amount parameter.

7.7.2 ENV B

Envelope B controls the signals of Oscillator B and Shaper B. It has full control over their output level and can have adjustable influences on the phase modulation amounts by their signal and the amount of distortion in the shaper. For a better control of percussive sounds the decay phase is split into D1 and D2 with an adjustable breakpoint level B.

The levels and the attack time can be influenced by MIDI Note-On Velocity and the release time by Note-Off Velocity. The levels and times depend on the key position by an amount that can be adjusted by the key tracking parameters.



View B—Envelope B parameters

(1) **Modulation Target button:** Shows the modulation targets and amounts for Envelope B.

(2) **ENV Display:** Visual display of the envelope for various targets.

(3) **A (Attack):** Adjusts the time it takes after a key is pressed for the envelope signal to climb from zero to its peak level. The Attack segment has a linear shape.

Due to a logarithmic scaling (in dB\_ms) the values:

-20 .. 0 .. 20 .. 40 .. 60 .. 80

result in the following times:

0.1 .. 1 .. 10 .. 100 .. 1000 .. 10000 ms.

(4) **D1 (First Decay):** Adjusts the time it takes for the envelope signal to fall from the peak level to the Breakpoint level. This decay segment has a linear shape.

Due to a logarithmic scaling (in dB\_ms) the values:

0 .. 20 .. 40 .. 60 .. 80

result in the following times:

1 .. 10 .. 100 .. 1000 .. 10000 ms.

(5) **B** (Breakpoint): Sets the level of the breakpoint where the First Decay segment ends and the Second Decay segment starts.

(6) **D2** (Second Decay): Adjusts the time it takes for the envelope signal to fall from the Breakpoint level to the Sustain level. This decay segment has an exponential shape.

Due to a logarithmic scaling (in dB\_ms) the values:

0 .. 20 .. 40 .. 60 .. 80

result in the following times:

1 .. 10 .. 100 .. 1000 .. 10000 ms.

(7) **S** (Sustain): Sets the level that the envelope remains at while the key is held down, after the Second Decay time has expired.

(8) **R** (Release): Adjusts the time it takes for the envelope signal to fall from the Sustain level to zero once the key is released. The Release segment has an exponential shape.

Due to a logarithmic scaling (in dB ms) the values:

0 .. 20 .. 40 .. 60 .. 80:

result in the following times:

1 .. 10 .. 100 .. 1000 .. 10000 ms.

### 7.7.2.1 Envelope B Assignments

1. Select the ENV B assignment button.



The labels of the available parameters will be highlighted.



- Click on the highlighted label of the parameter you want to set, and drag the mouse up to set the modulation range, or drag the mouse down to inverse the polarity of the modulation. Repeat this action for each of the available parameters you want to modulate.



### 7.7.2.2 Envelope B Modulation Assignment Target List

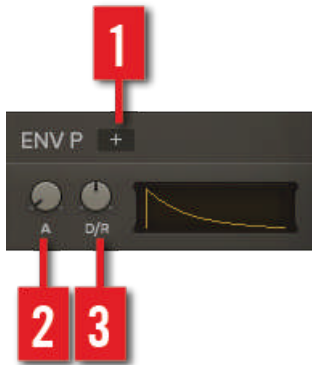
Modulation Target	Description of Target Parameter
OSC B: PM SELF	Amount of modulation by Envelope B. At zero, <b>PM Self</b> stays constant; at higher values, the envelope applies a time-variant attenuation.
OSC A: PM B	Amount of phase modulation by Oscillator and Shaper A Amount of modulation from Envelope B. At zero, the <b>PM A</b> remains constant; at higher values, the envelope applies a time-variant attenuation.
SHAPER B: DRIVE	Gain for the input signal of the Shaper. Driving the shaper with higher gains will deliver stronger distortion. Amount of the modulation of the Drive gain from Envelope B. At zero, the gain stays constant; at higher values the envelope applies a time-variant attenuation.
OSC + SHAPER B level	The envelope applies always 100%—no amount parameter.

### 7.7.3 ENV P

This envelope is dedicated to the modulation of the oscillator pitches and the filter frequencies. Since a sustain phase is not needed, it has only two segments: attack (A) and decay (D/R). The decay phase typically will be continued when the key is released, while the decay rate

can be influenced by MIDI Note-Off Velocity similar to the release of [Env A](#) and [Env B](#). The envelopes parameters for the velocity and key tracking sensitivities are the same as in the other envelopes.

### ENV P Parameters



View B—Envelope P parameters

- (1) **Modulation Target button:** Shows the modulation targets and amounts for Envelope P.
- (2) **A:** Attack time (logarithmic scaling: dB ms)
- (3) **D/R:** Decay and Release times (logarithmic scaling: dB ms). They are identical unless the release time is influenced by the Note-Off velocity.

### 7.7.3.1 Envelope P Assignments

1. Select the ENV P assignment button.



The labels of the available parameters will be highlighted.



- Click on the highlighted label of the parameter you want to set, and drag the mouse up to set the modulation range, or drag the mouse down to inverse the polarity of the modulation. Repeat this action for each of the available parameters you want to modulate.



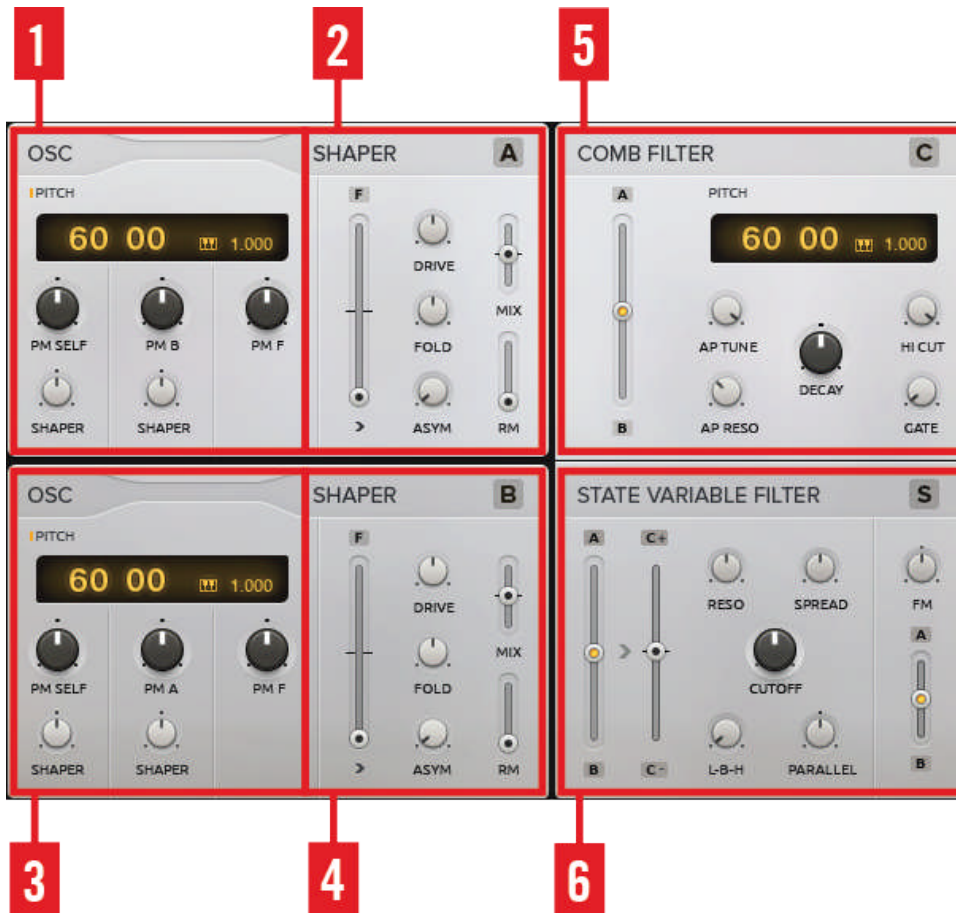
### 7.7.3.2 Envelope P Modulation Assignment Target List

Modulation Target	Description of Target Parameter
OSC A: PITCH	Oscillator pitch. Amount of pitch modulation by Envelope P [in semitones].
OSC B: PITCH	Oscillator pitch. Amount of pitch modulation by Envelope P [in semitones].
COMB FILTER: PITCH	Comb Filter pitch. Amount of pitch modulation by Envelope P [in semitones].
COMB FILTER: AP TUNE	Center frequency of the 2-pole allpass filter in the signal loop of the Comb Filter. Amount of modulation from Envelope P [in semitones].
S. V. FILTER: CUTOFF	Filter cutoff frequency. Amount of modulation by the pitch envelope [in semitones].

## 7.8 Synth Engine Sections

The View B Synth Engine section of KONTOUR contains the controls for sound generation.





View B—Synth Engine section

- (1) **OSC A**: This is one of the two sine oscillators which form the audio signal sources of the synthesizer.
- (2) **SHAPER A**: The Shaper is a distortion (wave shaping) unit that is based on a sine curve.
- (3) **OSC B**: This is one of the two sine oscillators which form the audio signal sources of the synthesizer.
- (4) **SHAPER B**: The Shaper is a distortion (wave shaping) unit that is based on a sine curve.

(5) **COMB FILTER**: This is a filter that is based on a delay and an allpass. It can be used for complex spectral shaping or as a resonator.

(6) **STATE VARIABLE FILTER**: This is a flexible multi-mode filter for the more analog-style subtractive filtering.

### 7.8.1 Oscillator A

This is one of the two sine oscillators which form the audio signal sources of the synthesizer. The oscillator has a phase modulation input that can be driven by three signals: its own output signal (**PM SELF**), the signal from the other oscillator (**OSC B**) and the signal from the feedback path (**PM F**).

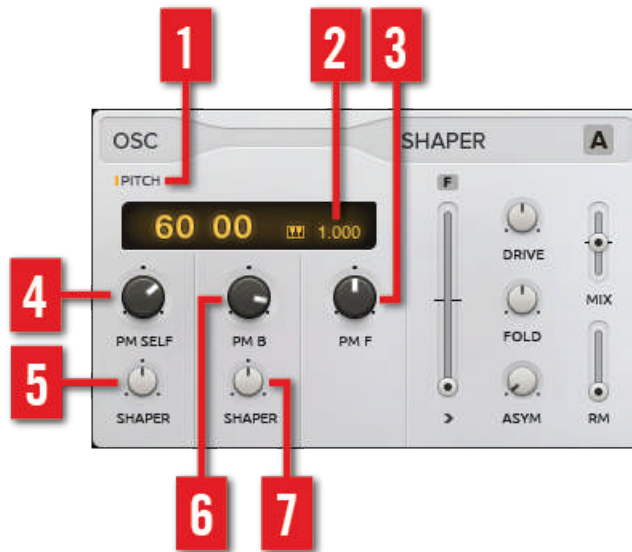
The effect of phase modulation depends very much on the frequency relation between the oscillator and the modulating signal. If both frequencies belong to a harmonic series, the result is a harmonic sound with additional overtones. If the frequencies are not in a harmonic relation the resulting sound can become metallic or atonal.

A pure self-modulation will modify the sine wave to become similar to a sawtooth. The most complex results are achieved with cross-modulation, where both oscillators modulate each other.

Since the oscillator's frequency is set by a pitch value in semitones, the resulting ratios can be derived from the pitch difference (e.g. 12 st = 2:1, 7 st = 3:2, 19 st = 3:1).

As very low frequencies and even 0 Hz can deliver interesting results, the low end of the (originally logarithmic) pitch range is bent/shaped in such a way that it starts at 0 Hz at a pitch setting of -20.

If the key tracking of the oscillators is set to different values the ratio between their frequencies will depend on the key position, which can be used for a subtle influence on the beating rate, drastic atonal behaviour or fixed frequency components.



View B—Oscillator A parameters

- (1) **PITCH**: Coarse and fine pitch of the oscillator at C3 (MIDI note 60) in semitones, based on MIDI note numbers. The range below zero is shaped in the way that -20 corresponds to 0 Hz.
- (2) **Key Tracking**: Key tracking of the oscillator pitch. This is the scaling factor between the key position of a received MIDI note (relative to C3=60) and the pitch of the oscillator. At 1.0 the pitch follows the equal temperament scale. Larger values result in a stretched tuning. At 0.5 the result is a quartertone scale and at 0.0 the oscillator pitch is constant for all keys.
- (3) **PM F**: Amount of phase modulation from the Feedback (F) signal.
- (4) **PM SELF**: Amount of phase modulation by Oscillator and Shaper A (local feedback).
- (5) **SHAPER**: Mix amount of Shaper A in the signal being used for **PM Self**. At zero, the direct output signal of Oscillator A is used. At negative values the signal from the Shaper is inverted.
- (6) **PM B**: Amount of phase modulation by Oscillator and Shaper B.
- (7) **SHAPER**: Mix amount of Shaper B in the signal being used for **PM B**. At zero, the direct output signal of Oscillator B is used. At negative values the signal from the Shaper is inverted.

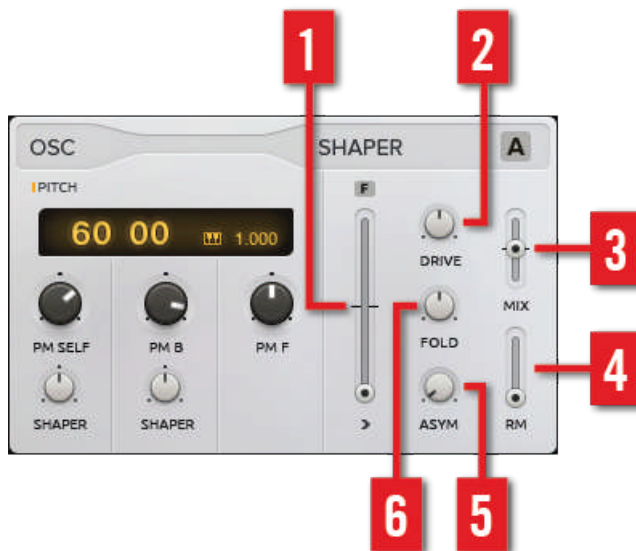
## 7.8.2 Shaper A

The Shaper is a distortion (wave shaping) unit that is based on a sine curve. You can also see it as a phase modulation of a sine oscillator that is standing still (at 0 Hz). It is a flexible tool for creating overtones.

For small input signals the curve is nearly linear. When the input gain (DRIVE) is increased, the signal is softly saturated and when it has reached the peak of the sine it will start to fold back. For high gains the folding will repeat due to the periodic shape of the sine function. With a sine wave at the input the result can sound like from a resonant filter.

Since the folding adds some characteristic color, its amount can be controlled. If you set it to zero the signal is just fully saturated at the peak of the sine. Another important property of a distortion curve is its (a)symmetry. It determines if more of the odd or more of the even harmonics are created.

With the **MIX** slider at the output of the Shaper you can crossfade between the undistorted input signal and the result of the wave shaping, to set the right amount of additional overtones. Like with many other bipolar mix controls in KONTOUR it can have a significant effect on the sound if the mix is using the inverted signal.



### View B—Shaper A parameters

- (1) **F**: The input signal of the Shaper is the result of a crossfade between Oscillator A and the Feedback (**F**) signal.
- (2) **DRIVE**: Gain for the input signal of the Shaper. Driving the shaper with higher gains will deliver stronger distortion.
- (3) **MIX**: Mix amount of the shaped (distorted) signal at the output of the Shaper. At zero (center position), no shaper signal is added to the oscillator/feedback mix. At negative values, the shaped signal in the mix is inverted.
- (4) **RM**: Mix amount for the ring modulation product (Oscillator and Shaper A x Oscillator and Shaper B) in signal A.
- (5) **ASYM**: Asymmetry of the shaper curve, generating even (2nd, 4th, ...) harmonics.
- (6) **FOLD**: Amount of folding back of the shaper curve for high input amplitudes. 0%: flat saturation, no folding; 100%: fully folded back, periodic sine curve. Higher amounts of folding lead to a softer but more nasal sound.

## 7.8.3 Oscillator B

This is one of the two sine oscillators which form the audio signal sources of the synthesizer. The oscillator has a phase modulation input that can be driven by three signals: the own output signal (**PM SELF**), the signal from the other oscillator (**OSC A**) and the signal from the feedback path (**PM F**).

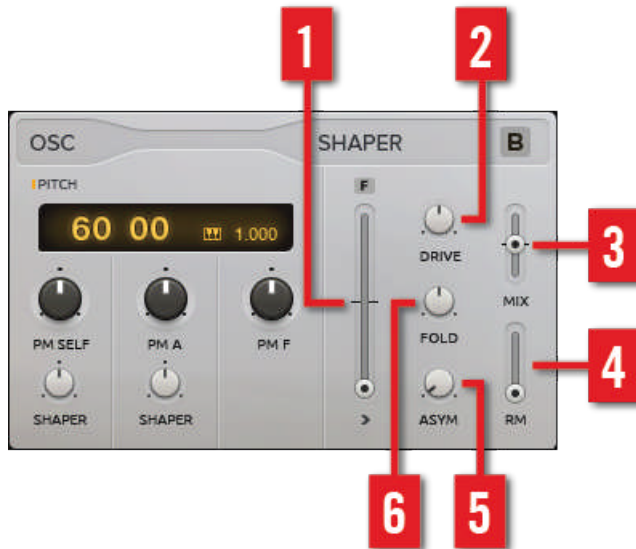
The effect of phase modulation depends very much on the frequency relation between the oscillator and the modulating signal. If both frequencies belong to a harmonic series, the result is a harmonic sound with additional overtones. If the frequencies are not in a harmonic relation the resulting sound can become metallic or atonal.

A pure self-modulation will modify the sine wave to become similar to a sawtooth. The most complex results are achieved with cross-modulation, where both oscillators modulate each other.

Since the oscillator's frequency is set by a pitch value in semitones, the resulting ratios can be derived from the pitch difference (e.g. 12 st = 2:1, 7 st = 3:2, 19 st = 3:1)

As very low frequencies and even 0 Hz can deliver interesting results, the low end of the (originally logarithmic) pitch range can be bent in such a way that it starts at 0 Hz at a pitch setting of -20.

If the key tracking amounts of the oscillators are set to different values the ratio between their frequencies will depend on the key position, which can be used for a subtle influence on the beating rate, drastic atonal behavior or fixed frequency components.



View B—Oscillator B parameters

(1) **PITCH**: Coarse pitch of the oscillator at C3 (MIDI note 60) in semitones, based on MIDI note numbers. The range below zero is shaped in the way that -20 corresponds to 0Hz.

(2) **Key Tracking**: Key tracking of the oscillator pitch. This is the scaling factor between the key position of a received MIDI note (relative to C3=60) and the pitch of the oscillator. At 1.0 the pitch follows the equal temperament scale. Larger values result in a stretched tuning. At 0.5 the result is a quartertone scale and at 0.0 the oscillator pitch is constant for all keys.

(3) **PM F**: Amount of phase modulation by Oscillator B and Shaper B (local feedback)

(4) **PM SELF**: Amount of phase modulation by Oscillator B and Shaper B (local feedback).

(5) **SHAPER**: Mix amount of Shaper B in the signal being used for **PM Self**. At zero, the direct output signal of Oscillator B is used. At negative values the signal from the Shaper is inverted.

(6) **PM A**: Amount of phase modulation by Oscillator and Shaper A.

(7) **SHAPER**: Mix amount of Shaper B in the signal being used for **PM B**. At zero, the direct output signal of Oscillator B is used. At negative values the signal from the Shaper is inverted.

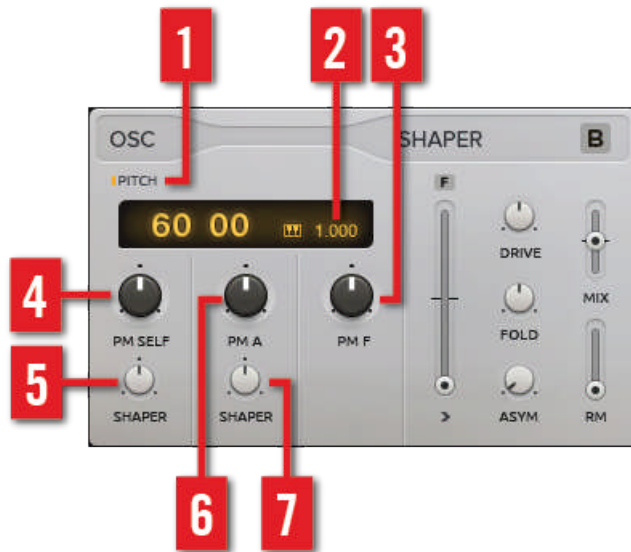
### 7.8.4 Shaper B

The Shaper is a distortion (wave shaping) unit that is based on a sine curve. You can also see it as a phase modulation of a sine oscillator that is standing still (at 0 Hz). It is a flexible tool for creating overtones.

For small input signals the curve is nearly linear. When the input gain (**DRIVE**) is increased, the signal is softly saturated and when it has reached the peak of the sine it will start to fold back. For high gains the folding will repeat due to the periodic shape of the sine function. With a sine wave at the input the result can sound like from a resonant filter.

Since the folding adds some characteristic color, its amount can be controlled. If you set it to zero the signal is just fully saturated at the peak of the sine. Another important property of a distortion curve is its (a)symmetry. It determines if more of the odd or more of the even harmonics are created.

With the **MIX** slider at the output of the Shaper you can crossfade between the undistorted input signal and the result of the wave shaping, to set the right amount of additional overtones. Like with many other bipolar mix controls in KONTOUR it can have a significant effect on the sound if the mix is using the inverted signal.



View B—Shaper B parameters

- (1) **F**: The input signal of the Shaper is the result of a crossfade between Oscillator B and the Feedback (**F**) signal.
- (2) **DRIVE**: Gain for the input signal of the Shaper. Driving the shaper with higher gains will deliver stronger distortion.
- (3) **FOLD**: Amount of folding back of the shaper curve for high input amplitudes. 0 %: flat saturation, no folding; 100 %: fully folded back, periodic sine curve. Higher amounts of folding lead to a softer but more nasal sound.
- (4) **ASYM**: Asymmetry of the shaper curve, generating even harmonics (2nd, 4th, ...).
- (5) **MIX**: Mix amount of the shaped (distorted) signal at the output of the Shaper. At zero (center position), no shaper signal is added to the oscillator/feedback mix. At negative values, the shaped signal in the mix is inverted.
- (6) **RM**: Mix amount for the ring modulation product (Oscillator and Shaper A x Oscillator and Shaper B) in signal B.



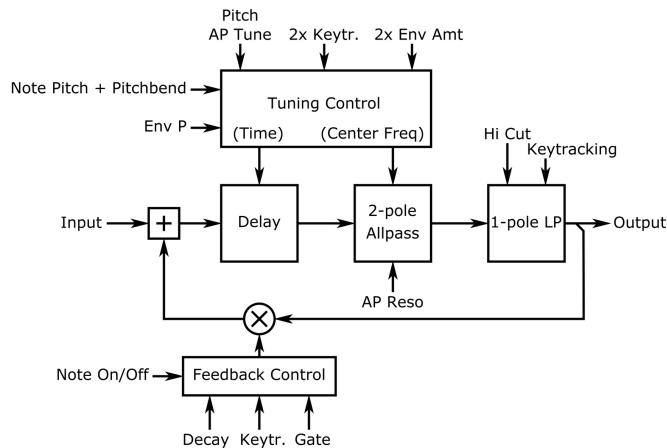
### 7.8.5 Comb Filter

This component has a large potential for sound design. It can work as a complex filter with many peaks and dips (that's where its name comes from) or create resonant oscillations that are similar to those of physical systems.

The core of it is a digital delay with feedback where the delay time is comparable to the period of an oscillator and therefore can be tuned to an exact pitch. The amount of feedback determines how long the content of the delay line is repeated. This decay time can also be interpreted as the amount of resonance that the filter adds to the input signal.

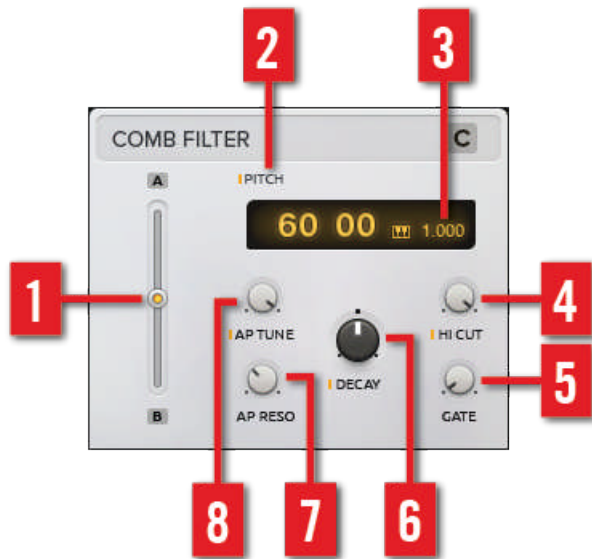
With larger decay times the comb filter converts short pulses into tuned sounds. Therefore it has the same pitch control elements like the oscillators. With the Gate parameter you can damp the sound, when the key is released.

In the signal path and feedback loop of the comb filter there are two filters: a low-pass (controlled by **HI CUT**) that can be adjusted to let the higher frequencies decay faster and an all-pass (**AP TUNE** and **AP RESO**) that makes the delay time dependent on the frequency and by this creates inharmonic partials in the response of the comb filter. When the pitch for the delay is set to the maximum of 120, the delay line is bypassed and you have the pure effect of the allpass, e.g. for phaser effects.



Signal Flow diagram of the Comb Filter

## Comb Filter Parameters



View B—Comb Filter parameters

- (1) **A/B**: The input signal of the Comb Filter is a crossfade between signal **A** and **B** (from the Oscillators & Shapers)
- (2) **PITCH**: Coarse pitch of the resonant oscillations in the tuned delay line of the Comb Filter in semitones, based on MIDI note numbers. Fine pitch of the resonant oscillations in the tunable delay of the Comb Filter in fractions of a semitone.
- (3) **Key Tracking**: Key tracking of the pitch. It's the scaling factor between the key position of a received MIDI note (relative to C3=60) and the pitch of the comb filter. At 1.0 the pitch follows the equal temperament scale. At values slightly larger than 1.0 you get a stretched tuning. At 0.0 the oscillation frequency is independent from the note pitches.
- (4) **HI CUT**: Cutoff frequency of the low-pass filter in the signal loop of the Comb Filter. It dampens the higher frequencies so that they decay faster than the fundamental.
- (5) **GATE**: Amount of gating applied to the decay time. It reduces the decay time when the key is released (note-off). 0%: same decay time in the release phase; 100%: the decay time is set to zero at the release of the key.

(6) **DECAY**: Amount of the internal feedback noticeable as the decay time of the impulse response (logarithmic scaling: dB\_ms). At negative values, the feedback signal is inverted, which shifts the fundamental resonance down by one octave.

(7) **AP RESO**: Resonance of the 2-pole all-pass. Determines how steep the phase shift rises around the center frequency.

(8) **AP TUNE**: Center frequency of the 2-pole all-pass filter in the signal loop of the Comb Filter (in semitones). This is the frequency where the phase is shifted by 180 degrees. At the maximum position (140 st) the all-pass has no effect.

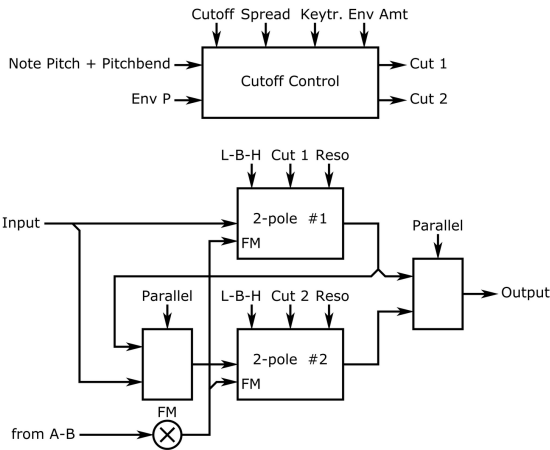
### 7.8.6 State Variable Filter

This is a 4-pole filter that can sound similar to filters which you find in analog synths. For greater flexibility it is built from a combination of two 2-pole filters.

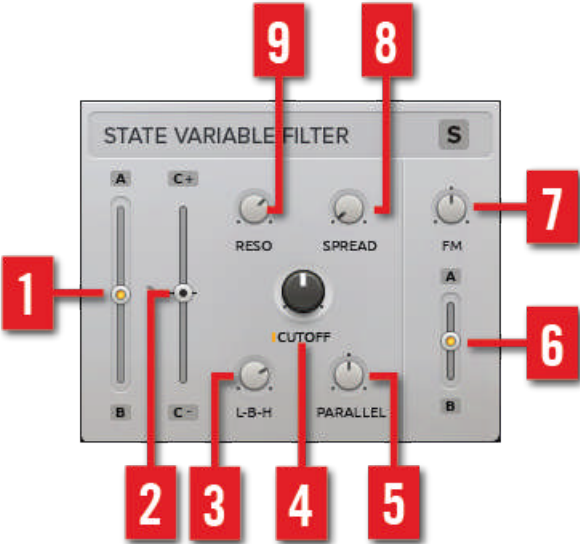
The two filter blocks can be set to different cutoff frequencies by the **SPREAD** parameter. The spreading of the cutoffs produces two resonance peaks instead of one stronger peak. This can sound a bit like the formants of the human voice.

With **PARALLEL** the signal flow to and from the 2-pole filters can be continuously faded from a serial to a parallel mode. In the serial mode you get the steep 24 dB/octave response of a 4-pole filter. The parallel mode can also use inverted signals, which will cancel out part of the frequencies.

Another strong flexibility is provided by the crossfade between low-pass, bandpass and high-pass mode (**L-B-H**). In addition the sound character of the filter can be influenced by an audio signal modulating the cutoff frequency (**FM**). The source signal for this is a separate mix between the signals **A** and **B**.



Signal flow diagram of the State Variable Filter



View B—State Variable Filter

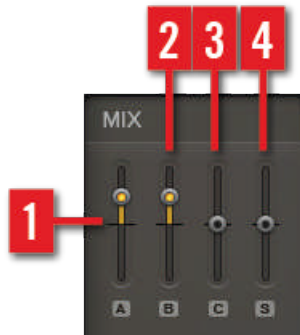
(1) A/B: Crossfade between signal A and B (from the Oscillators & Shapers).

- (2) **C+/C-**: The input signal of the filter is a mix of the signals from the **A-B** crossfader and from the Comb Filter (**C**). At the center position the **C** signal is not in the mix. By negative mix amounts it is inverted.
- (3) **L-B-H**: Crossfades between the low-pass, bandpass and high-pass outputs of the two filter stages.
- (4) **CUTOFF**: Filter cutoff frequency (in semitones) at C3=60. Applies to both stages of the filter. The offset between their individual cutoffs is controlled by **SPREAD**.
- (5) **PARALLEL**: Amount of modulation of the cutoff frequencies by the output signals of Oscillator and Shaper A and B, with the A-B crossfader below determining the mix of the modulating signal.
- (6) **A/B**: The modulating signal for the FM of the Cutoff is a result of a crossfade between the outputs of Oscillator and Shaper A and Oscillator and Shaper B.
- (7) **FM**: Amount of modulation of the cutoff frequencies by the output signals of Oscillator and Shaper A and B, with the A-B crossfader below determining the mix of the modulating signal.
- (8) **SPREAD**: Offset between the cutoffs of the two 2-pole filters (in semitones). It can be used to reduce the strong resonance peak in the serial mode and to get a filter curve with two formants in the parallel mode.
- (9) **RESO**: Amount of filter resonance, creating peaks at the cutoff frequencies.

## 7.9 MIX

The settings of this mixer determines which of the four different signals of the synthesizer engine or which combination of them is sent to the synthesizer's output. You can mix components of a sound, and by combining filtered and unfiltered signals you will emphasize partials that are in-phase while canceling out frequencies that are out-of-phase. That is why different results are attained from positive and negative fader positions.

## Mix Parameters



View B—Mix parameters

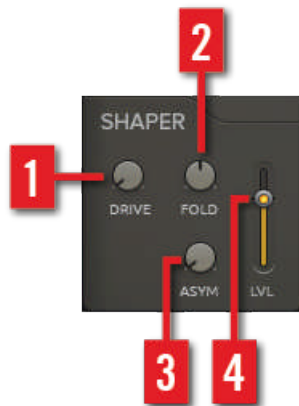
The Mix section contains the following parameters:

- (1) **A** (Oscillator A and Shaper A): Output mix factor for the direct output of Oscillator A and Shaper A.
- (2) **B** (Oscillator B and Shaper B): Output mix factor for the direct output of Oscillator B and Shaper B.
- (3) **C** (Comb Filter): Output mix factor for the output of the Comb Filter. With negative mix amounts the filter signal is inverted and cancellation frequencies are shifted.
- (4) **S** (State Variable Filter): Output mix factor for the output of the State Variable Filter. With negative mix amounts the filter signal is inverted and cancellation effects are different.

## 7.10 SHAPER

The output mixer is connected to a sine shaper of the same type like in use with the two oscillators. Here you can saturate or fold the output signal and by this compress it or add harmonics, e.g. to a filtered signal. The **DRIVE** gain influences the amount of wave shaping while **LVL** is the final volume control after the shaper.

## Shaper Parameters



View B—Shaper Parameters

- (1) **DRIVE** Input gain of the sine shaper stage. Higher gains will create more distortion and harmonics.
- (2) **FOLD** Amount of folding back of the shaper curve for high input amplitudes. 0%: flat saturation, no folding; 100%: fully folded back, periodic sine curve. Higher amounts of folding lead to a softer but more nasal sound.
- (3) **ASYM** (Asymmetry): Asymmetry of the shaper curve, generating even harmonics (2nd, 4th, ...).
- (4) **LVL** (Level): Output level of KONTOUR. This signal will be processed by the effects.

## 7.11 FEEDBACK

Similar to the output mixer the feedback mixer gives a lot of freedom to decide which signal or combination of signals is passed to the feedback bus. Feedback sources are the two filters and the end of the effect chain, where the amount of reverb is separately adjustable.

For the feedback behaviour the phases of the signals are extremely important. They can be inverted easily by the bipolar mix sliders.

## Feedback Parameters



View B—Feedback parameters

The Feedback section contains the following parameters:

- (1) **C** (Comb Filter): Feedback mix factor for the output of the Comb Filter.
- (2) **S** (State Variable Filter): Feedback mix factor for the output of the State Variable Filter.
- (3) **FX** (Effect): Feedback mix factor for the output of the effects chain. The reverb amount in the feedback can be set by **REV** independently. Since the effect chain is monophonic such feedback will cause intermodulation between the voices.
- (4) **REV** (Reverb): Controls the amount of reverb in the feedback independently from the **MIX** in the Reverb section: 0%: dry, no reverb signal, 100%: fully wet, reverb signal only.

## 7.12 Effects Section

Here you find five effects that process the output signal of the synthesizer. They can change the sound drastically by distortion or filtering, for example, or just add some subtle stereo width or room reflections.



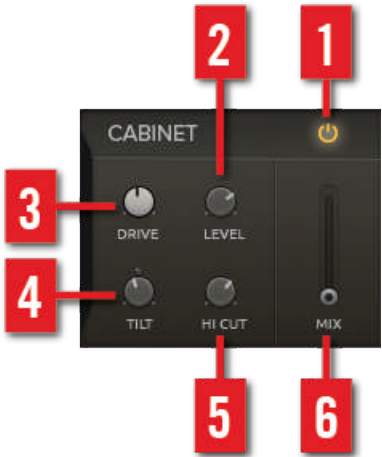


View B—Effects section.

### 7.12.1 Cabinet Section

The Cabinet is an advanced distortion effect. Since it is applied to the sum of the voices you will get intermodulation distortion when playing more than one note at a time. This can sound similar to a guitar amp.

The color of the distorted signal is adjustable by the **TILT** parameter that controls two filters in the internal signal chain of the Cabinet and by **HI CUT** that controls a steep filter at the output, that has a similar frequency response like a speaker cabinet.



View B—Cabinet parameters.

(1) **Effect Switch:** Toggles between the active state and the bypass of the Cabinet.

- (2) **LEVEL**: Controls the output level of the saturation effect before it is mixed with the dry signal.
- (3) **DRIVE**: Gain for the input signal. Higher gains will increase the amount of distortion/saturation.
- (4) **TILT**: Controls two inverted shelving EQs before and after the distortion stage. To the left: less intermodulation by low frequencies and softer sound. To the right: more intermodulation and harsher sound.
- (5) **HI CUT**: Cutoff frequency (in semitones) of the low-pass filter at the output.
- (6) **MIX**: Crossfades between the dry signal and the saturated signal.

### 7.12.2 Gap Filter Section

The Filter effect structure comprises four 4-pole filters: each stereo channel has a 4-pole low-pass filter and a 4-pole high-pass filter. The cutoff frequencies of the low-pass and high-pass filters are offset from a reference cutoff frequency. This offset is controlled by the **GAP** parameter. Since the two filters are running in parallel and their output signals are mixed, the result of a positive **GAP** value is a band rejection. With a negative **GAP** value the pass bands of both filters are overlapping so that all frequencies can pass and the overlapping range is emphasized.

The **BALANCE** determines the mix between low-pass and high-pass and makes it also possible to run the unit as a pure low-pass or high-pass.

## Gap Filter Parameters



View B—Filter parameters

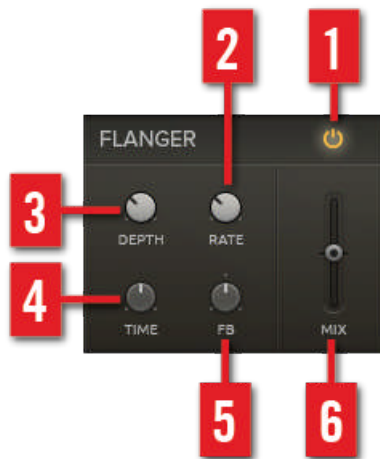
- (1) **Effect Switch:** Toggles between the active state and the bypass of the Filter.
- (2) **GAP:** Sets the average center frequency of the gaps in both channels [in semitones].
- (3) **L/R:** Sets the difference between the cutoff frequencies of the left and of the right channel.
- (4) **CENTER:** Shifts the mean cutoff frequency of both 4-pole filters on both channels up or down (Hz).
- (5) **STEREO:** Sets the difference between the cutoff frequencies in the left and right channel [in semitones].
- (6) **BALANCE:** Balance between the output levels of the low-pass filter and the high-pass filter. In the center position both filters are equally weighted. Turning the knob to the left boosts the lower range and attenuates the higher range, turning the knob to the right has the opposite effect.
- (7) **MIX:** Crossfades between the dry signal and the filtered signal.

### 7.12.3 Flanger Section

Flanger produces a spacey whooshing sound due to a mix of the original signal and one processed with a constantly varying delay time. The basic delay can be adjusted. Longer times give more the "chorus" type of effect, shorter times an effect known as "flanging".

The feedback emphasizes the resonant peaks. A static comb filter is provided when the modulation depth is set to zero.

#### Flanger Parameters



View B—Flanger parameters

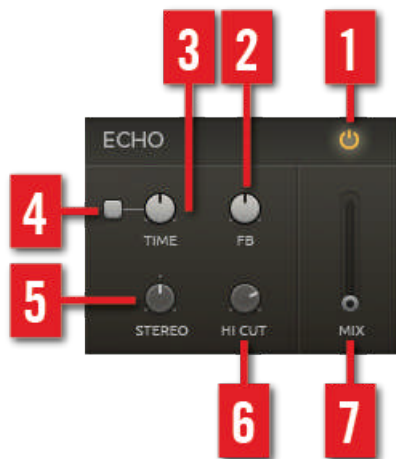
- (1) **Effect Switch:** Toggles between the active state and the bypass of the Flanger.
- (2) **RATE:** Frequency (Hz) of the modulation LFO. In the left position there is no modulation, to the right there is full modulation.
- (3) **DEPTH:** Relative amount of the LFO modulation applied to the delay lines.
- (4) **TIME:** Delay time of the Flanger (in milliseconds). Longer times will result in a chorus effect. (5) **FB:** Amount of feedback. At negative values the feedback is inverted and will emphasize other frequencies than in the non-inverted mode.

(6) **MIX**: Crossfades between the dry signal and the delayed signal. At negative values the delayed signal is inverted.

### 7.12.4 Echo Section

Echo is a stereo delay with a low-pass filter. When the sync button is active, the delay time can be set as a multiple of the length of a tempo-synced beat.

#### Echo Parameters



View B—Echo parameters

(1) **Effect switch**: Toggles between the active state and the bypass of the Echo.

(2) **FB**: Amount of feedback from the delay output to its input.

(3) **TIME**: Mean delay time. As there can be an offset between the left and right channel, this control shows the mean value. When the **SYNC** button (4) is off the delay is adjustable in milliseconds, when it is on the value display shows the number of echoes per beat and the delay can be set only to certain multiples of the beat time.

(4) **Sync button**: When **SYNC** is on, the value display will display the rate of the echoes as a multiple of the BPM tempo.

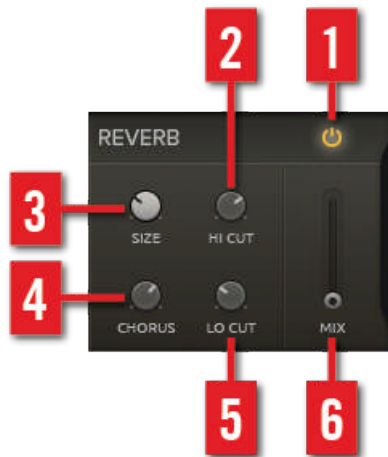
(5) **STEREO**: This factor allows to set different delay times for the left and right channel. It is the time offset of the right channel as a percentage of the value adjusted by Time. The left channel has the inverted time offset.

(6) **HI CUT**: Cutoff frequency of the filter that dampens the higher frequencies of the delayed signal.

(7) **MIX**: Crossfades between the dry signal and the delayed signal.

### 7.12.5 Reverb Section

Use this high quality reverberation unit to add more spatial depth to your sound. When the reverb is mixed to the feedback loop, the **CHORUS** parameter can be useful to adjust the amount of modulation in the reverb signal.



View B—Reverb parameters

#### Reverb Parameters

(1) **Effect switch**: Toggles between the active state and the bypass of the Reverb.

(2) **HI CUT**: Cutoff of the low-pass that dampens the higher frequencies of the reverberation signal.

(3) **SIZE**: Set the room size and reverb time.

- (4) **CHORUS**: This controls the internal modulation of the reverberation delays. At higher amounts there is more movement and the diffusion is smoother. At lower settings the reverb becomes more static and metallic.
- (5) **LO CUT**: Cutoff of the high-pass that damps the lower frequencies of the reverberation signal.
- (6) **MIX**: Crossfades between the dry signal and the reverberation signal.

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## 8 Credits

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Special thanks to Martijn Zwartjes, Mike Daliot, Brian Smith and the REAKTOR Team

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